1971-72 eem

electronic engineers master

Industry-wide catalog of electronic components, materials, equipment and services... in three distinct volumes

PRODUCT FINDER
Green Section

CATALOGS
White Section

MANUFACTURERS AND SALES OFFICES DIRECTORY
Yellow Section

TRADE NAME DIRECTORY
Volume 1, Page 957

Volume 1

test instruments equipment and systems

This volume contains pages 1-988

Section	Products	Starting Page
	Product Finder	3
	Index of Manufacturers' Catalogs	302
	Trade Name Directory	957
1200	Antennas & Accessories	307
1300	Audio Equipment & Accessories	308
1900	Communications Equipment (Facsimile, Telephone, Television)	322
2000	Computing, Data Handling Equipment & Accessories	328
2550	Environmental Test Equipment	388
2900	Instruments, Measuring & Test	391
3000	Instruments, Graphic Recording	587
3400	Microwave, Laser & Radar (Systems & Subsystems)	598
4000	Power Supplies, Converters, Inverters, Batteries, etc.	616
4100	Production Machinery & Automation Equipment	947
4300	Recording Equipment (Non-Audio Types)	950
5000	Studio Equipment	951
5200	Telemetering Equipment	953

Price: $20.00

How to use eem

to find manufacturers of a specific product

GREEN SECTION

PRODUCT INDEX & DIRECTORY

Absorbers, Microwave
Carborundum Co., Niagara Falls, N.Y.p 2100
Waveline, Inc., W. Caldwell, N.J.
Astrolab Inc., Linden, N.J.
Basic Ceramics Inc., Hawthorne, N.J.
Blocksom & Co., Michigan City, Ind.
Coax Devices Inc., Chelsea, Mass.
Custom Components, Inc., Caldwell, N.J.
Custom Materials, Inc., Chelmsford, Mass.,
Emerson & Cuming, Inc., Canton, Mass.
Goodyear Aerospace Corp., Akron, Ohio
Lieco, Inc., Lindenhurst, N.Y.
Magnetic Core Corp., Newburgh, N.Y.

Accelerometers—See Vol 2

Acoustic Materials—See Materials, Acoustic—Vol 3

Adapters, Waveguide
Hewlett-Packard, Palo Alto ... p 1071
Dittmore-Freimuth Corp., Milwaukee, Wisc.
Electrn. Specialty, Thomaston, Conn.
Gaude Inds., Inc., Sun Valley, Calif.
Hughes Aircraft Co., Culver City, Cal.
Kevlin Mfg. Co., Woburn, Mass.
Maury Microwave Corp., Cucamonga, Calif.

Alarms & Alarm Systems—See Vol 2

Alligator Clips—See Clips, Alligator—Vol 3

Alloys, Brazing—See Vol 3

Amplifiers, Klystron
Cober Elctrns., Inc., Stamford, Conn...p 863
Microwave Cavity Labs., La Grange, Ill.
Nippon Electric Co., Ltd., Tokyo, Japan
RCA Electron... N.J....p 776

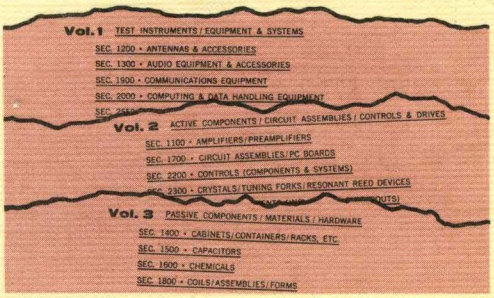
Each of the three volumes of **eem** contains a Product Index and Directory, the Green Section. This Index is a complete alphabetical listing of products. If the product you are looking for appears in the particular volume you are consulting, the green pages will provide a complete list of manufacturers who make that product. If the product is included in another volume of **eem**, the Index will provide a cross reference, directing you to the correct volume.

Boldface listings under product headings indicate that the listed manufacturer has products cataloged in **eem. Boldface** listings with page numbers indicate that this manufacturer's catalog pages include detailed data on the product indicated in the product heading.

Similar products are grouped together. For example, the many kinds of meters are listed in this manner: "Meters, Ampere," "Meters, Capacitance," "Meters, Flux" etc. To help you locate the prime product heading, there are hundreds of cross references, e.g. "Voltmeters — See Meters, Volt."

to find manufacturers' catalog information

WHITE SECTION



Vol. 1 TEST INSTRUMENTS / EQUIPMENT & SYSTEMS
SEC. 1200 • ANTENNAS & ACCESSORIES
SEC. 1300 • AUDIO EQUIPMENT & ACCESSORIES
SEC. 1900 • COMMUNICATIONS EQUIPMENT
SEC. 2000 • COMPUTING & DATA HANDLING EQUIPMENT
SEC. 2500 • ...

Vol. 2 ACTIVE COMPONENTS / CIRCUIT ASSEMBLIES / CONTROLS & DRIVES
SEC. 1100 • AMPLIFIERS/PREAMPLIFIERS
SEC. 1700 • CIRCUIT ASSEMBLIES/PC BOARDS
SEC. 2200 • CONTROLS (COMPONENTS & SYSTEMS)
SEC. 2300 • CRYSTALS/TUNING FORKS/RESONANT REED DEVICES
SEC. 2400 • ... (TUBES/CIRCUITS)

Vol. 3 PASSIVE COMPONENTS / MATERIALS / HARDWARE
SEC. 1400 • CABINETS/CONTAINERS/RACKS, ETC.
SEC. 1500 • CAPACITORS
SEC. 1600 • CHEMICALS
SEC. 1800 • COILS/ASSEMBLIES/FORMS

Catalog pages in **eem** are divided into three volumes based on very broad product groupings. These are:

Volume 1 — Test Instruments / Equipment and Systems

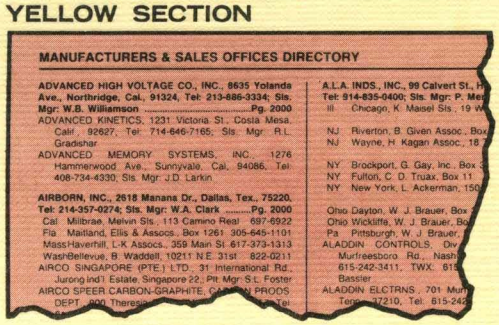
Volume 2 — Active Components / Circuit Assemblies / Controls and Drives

Volume 3 — Passive Components / Materials / Hardware

These volumes are further divided into 55 **eem** Product Sections which are assigned individually to the most appropriate volume. Within each of the 55 product sections manufacturers are arranged alphabetically, wherever possible. A complete index of all manufacturers' catalog pages is included in every volume. To locate the catalog pages of a specific manufacturer, refer to this index at the beginning of the white section in any of the three volumes. This index will provide the page numbers you require. In Volume 1, the index begins on page 302, in Volume 2 on page 1274 and in Volume 3, page 2310.

to find manufacturers' addresses, phones and sales offices

YELLOW SECTION



MANUFACTURERS & SALES OFFICES DIRECTORY

ADVANCED HIGH VOLTAGE CO., INC., 8635 Yolanda Ave., Northridge, Cal., 91324, Tel: 213-886-3334; Sls. Mgr: W.B. Williamson .....Pg. 2000
ADVANCED KINETICS, 1231 Victoria St., Costa Mesa, Calif., 92627, Tel: 714-646-7165; Sls. Mgr: R.L. Gradishar
ADVANCED MEMORY SYSTEMS, INC., 1276 Hammerwood Ave., Sunnyvale, Cal., 94086, Tel: 408-734-4330; Sls. Mgr: J.D. Larkin

AIRBORN, INC., 2918 Manans Dr., Dallas, Tex., 75220, Tel: 214-357-0274; Sls. Mgr: W.A. Clark .....Pg. 2000
Cal: Millbrae, Melvin Sls., 113 Camino Real 697-6922
Fla: Maitland, Ellis & Assocs., Box 1261 305-645-1101
Mass: Haverhill, L-K Assocs., 359 Main St 617-373-1313
Wash: Bellevue, B. Waddell, 10211 N.E. 31st 822-0211
AIRCO SINGAPORE (PTE.) LTD., 31 International Rd., Jurong Ind'l Estate, Singapore 22; Pit. Mgr: S.L. Foster
AIRCO SPEER CARBON-GRAPHITE, CA... PRODS. DEPT., 900 Theresia... Tel:

A.L.A. INDS., INC., 99 Calvert St., H... Tel: 914-835-0400; Sls. Mgr: P. Me...
Ill: Chicago, K. Maisel Sls., 19 W...
NJ: Riverton, B. Given Assoc., Box...
NJ: Wayne, H. Kagan Assoc., 18...
NY: Brockport, G. Gay, Inc., Box...
NY: Fulton, C. D. Truax, Box 11...
NY: New York, L. Ackerman, 150...
Ohio: Dayton, W. J. Brauer, Box...
Ohio: Wickliffe, W. J. Brauer, Bo...
Pa: Pittsburgh, W. J. Brauer...
ALADDIN CONTROLS, Dr... Murfreesboro Rd., Nash... 615-242-3411, TWX: 61... Bassler
ALADDIN ELCTRNS., 701 Mur... Tenn. 37210, Tel: 615-242...

More than 6,000 manufacturers of electronic components, materials, instruments, assemblies, systems and key services are listed in the Yellow Section. An identical Yellow Section appears in each of the three volumes of **eem**, listing addresses, phone numbers and sales managers' names. TWX numbers are also included where available. **Boldface** listings indicate that detailed information on the manufacturers' products is cataloged in the White Section of **eem. Boldface** listings also indicate that local sales offices or representatives are listed for that manufacturer.

to find trade name sources

VOLUME 1, PAGE 957

TRADE NAME DIRECTORY

Autonavigator - auto. plotting radar navigation sys. - Moran Instr.
Autopolar - microwave polarization switch - Teledyne Micronetics
AutoRad - x-ray exposure control - Torr Labs.
Autoray & Baltoray - inspection systems - Batteau Electric
Autorol - dynamometer - Bear Mfg.
Autosplice - medium size splice/connector machine - Connectrol
Autosyn - instr. & sys. of remote indication - Bendix Aerospace-Elctrns.
Autotak - rpm indicator - Howell Instrs.
Autotec ... Bosch Lab...

Bicalex - winding wires... Cables.
Bicaloc - winding wires...
Biccastrip - flat conduc... Cables.
Bicon - bi-state, solid...
Bicronite - epoxy coat...
Biflex - type of speake...
Big inch - motors - Ha...
Big Mike ...

If you know only the trade name, brand name or trade mark of a product, you can locate it in **eem** by using the **Trade Name Directory.** This appears only in Volume 1, beginning on page 957 of the White Section. These pages can be identified by a vertical black band along the outside edge.

if you require additional assistance

contact the Editorial Department, United Technical Publications, Inc., 645 Stewart Ave., Garden City, N.Y. 11530, or phone (516) 248-9700.

1971-72 eem

These are the 55 eem Product Sections grouped in 3 volumes

55
PRODUCT SECTIONS
IN 3
VOLUMES

TEST INSTRUMENTS EQUIPMENT & SYSTEMS	Vol. 1
ACTIVE COMPONENTS / CIRCUIT ASSEMBLIES / CONTROLS & DRIVES	Vol. 2
PASSIVE COMPONENTS MATERIALS / HARDWARE	Vol. 3

eem — Electronic Engineers Master saves you engineering, specifying and purchasing time. Manufacturers' catalogs are grouped under easy-to-remember headings.

The 55 Product Sections categorize related electronics components, equipment, materials, instruments and systems, and fabrication services, enabling you to quickly compare and evaluate similar items.

To find a specific manufacturer's catalog pages refer to the Index of Manufacturers which precedes each Catalog Section (white pages).

Volume Number	Product Section	Page Number	Products
2	1100	1278	Amplifiers, Audio, Operational, etc.
1	1200	307	Antennas & Accessories
1	1300	308	Audio Equipment & Accessories
3	1400	2314	Cabinets, Chassis, Containers, Racks, Boxes, etc.
3	1500	2330	Capacitors (All Types)
3	1600	2478	Chemicals (Acids, Adhesives, Coatings, Lubricants, etc.)
2	1700	1296	Circuit Assemblies, Circuit Boards & Breadboarding Kits
3	1800	2481	Coils (Inductors, Chokes), Assemblies, Forms
1	1900	322	Communications Equipment (Facsimile, Telephone, Television)
1	2000	328	Computing, Data Handling Equipment & Accessories
3	2100	2510	Connectors, Electrical (Receptacles, Sockets, Terminal Boards)
2	2200	1304	Controls, Control Components & Systems
2	2300	1353	Crystals & Mechanical Tuning Devices; Oscillators
3	2350	2728	Delay Lines (All Types)
2	2400	1435	Panel Components (Including Lighting & Readouts)
3	2500	2754	Fabricated Mechanical Parts (Bearings, Cores, Magnets, etc.)
1	2550	388	Environmental Test Equipment
3	2600	2776	Fans, Blowers & Cooling Equipment
2	2700	1506	Filters
3	2800	2809	Hardware, Non-Current Carrying (Fasteners, Washers, etc.)
1	2900	391	Instruments, Measuring & Test
1	3000	587	Instruments, Graphic Recording
3	3100	2810	Insulators, Insulating Materials & Parts
2	3130	1535	Integrated Circuits & Hybrid Microcircuits
3	3150	2814	Manufacturing, Subcontracting, Custom Fabrication
3	3200	2816	Materials, Raw (Metals, Plastics, Glass, Rubber, Cloth, etc.)
1	3300		Medical Electronic Equipment
1	3400	598	Microwave, Laser & Radar (Systems & Subsystems)
2	3450	1552	Microwave, Laser & Radar (Components/Accessories)
2	3500	1572	Motors, Rotating Components & Accessories
1	3600		Nuclear & Radiation Equipment
2	3700	1636	Photoelectric Equipment & Components
2	3800	1641	Optical Equipment & Accessories
1	4000	616	Power Supplies, Converters, Inverters, Batteries, etc.
1	4100	947	Production Machinery & Automation Equipment
3	4200		Engineering Aids (Books, Drafting Equipment, Whiteprinters)
1	4300	950	Recording Equipment (Non-Audio Types)
2	4500	1645	Relays
3	4600		Research, Development, Engineering Services
3	4700	2818	Resistors, Fixed
3	4750	2902	Resistors, Variable (Potentiometers & Rheostats)
2	4800	1794	Semiconductors & Devices, Rectifiers (Non-Tube Types)
2	4900	1865	Servomechanisms & Components
1	5000	951	Studio Equipment
2	5100	1877	Switches, Circuit Breakers, Fuses, Protective Devices
1	5200	953	Telemetering Equipment
2	5300	1963	Thermal Devices, Thermistors, Thermocouples, Thermostats, etc.
3	5400	2933	Tools (Hand & Power); Soldering Supplies
2	5500	1985	Transducers & Associated Equipment
3	5600	2948	Transformers
2	5700	1995	Tubes, Tube Parts, Shields, Inserts, etc.
1	5800		Ultrasonic, Sonic, Subsonic Equipment
1	5850		Vacuum Equipment & Accessories
2	5900	2006	Vibrators, Choppers, etc.
3	6000	2994	Wire, Cable, Harnesses & Accessories

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INTRODUCTION

This 1971-72 edition of **eem**/**Electronic Engineers Master** is the fourteenth and largest volume published to date. You will find more catalog data included than ever before, systematically presented for the first time in **three separate volumes.**

Volume 1 — Test Instruments, Equipment and Systems

Volume 2 — Active Components / Circuit Assemblies / Controls and Drives

Volume 3 — Passive Components / Materials / Hardware

The 55 **eem** Product Sections have been individually assigned to their appropriate volume. A listing of the product sections within each volume appears on each cover. A complete listing of the 55 product sections appears on the first page of each volume (pages 1, 301, 989, 2009 and inside the back cover).

United Technical Publications' Time-Saving Product Information System

We have drawn upon the experience of hundreds of engineers and purchasing agents to develop a time-saving product/information system. It includes these major elements:

eem/Electronic Engineers Master

This bound catalog file for the complete product data of many huundreds of manufacturers is divided into three volumes with a total of 55 product sections. It includes the **Catalog Section** (white section); an industry-wide **Product Directory** (green section); a verified **Directory of Manufacturers** (yellow section) which can put the products and sales offices of more than 6,000 manufacturers at the user's fingertips; and a **Trade Name Directory** which starts on page 957 in the white pages of Volume 1.

Electronic Products Magazine

The electronic industry's only major magazine devoted 100% to products, product application and product selection, EPM keeps engineers and purchasing agents up to date on all phases of products.

Prices

Prices are furnished for information only — they are not offered as quotations. Participating manufacturers reserve the right to change specifications, revise prices or discontinue items without notice. While every precaution has been taken to assure accuracy in content, the publisher cannot be responsible for manufacturers' claims and representations; nor can any guarantee be made against the possibility of error or omission.

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1971-72

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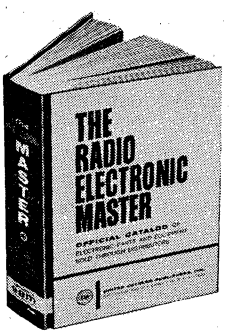

Companion volume
THE RADIO-ELECTRONIC MASTER
available from
electronic parts distributors
(See pages 984 or 3072)

PRODUCT INDEX AND DIRECTORY

This Product Index and Directory contains listings for all products in **eem**. Since **eem** consists of three volumes, if a product is shown in this volume, a complete list of its manufacturers appears below the product heading. If the product appears in one of the other two volumes, a cross reference indicates the appropriate volume.

For products which are included in this volume, manufacturers are listed alphabetically in two groups under each product heading. The first group **(shown in bold face)** includes those manufacturers whose catalog pages appear in the white pages of **eem**. Page numbers are included if information on the specific product shown in the heading is included in the manufacturers' pages. The second group includes those manufacturers who make this product but whose catalog pages do not appear in the white section.

eem
electronic engineers master
1971-72

VOLUME 1

Abrasive Belts, Cords, Wheels, etc.
Jonard Inds. Corp., Bronx, N.Y.
Sprague Elec. Co., No. Adams, Mass.
Avco Bay State Abrasives Div., Westboro, Mass.
Avco Felker Corp., Torrance, Calif.
Black & Decker Mfg. Co., The, Towson, Md.
Cratex Rubberized Abrasives, Burlingame, Calif.
DoAll Co., Des Plaines, Ill.
Engis Corp., Morton Grove, Ill.
Foredom Elec. Co., Bethel, Conn.
Ideal Industries, Inc., Sycamore, Ill.
LEA Mfg. Co., Waterbury, Conn
Mitchell, E.C., Co., Middleton, Mass.
Norton Coated Abrasive & Tape Divs., Troy, N.Y.
Norton Co., Worcester, Mass.
Penn Sci. Prods. Co., Inc., Abington, Pa.
Pfizer-Minerals, New York, N.Y.
Press-On Prods., Addison, Ill.
Raybestos-Manhattan, Inc., Bridgeport, Conn.
3M Co., St. Paul, Minn.
Unibraze Corp, White Plains, N.Y.
Universal Shellac & Supply Co., Inc., Hicksville, NY

Abrasive Compounds, Grains, Powders, etc.
Sprague Elec. Co., No. Adams, Mass.
Avco Felker Corp., Torrance, Calif.
Barton Mines Corp., North Creek, N.Y.
Engis Corp., Morton Grove, Ill.
Inland Mfg. Co., Omaha, Neb.
LEA Mfg. Co., Waterbury, Conn
M & T Chemicals Inc., Rahway, N.J.
Materials Development, Los Angeles, Cal.
Norton Co., Worcester, Mass.
Penn Sci. Prods. Co., Inc., Abington, Pa.
Pfizer-Minerals, New York, N.Y.
Phoenix Materials Corp., Kittanning, Pa.
Titan Tool Supply Co., Inc., Buffalo, N.Y.
Union Carbide, San Diego, Cal.
Universal Shellac & Supply Co., Inc., Hicksville, NY
Var-Lac-Oid Chemical Co., Elizabeth, N.J.
Wells Elctrns., Inc., So. Bend, Ind.
Wells Elctrns., Inc., Weltek Div., So. Bend, Ind.
Wheelabrator Corp., Mishawaka, Ind.
Zirconium Corp. of Amer., Solon, Ohio

Absorbers, Microwave—See Vol 2

Absorbers, Nuclear Radiation
Beckman Instrs., (AISSD), Fullerton, Cal.
Corning Glass Works, Tech. Prods. Div., Corning, N.Y.
Eberline Instr. Corp., Santa Fe, N.M.
Emerson & Cuming, Inc., Canton, Mass.
Nuclear Equip. Chem. Corp., Farmingdale, N.Y.
Nuclear Resch. Corp., Southampton, Pa.
Nuclear Supply Co., Washington, D.C.
Research Chem., Phoenix, Ariz.
Soltec Corp., No. Hollywood, Cal.
Topper Mfg. Co., Inc., Great Neck, N.Y.

Absorbers, Shock—See Mounts, Shock & Vibration—Vol 3

Accelerators & Accessories, Particle
Amperex Electronic Corp., Hicksville, N.Y.
Energy Sciences Inc., Burlington, Mass.
High Voltage Engrg. Corp., Burlington, Mass.
Instr. Resch. Co., Lincoln, Mass.
Kaman Nuclear, Colorado Springs, Colo.
Radiation Dynamics, Inc., Westbury, N.Y.
Thomson-CSF Inc., New York, N.Y.
Varian Assocs., Palo Alto, Cal.
Varian Assocs., Radiation Div., Palo Alto, Cal.

Accelerometers—See Vol 2

Acoustic Materials—See Materials, Acoustic—Vol 3

Acoustic Noise Generators—See Generators, Acoustic, High Intensity Noise

Acoustic Test Chambers—See Chambers, Acoustical Test, High Intensity Noise

Acrylic Sprays—See Insulating Compounds, Acrylic—Vol 3

Actuators, Servo, Linear—See Vol 2

Actuators, Servo, Rotary—See Vol 2

Adapters—See Connectors; Plugs; Sockets; etc.—Vol 3

Adapters, F-M, Recording
Data-Control Systems, Danbury, Conn.
Electronic Design Labs., Inc., Phila., Pa.
Vetter, A.R., Co., Rebersburg, Pa
Video Resch. Corp., Rockville, Md.
Workman Elctrn. Prods., Inc., Sarasota, Fla.

Adapters, Panoramic—See Receivers, Panoramic

Adapters, Waveguide—See Vol 2

Adhesives (All Types)—See Vol 3

Aging Racks—See Racks, Aging

Air Cleaners & Filters (Shielded & Unshielded)—See Vol 3

Air Conditioners (For Equipment)—See Vol 3

Air Filtering & Ventilating Panels (Shielded & Unshielded)—See Air Cleaners & Filters—Vol 3

Alarms & Alarm Systems—See Vol 2

Alligator Clips—See Clips, Alligator—Vol 3

Alloys, Brazing—See Vol 3

Alloys, Metal - Ceramic—See Vol 3

Alloys, Metal-To-Glass Sealing—See Seals, Glass-To-Metal—Vol 3

Alphanumeric Readout Tubes—See Tubes, Readout—Vol 2

Alphanumeric Readouts—See Readouts As Modified—Vol 2

Alternators—See Generators, A-C

Altitude Chambers—See Chambers, Altitude

Alumina (Incl. High Purity)—See Insulation Materials, Ceramic—Vol 3

Aluminizers, Vacuum—See Deposition Equip.; Evaporation Equip.

Ammeters—See Meters, Ampere

Amplifiers, A-F (Excluding Hi-Fi)—See Vol 2

Amplifiers, Antenna

American Elctrn. Labs., Inc., Lansdale, Pa.
Applied Research Inc., Port Washington, N.Y.
Arvee Engrg. Co., Torrance, Calif.
C-COR Elctrns., State College, Pa. p 1281
Electro/Data, Inc., Garland, Tex.
Honeywell, Denver, Colo.
Lorch Elctrns. Corp., Englewood, N.J.
Matrix Corp., Beech Grove, Ind.
Microwave Cavity Labs., La Grange, Ill.
Millen, James Mfg., Malden, Mass.
RHG Elctrns. Lab., Farmingdale, N.Y. p 1562
Sierra Sys., Mountain View, Cal.
Adams-Russell Co., Waltham, Mass.
Advance Ross Elctrns. Corp., Chicago, Ill.
Aerolite Electronics Corp., Union City, N.J.
Aertech Inds., Sunnyvale, Calif.
AMF Electical Prods., Alexandria, Va.
Anzac Elctrns., Waltham, Mass.
Ava Elctrns., Upper Darby, Pa.
Avantek, Inc., Santa Clara, Cal.
Benco Television Assoc., Rexdale, Ont., Can.
BF Elctrns., Solana Beach, Calif.
Blonder-Tongue Labs., Inc., Old Bridge, N.J.
Comdel, Inc., Beverly, Mass.
Dittmore-Freimuth Corp., Milwaukee, Wisc.
Elctrn. Comm., Inc., St. Petersburg, Fla.
Elctrn. Resources Div., Los Angeles, Cal.
Entron, Inc., Silver Spring, Md.
Finney Co., Bedford, Ohio
Gavin Instrs., Somerville, N.J.
Hope Elctrns., Clifton, N.J.
HRB-Singer, Inc., State College, Pa.
Hughes Aircraft Co, Culver City, Cal.
Hughes Aircraft Co, Fullerton, Cal.
Int'l. Microwave, Cos Cob, Conn.
Itek Corp., Lexington, Mass.
Jerrold Elctrns. Corp., Philadelphia, Pa.
Jerrold/Watkins Div., Toronto, 395, Ont., Can.
Kaman Nuclear, Colorado Springs, Colo.
Koch Inds., Anaheim, Cal.
Lindsay Antenna & Specialty Prods., Lindsay, Ont., Canada
Loral Elctrn. Sys., Bronx, N.Y.
Maspro Co., Inc., Nagoya-Shigai, Japan
MITEQ, Inc., Hauppauge, N.Y.
Morey Corp, Downers Grove, Ill.
Olektron Corp., Dudley, Mass.
Philips Elctrns. Inds., Ltd., Toronto 17, Can.
Pickard & Burns Inc., Lindenhurst, N.Y.
S & A Elctrns., Inc., Toledo, Ohio
Scientific-Atlanta, Inc., Atlanta, Ga.
Scientific Communications, Garland, Tex.
Systems Resch. Labs., Dayton, Ohio
Teledyne Micronetics, San Diego, Calif.
Tricraft Prods., Chicago, Ill.
Varian Assocs., Palo Alto, Cal.
Wald Sound, Sun Valley, Calif.
Wand Elctrns., Inc., Old Bethpage, N.Y.
Wheeler Lab. of Hazeltine Corp., Greenlawn, N.Y.

Amplifiers, Biophysical—See Vol 2

Amplifiers, Charge—See Vol 2

Amplifiers, Compressor—See Vol 2

Amplifiers, Current—See Vol 2

Amplifiers, D-C—See Vol 2

Amplifiers, Decade—See Vol 2

Amplifiers, Deflection—See Vol 2

Amplifiers, Delay Line—See Vol 3

Amplifiers, Differential—See Vol 2

Amplifiers, Distributed—See Vol 2

Amplifiers, Distribution—See Vol 2

Amplifiers, Fluidic—See Vol 2

Amplifiers, I-F—See Vol 2

Amplifiers, Integrating—See Vol 2

Amplifiers, Isolation—See Vol 2

Amplifiers, Keying

Dynamics Instr. Co., Monterey Pk., Cal.
Honeywell, Denver, Colo.
Multitech Data Prods., Monterey Pk., Cal.
Consolidated Resistance Sls., Yonkers, N.Y.
Defense Elctrns., Inc., Rockville, Md.
General Instr. Corp., Hicksville, N.Y.
Iso-Switch Corp., Costa Mesa, Cal.
Philips Elctrns. Inds., Ltd., Toronto 17, Can.
Virginia Elctrns. Co., Inc., Falls Church, Va.

Amplifiers, Klystron

Cober Elctrns., Inc., Stamford, Conn. p 601
Microwave Cavity Labs., La Grange, Ill. p 611
RCA Elctrns. Comps., Harrison, N.J.
Collins Radio Co., Dallas, Tex.
Continental Elctrns. Mfg., Dallas, Tex.
Energy Systems, Palo Alto, Cal.
Ferranti Ltd., Hollinwood, Lancs., England
General Instr. Corp., Hicksville, N.Y.
General Microwave Corp., Farmingdale, N.Y.
Litton Inds., San Carlos, Calif.
Microwave Assocs., Inc., Burlington, Mass.
Sperry Elctrn. Tube, Gainesville, Fla.
Varian Assocs., Palo Alto, Cal.
Varian Assocs.Electron Tube & Device Grp., Palo Alto, Cal.

Amplifiers, Limiting—See Vol 2

Amplifiers, Line—See Vol 2

Amplifiers, Lock-In—See Vol 2

Amplifiers, Logarithmic—See Vol 2

Amplifiers, Magnetic—See Vol 2

Amplifiers, Maser—See Masers

Amplifiers, Master Antenna—See Amplifiers, Distribution—Vol 2

Amplifiers, Microphone—See Amplifiers A-F (Excluding Hi-Fi)—Vol 2

Amplifiers, Microwave

American Elctrn. Labs., Inc., Lansdale, Pa.
Applied Microwave Lab., Andover, Mass.
Applied Research Inc., Port Washington, N.Y. p 1554
C-COR Elctrns., State College, Pa. p 1280
Cober Elctrns., Inc., Stamford, Conn. p 601
Daico Inds., Inc., Compton, Cal.
E & M Labs., Westlake Village, Cal. p 1557
Electro/Data, Inc., Garland, Tex. p 1558
Frequency Engrg. Labs., Farmingdale, N.J.
General Elec. Co., Schenectady, N.Y.
Greenray Inds., Inc., Mechanicsburg, Pa. p 607
Hewlett-Packard, Palo Alto, Cal.
Microdot Inc., City of Industry, Cal.
Microwave Cavity Labs., La Grange, Ill. p 610,611
Multitech Power Sys., Costa Mesa, Cal.
RCA Elctrns. Comps., Harrison, N.J.
RHG Elctrns. Lab., Farmingdale, N.Y. p 1562
Sierra Sys., Mountain View, Cal.
Singer Instrumentation Palo Alto Oper., Palo Alto, Cal.
Vega Precision Labs., Vienna, Va.
Watkins Johnson Co., Palo Alto, Cal. p 1295
Addington Labs., Inc., Santa Clara, Calif.
Aertech Inds., Sunnyvale, Calif.
AIL, Div. Cutler-Hammer, Inc., Deer Park, N.Y.
Aircom, Inc., Union, N.H.
AMBAC Inds., Garden City, N.Y.
Anzac Elctrns., Waltham, Mass.
Applied Tech., Palo Alto, Cal.
Avantek, Inc., Santa Clara, Cal.
Avco Corp., Cincinnati, Ohio
Bertan Assocs., Inc., Plainview, N.Y.
Collins Radio Co., Dallas, Tex.
Dittmore-Freimuth Corp., Milwaukee, Wisc.
Elctrn. Resources Div., Los Angeles, Cal.
EMF Systems, Inc., State College, Pa.
Energy Systems, Palo Alto, Cal.
Ferranti Elec., Inc., Plainview, N.Y.
Ferranti Ltd., Hollinwood, Lancs., England
GAF Corp., New York, N.Y.
General Instr. Corp., Hicksville, N.Y.
General Microwave Corp., Farmingdale, N.Y.
Guide Inds., Inc., Sun Valley, Calif.
Hope Elctrns., Clifton, N.J.
HRB-Singer, Inc., State College, Pa.
Hughes Aircraft Co, Culver City, Cal.
Hughes Aircraft Co., Torrance, Cal.
Hyletronics Corp., Littleton, Mass.
Int'l. Microwave, Cos Cob, Conn.
Itek Corp., Lexington, Mass.
Litton Inds., San Carlos, Calif.
Locus, Inc, State College, Pa.
Loral Elctrn. Sys., Bronx, N.Y.
Maxson Elctrns. Div., Great River, N.Y.
Merrimac Resch. & Dev., Inc., West Caldwell, N.J.
Microwave Assocs., Inc., Burlington, Mass.
Microwave Div, Nashua, N.H.
MITEQ, Inc., Hauppauge, N.Y.
Narda Microwave Corp., Plainview, N.Y.
Philco-Ford Corp., Washington, D.C.
RCA Govt. & Comm. Sys., Moorestown, N.J.
RFD, Inc., Tampa, Fla.
Sage Labs. Inc., Natick, Mass.
Sanders Assocs., Nashua, N.H.
Scientific Communications, Garland, Tex.
Semi/Dyne Elctrns. Corp., Freeport, N.Y.
Servo Corp. America, Hicksville, N.Y.
Somerset Radiation Lab., Arlington, Va.
Special Microwave Devices Oper., Waltham, Mass.
Sperry Marine Sys., Charlottesville, Va.
Struthers Elctrns. Corp., Mamaroneck, N.Y.
Teledyne Micronetics, San Diego, Calif.
Trak Microwave, Tampa, Fla.
Varian Assocs., Palo Alto, Cal.
Varian, Beverly, Mass.
Wand Elctrns., Inc., Old Bethpage, N.Y.
Wheeler Lab. of Hazeltine Corp., Greenlawn, N.Y.
Wiltron Co., Palo Alto, Calif.
Zeta Labs., Inc., Mountain View, Calif.

Amplifiers, Mixing—See Vol 2

Amplifiers, Narrow-Band—See Vol 2

Amplifiers, Null

California Elctrn. Mfg. Co., Alamo, Calif.
Control Technology Co., L.I.C., N.Y.
Hewlett-Packard, Palo Alto, Cal.
Honeywell, Denver, Colo.
Ind'l. Control Co., Farmingdale, N.Y.
Ind'l. Test Equip., Port Washington, N.Y.
Intronics, Inc., Newton, Mass.
North Atlantic Inds., Plainview, N.Y.
Precision Monolithics, Santa Clara, Cal.
Preston Scientific, Anaheim, Cal. p 1293
Solid State Elctrns., Sepulveda, Cal.
Teledyne Philbrick, Dedham, Mass.
Trio Labs, Inc., Plainview, N.Y.
Acromag, Inc., Wixom, Mich.
Analog Devices, Inc., Norwood, Mass.
Applied Control Co., Fairfield, N.J.
AUL Instrs., Inc., Flushng, N.Y.
Automatic Control Elctrns. Co., San Antonio, Tex.
Brower Laboratories, Inc., Waltham, Mass.
Burr-Brown Resch. Corp., Tucson, Ariz.
Canadian Research Institute, Don Mills, Ont., Canada
Computer Dynamics, Torrington, Conn.
General Radio Co., Concord, Mass.
Glentek, Inc., Santa Monica, Calif.
Honeywell, Apparatus Controls, Mpls., Minn.
Integrated Controls, San Diego, Cal.
Isotech Inc., Westford, Mass.
Jordan Controls, Milwaukee, Wisc.
Keithley Instrs., Inc., Cleveland, Ohio
Medistor Instr. Co., Seattle, Wash.
Newport Labs., Inc., Santa Ana, Cal.
Optical Elctrns., Tucson, Ariz.
Robicon Corp., Pittsburgh, Pa
Rohde & Schwarz Sls., Passaic, N.J.
Singer Co., Somerville, N.J.
Theta Instr. Corp., Fairfield, N.J.
Transducer Systems, Inc., Willow Grove, Pa.

Amplifiers, Operational—See Vol 2

Amplifiers, Parametric

American Elctrn. Labs., Inc., Lansdale, Pa. p 1552
Electro/Data, Inc., Garland, Tex. p 1559
Nippon Electric/NEC America, N.Y., N.Y.
RHG Elctrns. Lab., Farmingdale, N.Y.
Teledyne Philbrick, Dedham, Mass. p 1294
Watkins Johnson Co., Palo Alto, Cal. p 1295
AIL, Div. Cutler-Hammer, Inc., Deer Park, N.Y.
Analog Devices, Inc., Norwood, Mass.
Avco Corp., Cincinnati, Ohio
Ferranti Elec., Inc., Plainview, N.Y.
Ferranti Ltd., Hollinwood, Lancs., England
GTE Sylvania Inc., Elctrn. Sys. Gp., Waltham, Mass.
Guide Inds., Inc., Sun Valley, Calif.
Hughes Aircraft Co, Culver City, Cal.
Loral Elctrn. Sys., Bronx, N.Y.
Merrimac Resch. & Dev., Inc., West Caldwell, N.J.
Micromega, Los Angeles, Cal.
RCA Govt. & Comm. Sys., Moorestown, N.J.
Scientific Communications, Garland, Tex.
TRG Prods., E. Boston, Mass.

Amplifiers, Peak-Limiting—See Vol 2

Amplifiers, Phase-Lock—See Amplifiers, Lock-In—Vol 2

Amplifiers, Photocell-See Amplifiers, Transducer—See Vol 2

Amplifiers, Power (Excluding Hi-Fi)—See Vol 2

Amplifiers, Public Address-See Amplifiers, A-F—See Vol 2

Amplifiers, Pulse—See Vol 2

Amplifiers, Pulse-Limiting—See Vol 2

Amplifiers, Radar—See Amplifiers, Microwave

Amplifiers, Recording—See Amplifiers, A-F (Excluding Hi-Fi)—Vol 2

Amplifiers Resolver—See Amplifiers, Servo—Vol 2

Amplifiers, R-F—See Vol 2

Amplifiers, Sample & Hold—See Vol 2

Amplifiers, Servo—See Vol 2

Amplifiers, Single-Sideband

RF Communications, Rochester, N.Y.
Sierra Sys., Mountain View, Cal.
Aerocom, Miami, Fla.
Aeronautical Comm. Equip. Inc., Miami, Fla.
Avco Corp., Cincinnati, Ohio
Barker & Williamson, Bristol, Pa.
BF Elctrns., Solana Beach, Calif.
CCA Elctrns. Corp., Gloucester, N.J.
Comdel, Inc., Beverly, Mass.

Continental Elctrns. Mfg., Dallas, Tex.
Elctrn. Resources Div., Los Angeles, Cal.
General Instr. Corp., Hicksville, N.Y.
Hafstrom Tech. Prods., Inc., San Diego, Calif.
Hammarlund Mfg. Co., Red Bank, N.J.
Heath Co., Benton Harbor, Mich.
Hughes Aircraft Co, Culver City, Cal.
ITT Mackay Marine, Clark, N.J.
Linear Sys., Inc., Watsonville, Calif.
Philips Elctrns. Inds., Ltd., Toronto 17, Can.
RCA Govt. & Comm. Sys., Moorestown, N.J.
RF Communications, Inc., Rochester, N.Y.
Technical Mat'l., Mamaroneck, N.Y.

Amplifiers, Standing Wave

Hewlett-Packard, Palo Alto, Cal.
Weinschel Engrg. Co., Gaithersburg, Md.
Avco Corp., Cincinnati, Ohio
General Microwave Corp., Farmingdale, N.Y.
Hughes Aircraft Co, Culver City, Cal.
Hughes Aircraft Co, Fullerton, Cal.
Loral Elctrn. Sys., Bronx, N.Y.
Narda Microwave Corp., Plainview, N.Y.
PRD Elctrns., Inc., Westbury, N.Y.
Rohde & Schwarz Sls., Passaic, N.J.
Wiltron Co., Palo Alto, Calif.

Amplifiers, Strain Gauge-See Amplifiers, Transducer—

See Vol 2

Amplifiers, Sweep—

See Vol 2

Amplifiers, Synchro—

See Vol 2

Amplifiers, Telemetering

Airpax Elctrns., Inc., Cambridge, Md.
Airpax Elctrns., Ft. Lauderdale, Fla. p 1308
American Elctrn. Labs., Inc., Lansdale, Pa.
Applied Research Inc., Port Washington, N.Y.
Astrosystems, Lake Success, N.Y.
C-COR Elctrns., State College, Pa. p 1280
Control Technology Co., L.I.C., N.Y.
Data-Control Systems, Danbury, Conn. p 345
DDC, Hicksville, N.Y.
Dynamics Instr. Co., Monterey Pk., Cal.
Electro/Data, Inc., Garland, Tex. p 1558
General Elec. Co., Schenectady, N.Y.
Intronics, Inc., Newton, Mass.
Ithaco, Inc., Ithaca, N.Y.
Microdot Inc., City of Industry, Cal.
Microwave Cavity Labs., La Grange, Ill.
Neff Instr. Corp., Duarte, Calif.
Precision Monolithics, Santa Clara, Cal.
Quindar Elctrns., Inc., Springfield, N.J.
RHG Elctrns. Lab., Farmingdale, N.Y. p 1562
Sierra Sys., Mountain View, Cal.
Solid State Elctrns., Sepulveda, Cal.
Sonex, Inc., Bethayres, Pa.
Teledyne Geotech, Dallas, Tex.
Vega Precision Labs., Vienna, Va.
Watkins Johnson Co., Palo Alto, Cal. p 1295
Acromag, Inc., Wixom, Mich.
Aertech Inds., Sunnyvale, Calif.
AMBAC Inds., Garden City, N.Y.
Avantek, Inc., Santa Clara, Cal.
B & W Elctrn. Resch. Labs., Dallas, Tex.
Bell & Howell Co., Pasadena, Calif.
Biocom, Inc., Culver City, Cal.
Bourns, Inc., Riverside, Calif.
Dana Labs., Inc., Irvine, Calif.
Defense Elctrns., Inc., Rockville, Md.
Dorsett Elctrns., Tulsa, Okla.
Dynamic Precision Controls, Hagerstown, Ind.
EDC (Electro Dev.), Lynnwood, Wash.
Elctrn. Resources Div., Los Angeles, Cal.
General Devices, Inc., Princeton, N.J.
General Instr. Corp., Hicksville, N.Y.
Gulton Inds., Albuquerque, N.M.
HRB-Singer, Inc., State College, Pa.
Hughes Aircraft Co, Culver City, Cal.
Hughes Aircraft Co, Fullerton, Cal.
Interlind Elctrns., Doraville, Ga.
K West, Westminster, Calif.
Koch Inds., Anaheim, Cal.
Lear Siegler, Inc., Santa Monica, Calif.
Loral Elctrn. Sys., Bronx, N.Y.
Megadyne Inds., Inc., Rochester, N.Y.
Mennen-Greatbatch Elctrns., Inc., Clarence, N.Y.
Micromega, Los Angeles, Cal.
Monitor Sys., Inc., Ft. Washington, Pa.
Moore Inds., Van Nuys, Cal.
Oklahoma Aerotronics, Hartshorne, Okla.
Ramsay Engrg. Co., Anaheim, Calif.
Rantec Div., Calabasas, Calif.
Rawco Instrs., Inc., Ft. Worth, Tex.
RF Communications, Inc., Rochester, N.Y.
Rochester Instr. Sys., Rochester, N.Y.
Rosemount Engrg. Co., Minneapolis, Minn.
Sage Labs. Inc., Natick, Mass.
Scientific Communications, Garland, Tex.
Special Microwave Devices Oper., Waltham, Mass.
Taft Electrosystems, Inc., Metuchen, N. J.
Transidyne-General Corp., Ann Arbor, Mich.
Trepac Corp. America, Englewood, N.J.
Varian Assocs., Palo Alto, Cal.
Westinghouse Elec. Int'l., New York, N.Y.

Amplifiers, Thermocouple-See Amplifiers, Transducer—

See Vol 2

Amplifiers, Thyratron—

See Vol 2

Amplifiers, Transducer—

See Vol 2

Amplifiers, Traveling-Wave Tube

Hewlett-Packard, Palo Alto, Cal.
Microwave Cavity Labs., La Grange, Ill. p 611
Multitech Power Sys., Costa Mesa, Cal.
RCA Elctrns. Comps., Harrison, N.J.
Singer Instrumentation Palo Alto Oper., Palo Alto, Cal.
Vega Precision Labs., Vienna, Va.
Watkins Johnson Co., Palo Alto, Cal. p 1295
Collins Radio Co., Dallas, Tex.
Energy Systems, Palo Alto, Cal.
Ferranti Ltd., Hollinwood, Lancs., England
Hughes Aircraft Co., Torrance, Cal.
Litton Inds., San Carlos, Calif.
Microwave Assocs., Inc., Burlington, Mass.
RCA Govt. & Comm. Sys., Moorestown, N.J.
Scientific-Atlanta, Inc., Atlanta, Ga.
Semi/Dyne Elctrns. Corp., Freeport, N.Y.
Servo Corp. America, Hicksville, N.Y.
Sperry Elctrn. Tube, Gainesville, Fla.
Varian Assocs., Palo Alto, Cal.
Varian Assocs.Electron Tube & Device Grp., Palo Alto, Cal.
Varian Assocs., Travel Wave Tube, Palo Alto, Cal.

Amplifiers, Tunnel Diode—

See Vol 2

Amplifiers, Ultrasonic

Arvee Engrg. Co., Torrance, Calif. p 1278
CML-Macarr, Inc., Edison, N.J. ..... p 666
Control Elctrns. Co., Inc., Farmingdale, N.Y.
Intronics, Inc., Newton, Mass.
Ithaco, Inc., Ithaca, N.Y. ..... p 1287
James Elctrns., Inc., Chicago, Ill.
Krohn-Hite, Cambridge, Mass.
Quan-Tech, Whippany, N.J. ..... p 548
Advanced Patent Technology, Inc., Las Vegas, Nev.
AMF Electical Prods., Alexandria, Va.
Arenberg Ultrasonic Lab., Inc., Jamaica Plain, Mass.
Automation Inds., Los Angeles, Cal.
Delta Elctrn. Control, Costa Mesa, Cal.
Du Kane Corp., St. Charles, Ill.
InterOcean Systems, San Diego, Cal.
NUS Corp., Paramus, N.J.
Perry Amplifier, Brookline, Mass.
Ramsay Engrg. Co., Anaheim, Calif.
Sensor Corp., Greenwich, Conn.
Taylor Instr. Process Control Div., Rochester, N.Y.
Westinghouse Elec., Sykesville, Md.
Westinghouse Elec. Int'l., New York, N.Y.

Amplifiers, Vibration Pickup-See Amplifiers, Transducer—

See Vol 2

Amplifiers, Video—

See Vol 2

Amplifiers, Voltage Reference —

See Vol 2

Amplifiers, Wideband—

See Vol 2

Analog Computers—

See Computers, Analog

Analog-To-Digital Converters —

See Converters, Analog-To-Digital

Analyzers, A-F

A. P. Circuit Corp., New York, N.Y.
Freed Transformer Co., Bklyn., N.Y.
Hewlett-Packard, Palo Alto, Cal.
Kay Elemetrics, Pine Brook, N.J.
London Co., Cleveland, Ohio ..... p 516
Marconi Instrs., Englewood, N.J... p 521
Nelson Ross Elctrns., Lake Success, N.Y. .....p 536,537
Polarad Elctrn. Instrs., Lake Success, N.Y.
Quan-Tech, Whippany, N.J. ..... p 546
Rockland Sys. Corp., Blauvelt, N.Y.
Tektronix, Inc., Beaverton, Ore.
Abphot, New York, N.Y.
AGAC-Derritron, Inc., Alexandria, Va.
Audio Instr. Co., Union City, N.J.
B & K Instrs., Inc., Cleveland, Ohio
Brower Laboratories, Inc., Waltham, Mass.
Digitech Data Inds., Inc., Ridgefield, Conn.
Eico Electronic Instrument Co., Inc., Brooklyn, N.Y.
Fairchild Electro-Metrics, Amsterdam, N.Y.
General Radio Co., Concord, Mass.
Heath Co., Benton Harbor, Mich.
Honeywell, Aerospace & Def., Minneapolis, Minn.
Hughes Aircraft Co, Fullerton, Cal.
Lab Electro-Acoustique, 92-Rueil, Malmaison, France
Loral Elctrn. Sys., Bronx, N.Y.
Matsushita Comm. Ind'l. Co., Ltd., Yokohama, Japan
MB Elctrns/Textron Co., New Haven, Conn.
Muirhead, Inc., Mountainside, N.J.
Northeast Elctrns. Corp., Concord, N.H.
Oklahoma Aerotronics, Hartshorne, Okla.
Philco-Ford Corp., Washington, D.C.
Princeton Applied Resch. Corp., Princeton, N.J.
Rohde & Schwarz Sls., Passaic, N.J.
Siemens Corp., Comm. Eq. Div., Iselin, N.J.
Singer - Tele-Signal, Woodbury, N.Y.
Spectral Dynamics Corp. San Diego, San Diego, Cal.
Wandel & Goltermann, E. Hanover, N.J.
Weston Instrs. Div., Hatboro, Pa
Wiltron Co., Palo Alto, Calif.

Analyzers, Antenna Pattern

Watkins Johnson Co., Palo Alto, Cal.
Weinschel Engrg. Co., Gaithersburg, Md.
Carco Elctrns., Menlo Park, Calif.
GTE Sylvania Inc., Elctrn. Sys. Gp., Waltham, Mass.
Hughes Aircraft Co, Culver City, Cal.
Hughes Aircraft Co, Fullerton, Cal.
Loral Elctrn. Sys., Bronx, N.Y.
Maxson Elctrns. Div., Great River, N.Y.
Micro-Tel Corp., Baltimore, Md.
Scientific-Atlanta, Inc., Atlanta, Ga.
Wiltron Co., Palo Alto, Calif.

Analyzers, Behavioral, Experimental

Applied Systems Corp., Detroit, Mich
Bio-Medical Elctrns., Inc., Rockville, Md.
Bionic Instrs., Inc., Bala Cynwyd, Pa.
Esterline Angus Div., Indianapolis, Ind.
Lehigh Valley Elctrn., Inc., Fogelsville, Pa.
Listening, Inc., Arlington, Mass.
Massey Dickinson Co., Inc., Saxonville, Mass.
Westinghouse Elec. Corp., Pittsburgh, Pa.

Analyzers, Capacitor—

See Testers, Capacitor

Analyzers, Circuit—

See Testers, Signal Tracing

Analyzers, Coincidence

Chronetics, Inc., Mt. Vernon, N.Y.
Hewlett-Packard, Palo Alto, Cal.
Beckman Instrs., (AISSD), Fullerton, Cal.
Harshaw Chem. Co., Cleveland, Ohio
Lecroy Resch. Sys. Corp., West Nyack, N.Y.
Nanosecond Systems, Inc., Fairfield, Conn.
Nuclear Diodes, Prairie View, Ill.
Nuclear Equip. Chem. Corp., Farmingdale, N.Y.
Soltec Corp., No. Hollywood, Cal.
3M Co., St. Paul, Minn.

Analyzers, Color—

See Colorimeters—Vol 2

Analyzers, Crystal

Beckman Instrs., Cedar Grove, N.J.
Dranetz Engrg. Labs., Plainfield, N.J.
RFL Inds., Instr. Div., Boonton, N.J. p 554
AIL, Div. Cutler-Hammer, Inc., Deer Park, N.Y.
Beckman Instrs., (AISSD), Fullerton, Cal.
Elctrn. Svc., Verona, N.J.
Harshaw Chem. Co., Cleveland, Ohio
Isomet Corp., Oakland, N.J.
Lasermetrics, Inc., Rochelle Park, N.J.
Philips Elctrn. Instrs., Mt. Vernon, N.Y.
Rohde & Schwarz Sls., Passaic, N.J.
Varian Assocs., Vacuum Div., Palo Alto, Cal.
Winslow Tele-Tronics, Inc., Eatontown, N.J.

Analyzers, Differential

Electronic Dev. Corp., Boston, Mass.
Frequency Engrg. Labs., Farmingdale, N.J. ..... p 604
Honeywell, Denver, Colo.
Applied Dynamics Computer Sys., Ann Arbor, Mich.
Audio Instr. Co., Union City, N.J.
B & W Elctrn. Resch. Labs., Dallas, Tex.
E.I. DuPont DeNemours & Co., Wilmington, Del.
Honeywell, Aerospace & Def., Minneapolis, Minn.
Nester/Faust Mfg. Corp., Newark, Dela.
Philips Elctrn. Instrs., Mt. Vernon, N.Y.
Singer - Tele-Signal, Woodbury, N.Y.
Systron-Donner Microwave Div., Van Nuys, Cal.
T & T Controls Co., Media, Pa.
Varian Assocs., Vacuum Div., Palo Alto, Cal.

Analyzers, Dispersion—

See Analyzers, Spectrum

Analyzers, Distortion—

See Analyzers, A-F

Analyzers, Frequency—

See Analyzers, Spectrum

Analyzers, Frequency Stability—

See Meters, Frequency Deviation

Analyzers, Gas

Engelhard Minerals & Chem., Murray Hill, N.J.
Hewlett-Packard, Palo Alto, Cal.
Meloy Laboratories, Springfield, Va.
Monitor Labs, Inc., San Diego, Cal.
Aero Vac Corp., Troy, N.Y.
AMBAC Inds., Garden City, N.Y.
Atlas Electric Devices, Chicago, Ill.
Bacharach Instr. Co., Pittsburgh, Pa.
Bacharach Instr. Co., Mt. View, Calif.
Bailey Meter Co., Wickliffe, Ohio
Beckman Instrs., Advanced Tech., Fullerton, Cal.
Beckman Instrs., (AISSD), Fullerton, Cal.
Beckman Instrs., Process Instrs., Fullerton, Cal.
Bell & Howell Co., Pasadena, Calif.
Bendix, Rochester, N.Y.

Cambridge Sys., EG&G Inc., Waltham, Mass.
Coleman Instrs., Maywood, Ill.
Cutler-Hammer, Milwaukee, Wisc.
Devco Engrg., W. Caldwell, N.J.
Electron Technology, Inc., Kearny, N.J.
Fisher Sci. Co., Pittsburgh, Pa.
Franklin Gno Corp., W. Palm Beach, Fla.
Gas Analysis Sys., Inc., Basking Ridge, N.J.
GCA Technology Div., Bedford, Mass.
General Elec. Co., W. Lynn, Mass.
General Monitors, Inc., Costa Mesa, Calif.
Gow-Mac Instr. Co., Madison, N.J.
Granville-Phillips Co., Boulder, Colo.
Honeywell, Apparatus Controls, Mpls., Minn.
Honeywell, Ft. Washington, Pa.
Infrared Inds., Inc., Santa Barbara, Cal.
Johnston Labs., Inc., Cockeysville, Md.
Kahn & Co., Inc., Wethersfield, Conn.
Laboratory Equipment Corp., St. Joseph, Mich.
Leeds & Northrup Corp., No. Wales, Pa.
Lion Precision Div., Newton, Mass.
Mast Dev. Co., Davenport, Iowa
Milton Roy Co., St. Petersburg, Fla.
Nester/Faust Mfg. Corp., Newark, Dela.
N.Y. Testing Labs., Inc., Westbury, N.Y.
Norton Co., Newton, Mass.
Nuclear-Chicago, Des Plaines, Ill.
Nuclear Meas. Corp., Indianapolis, Ind.
Perkin-Elmer Corp., Norwalk, Conn.
Philips Elctrn. Instrs., Mt. Vernon, N.Y.
Precision Sci. Co., Chicago, Ill.
Process & Instrs. Corp., Brooklyn, N.Y.
Royco Instrs., Inc., Menlo Pk., Cal.
Scientific Inds., Inc., Mineola, N.Y.
Statham Instrs., Inc., Oxnard, Cal.
Sunshine Sci. Instrs., Inc., Philadelphia, Pa.
Tracor, Inc., Austin, Tex.
Ultek Div., Palo Alto, Calif.
Vacuum Equip. Div., Newton, Mass.
Varian Aerograph, Walnut Creek, Calif.
Varian Assocs., Palo Alto, Cal.
Varian Assocs., Vacuum Div., Palo Alto, Cal.
Veeco Instrs., Inc., Plainview, N.Y.
VWR Scientific, San Francisco, Cal.
Waters Instrs., Inc., Rochester, Minn
Westinghouse Elec., Pittsburgh, Pa.

Analyzers, Gear Train

Orbit Instr. Corp., Syosset, N.Y.
Spectral Dynamics Corp. San Diego, San Diego, Cal.

Analyzers, Harmonic

Hewlett-Packard, Palo Alto, Cal.
London Co., Cleveland, Ohio ..... p 516
Marconi Instrs., Englewood, N.J... p 521
Nelson Ross Elctrns., Lake Success, N.Y. ..... p 537
Quan-Tech, Whippany, N.J.
Rockland Sys. Corp., Blauvelt, N.Y.
B & K Instrs., Inc., Cleveland, Ohio
Eico Electronic Instrument Co., Inc., Brooklyn, N.Y.
Fairchild Electro-Metrics, Amsterdam, N.Y.
General Radio Co., Concord, Mass.
Lab Electro-Acoustique, 92-Rueil, Malmaison, France
Lecroy Resch. Sys. Corp., West Nyack, N.Y.
Link Div., Binghamton, N.Y.
MSE, Inc., Westlake, Ohio
Muirhead, Inc., Mountainside, N.J.
Philco-Ford Corp., Washington, D.C.
Princeton Applied Resch. Corp., Princeton, N.J.
Railway Comm., Raytown, Mo.
Rohde & Schwarz Sls., Passaic, N.J.
Signal Analysis Inds. Corp., Hauppauge, N.Y.
Spectral Dynamics Corp. San Diego, San Diego, Cal.
Waveforms, No. Hollywood, Cal.
Weston Instruments, Inc., Newark, N.J.

Analyzers, Interference

Hewlett-Packard, Palo Alto, Cal.
Honeywell, Denver, Colo.
Ohio Semitronics, Columbus, Ohiop 533
Polarad Elctrn. Instrs., Lake Success, N.Y.
AUL Instrs., Inc., Flushng, N.Y.
Bowmar/Ali, Inc., Acton, Mass.
Fairchild Electro-Metrics, Amsterdam, N.Y.
Hacker Instrs., Inc., W. Caldwell, N.J.
Hughes Aircraft Co, Culver City, Cal.
Philco-Ford Corp., Washington, D.C.
Rohde & Schwarz Sls., Passaic, N.J.
Signatron, Inc., Lexington, Mass.
Solar Elctrns. Co., Hollywood, Calif.
Teledyne Adcom, Cambridge, Mass.
Zeiss, Carl, Inc., New York, N.Y.

Analyzers, Intermodulation

Crown Int'l., Elkhart, Ind.
London Co., Cleveland, Ohio ..... p 516
Marconi Instrs., Englewood, N.J. p 520,521
Nelson Ross Elctrns., Lake Success, N.Y. ..... p 537
Polarad Elctrn. Instrs., Lake Success, N.Y.
Quan-Tech, Whippany, N.J.
Audio Instr. Co., Union City, N.J.
Collins Radio Co., Cedar Rapids, Iowa
Eico Electronic Instrument Co., Inc., Brooklyn, N.Y.
MSE, Inc., Westlake, Ohio
Rohde & Schwarz Sls., Passaic, N.J.
Sage Labs. Inc., Natick, Mass.
Signal Analysis Inds. Corp., Hauppauge, N.Y.
Signatron, Inc., Lexington, Mass.
Spectrum Instrs., Inc., New Rochelle, N.Y.

Analyzers, Magnetic

Bell, F.W., Inc., Columbus, Ohio.... p 418
Electro-Mechanics Co., Austin, Tex. p 452
Ind'l. Control Co., Farmingdale, N.Y.
London Co., Cleveland, Ohio ..... p 516
Ohio Semitronics, Columbus, Ohiop 533
RFL Inds., Instr. Div., Boonton, N.J. p 554
Systron-Donner Corp., Concord, Cal. p 565
Systron-Donner Alpha Div., Oakland, Cal. ..... p 565
Systron-Donner Concord Instr. Div., Concord, Cal. ..... p 565
Systron-Donner Kruse Elctrns. Sub., Mountain View, Cal. ..... p 565
Acoustronics, Inc., Huntington, N.Y.
Ann Arbor Div., Ann Arbor, Mich.
Computer Test Corp., Cherry Hill, N.J.
Hallmark Standards, Inc., Mt. Vernon, N.Y.
High Voltage Engrg. Corp., Burlington, Mass.
Irwin Labs., Inc., Los Angeles, Calif.
Magnaflux Corp., Chicago, Ill.
Magnetic Analysis Corp., Mt. Vernon, N.Y.
Magnetic Sys. & Instrs., Worcester, Mass.
Magnetics Sys. & Instrs., Worcester, Mass.
Oeco Corp., Portland, Ore.
Thomas & Skinner, Inc., Indianapolis, Ind.
Varian Assocs., Palo Alto, Cal.

Analyzers, Magnetic Tape Dropout

Data-Control Systems, Danbury, Conn.
Datacom, Inc., Ft. Walton Bch., Fla.
Acoustronics, Inc., Huntington, N.Y.
Kenton Engrg. Corp., Skokie, Ill.
Magnetic Sys. & Instrs., Worcester, Mass.
Magnetics Sys. & Instrs., Worcester, Mass.

Analyzers, Microwave

Alford Mfg. Co., Winchester, Mass.
Del Elctrns. Corp., Mt. Vernon, N.Y.
Electro/Data, Inc., Garland, Tex.
Frequency Engrg. Labs., Farmingdale, N.J. ..... p 604
Hewlett-Packard, Palo Alto, Cal.
Nelson Ross Elctrns., Lake Success, N.Y. ..... p 537
Polarad Elctrn. Instrs., Lake Success, N.Y. ..... p 540
Singer Instrumentation Los Angeles Oper., Los Angeles, Cal. ..... p 562
Singer Instrumentation Palo Alto Oper., Palo Alto, Cal. ..... p 562
Systron-Donner Corp., Concord, Cal. p 565
Systron-Donner Alpha Div., Oakland, Cal. ..... p 565
Systron-Donner Concord Instr. Div., Concord, Cal. ..... p 565
Systron-Donner Kruse Elctrns. Sub., Mountain View, Cal. ..... p 565
Tektronix, Inc., Beaverton, Ore.
Watkins Johnson Co., Palo Alto, Cal.
AUL Instrs., Inc., Flushng, N.Y.
Collins Radio Co., Dallas, Tex.
General Microwave Corp., Farmingdale, N.Y.
GTE Sylvania Inc., Elctrn. Sys. Gp., Waltham, Mass.
Hughes Aircraft Co, Culver City, Cal.
Loral Elctrn. Sys., Bronx, N.Y.
Maxson Elctrns. Div., Great River, N.Y.
Microwave Instrs. Co., Corona del Mar, Calif.
Microwave/Sys., Inc., E. Syracuse, N.Y.
Narda Microwave Corp., Plainview, N.Y.
Philco-Ford Corp., Washington, D.C.
Rohde & Schwarz Sls., Passaic, N.J.
Sage Labs. Inc., Natick, Mass.
Scientific-Atlanta, Inc., Atlanta, Ga.
Siemens Corp., Comps. Div., Iselin, N.J.
Westinghouse Elec. Int'l., New York, N.Y.
Wiltron Co., Palo Alto, Calif.

Analyzers, Noise

A. P. Circuit Corp., New York, N.Y.
Frequency Engrg. Labs., Farmingdale, N.J. ..... p 604
Hewlett-Packard, Palo Alto, Cal.
Honeywell, Denver, Colo.
Kay Elemetrics, Pine Brook, N.J.
Nelson Ross Elctrns., Lake Success, N.Y.
Polarad Elctrn. Instrs., Lake Success, N.Y.
Quan-Tech, Whippany, N.J. ..... p 546
Rockland Sys. Corp., Blauvelt, N.Y.
Aerospace Resch. Inc., Boston, Mass.
AIL, Div. Cutler-Hammer, Inc., Deer Park, N.Y.
Alden Elctrn. & Impulse Record. Equip., Westboro, Mass.
B & K Instrs., Inc., Cleveland, Ohio
Bearing Inspection, Santa Fe Springs, Cal.
Bowmar/Ali, Inc., Acton, Mass.
Brower Laboratories, Inc., Waltham, Mass.
Collins Radio Co., Dallas, Tex.
Fairchild Electro-Metrics, Amsterdam, N.Y.
General Microwave Corp., Farmingdale, N.Y.
General Radio Co., Concord, Mass.
Lab Electro-Acoustique, 92-Rueil, Malmaison, France
Ling Elctrns., Anaheim, Calif.
Listening, Inc., Arlington, Mass.
Milletron, Inc., Pittsburgh, Pa.
Muirhead, Inc., Mountainside, N.J.
Nuclear Diodes, Prairie View, Ill.
Philco-Ford Corp., Washington, D.C.
Princeton Applied Resch. Corp., Princeton, N.J.
Rohde & Schwarz Sls., Passaic, N.J.
Sage Labs. Inc., Natick, Mass.
Siemens Corp., Comm. Eq. Div., Iselin, N.J.
Signal Analysis Inds. Corp., Hauppauge, N.Y.
Spectral Dynamics Corp. San Diego, San Diego, Cal.
Spencer-Kennedy Labs., Inc., Winchester, Mass.
Tracor, Inc., Austin, Tex.
Weston Instrs. Div., Hatboro, Pa.

Analyzers, Particle-Size

AIL, Div. Cutler-Hammer, Inc., Deer Park, N.Y.
American Instr. Co., Silver Spring, Md.
Bausch & Lomb, Rochester, N.Y.
Bionic Instrs., Inc., Bala Cynwyd, Pa.
Coulter Elctrns., Inc., Hialeah, Fla.
Fansteel Inc., N Chicago, Ill.
Fisher Sci. Co., Pittsburgh, Pa.
GCA Technology Div., Bedford, Mass.
Hacker Instrs., Inc., W. Caldwell, N.J.
High Accuracy Prods. Corp., Claremont, Cal.
Nuclear Diodes, Prairie View, Ill.
Royco Instrs., Inc., Menlo Pk., Cal.
Thermo Sys., Inc., St. Paul, Minn.
Zeiss, Carl, Inc., New York, N.Y.

Analyzers, Phase & Voltage

Automated Meas., Oakland, Calif.p 446,447
Dranetz Engrg. Labs., Plainfield, N.J.p 435
Dytronics Co., Columbus, Ohio .... p 441
E-H Resch. Labs., Inc., Oakland, Cal. p 446,447
Frequency Engrg. Labs., Farmingdale, N.J. ..... p 604
Hewlett-Packard, Palo Alto, Cal.
Ind'l. Test Equip., Port Washington, N.Y.
Ithaco, Inc., Ithaca, N.Y.
North Atlantic Inds., Plainview, N.Y. p 531
Quan-Tech, Whippany, N.J. ..... p 545
Universal Ad-Yu Elctrns., Inc., Passaic, N.J. ..... p 579
Westinghouse Elec. Corp., Newark, N.J.
A & M Instrument, Inc., Great Neck, N.Y.
Aerospace Resch. Inc., Boston, Mass.
Baganoff Assocs., Inc., St. Louis, Mo.
Bowmar/Ali, Inc., Acton, Mass.
Brower Laboratories, Inc., Waltham, Mass.
Canadian Research Institute, Don Mills, Ont., Canada
Eastern Specialty Co., Philadelphia, Pa.
Feedback, Inc., Berkeley Hghts., N.J.
Loral Elctrn. Sys., Bronx, N.Y.
Pickard & Burns Inc., Lindenhurst, N.Y.
Rantec Div., Calabasas, Calif.
Scientific-Atlanta, Inc., Atlanta, Ga.
Servo Corp. America, Hicksville, N.Y.
Signal Analysis Inds. Corp., Hauppauge, N.Y.
Spectral Dynamics Corp. San Diego, San Diego, Cal.
Sunshine Sci. Instrs., Inc., Philadelphia, Pa.
Theta Instr. Corp., Fairfield, N.J.
Westinghouse Elec. Int'l., New York, N.Y.
Weston Instruments, Inc., Newark, N.J.
Weston Instrs. Div., Hatboro, Pa

Analyzers, Polargraphic

Beckman Instrs., Advanced Tech., Fullerton, Cal.
Brinkmann Instrs., Inc., Westbury, N.Y.
Leeds & Northrup Corp., No. Wales, Pa.
Princeton Applied Resch. Corp., Princeton, N.J.

Analyzers, Probability Density

CELCO, Mahwah, N.J. ..... p 339
Hewlett-Packard, Palo Alto, Cal.
Quan-Tech, Whippany, N.J. ..... p 548
B & K Instrs., Inc., Cleveland, Ohio
Electron-Machine Corp., Umatilla, Fla.
Fabri-Tek Instrs., Inc., Madison, Wisc.
Kay-Ray, Inc., Palatine, Ill.
Nuclear Diodes, Prairie View, Ill.
Signal Analysis Inds. Corp., Hauppauge, N.Y.
Technical Instrs., Inc., No. Haven, Conn.
Thermo Sys., Inc., St. Paul, Minn.
Weston Instrs. Div., Hatboro, Pa

Analyzers, Probability Distribution—See Analyzers, Probability Density

Analyzers, Pulse Height

A. D. Data Sys., Inc., Rochester, N.Y.
Hewlett-Packard, Palo Alto, Cal.
Hickok Elect. Instr., Cleveland, Ohio
Polarad Elctrn. Instrs., Lake Success, N.Y.
Quan-Tech, Whippany, N.J. ..... p 545
Alden Elctrn. & Impulse Record. Equip., Westboro, Mass.
Fabri-Tek Instrs., Inc., Madison, Wisc.
General Atronics, Military Elctrns., Phila., Pa.
Harshaw Chem. Co., Cleveland, Ohio
Hughes Aircraft Co, Culver City, Cal.
Lab Electro-Acoustique, 92-Rueil, Malmaison, France
Loral Elctrn. Sys., Bronx, N.Y.
Northern Sci., Inc., Middleton, Wisc.
Nuclear-Chicago, Des Plaines, Ill.
Nuclear Data, Inc., Palatine, Ill.
Nuclear Diodes, Prairie View, Ill.
Nuclear Equip. Chem. Corp., Farmingdale, N.Y.
Nuclear Meas. Corp., Indianapolis, Ind.
Packard Instrument Co., Inc., Downers Grove, Ill.
Pioneer Magnetics, Santa Monica, Cal.
Randam Elctrns., Inc., Cincinnati, Ohio
Soltec Corp., No. Hollywood, Cal.
Technical Instrs., Inc., No. Haven, Conn.

Analyzers, Radar

Del Elctrns. Corp., Mt. Vernon, N.Y.
Nelson Ross Elctrns., Lake Success, N.Y. ..... p 537

Polarad Elctrn. Instrs., Lake Success, N.Y. ..... p 540
Tektronix, Inc., Beaverton, Ore.
Watkins Johnson Co., Palo Alto, Cal.
Aerospace Resch. Inc., Boston, Mass.
Alden Elctrn. & Impulse Record. Equip., Westboro, Mass.
Electrac, Inc., Anaheim, Calif.
General Atronics, Military Elctrns., Phila., Pa.
Goodyear Aerospace Corp., Akron, Ohio
GTE Sylvania Inc., Elctrn. Sys. Gp., Waltham, Mass.
Hughes Aircraft Co, Fullerton, Cal.
ISC/Telephonics Div, Huntington, N.Y.
Maxson Elctrns. Div., Great River, N.Y.
Sage Labs. Inc., Natick, Mass.
Signal Analysis Inds. Corp., Hauppauge, N.Y.
Sperry Microwave Elctrns., Clearwater, Fla.
Westinghouse Elec. Int'l., New York, N.Y.

Analyzers, Radiation, Nuclear

General Elec. Co., Schenectady, N.Y.
Hewlett-Packard, Palo Alto, Cal.
Victoreen Instr., Cleveland, Ohio
AMBAC Inds., Garden City, N.Y.
Beckman Instrs., (AISSD), Fullerton, Cal.
Eberline Instr. Corp., Santa Fe, N.M.
Fabri-Tek Instrs., Inc., Madison, Wisc.
Fansteel Inc., N Chicago, Ill.
Harshaw Chem. Co., Cleveland, Ohio
Isomet Corp., Oakland, N.J.
Johnston Labs., Inc., Cockeysville, Md.
Kay-Ray, Inc., Palatine, Ill.
Landsverk Electrometer Co., Glendale, Cal.
Nuclear-Chicago, Des Plaines, Ill.
Nuclear Data, Inc., Palatine, Ill.
Nuclear Diodes, Prairie View, Ill.
Nuclear Equip. Chem. Corp., Farmingdale, N.Y.
Nuclear Meas. Corp., Indianapolis, Ind.
Nuclear Resch. Corp., Southampton, Pa.
Nuclear Supply Co., Washington, D.C.
Packard Instrument Co., Inc., Downers Grove, Ill.
Randam Elctrns., Inc., Cincinnati, Ohio
Soltec Corp., No. Hollywood, Cal.
Technical Instrs., Inc., No. Haven, Conn.
Viewlex, Holbrook, N.Y.

Analyzers, Servo—See Vol 2

Analyzers, Single-Sideband—See Analyzers, Spectrum

Analyzers, Sonic & Subsonic

A. P. Circuit Corp., New York, N.Y.
Hewlett-Packard, Palo Alto, Cal.
Ind'l. Control Co., Farmingdale, N.Y.
Ithaco, Inc., Ithaca, N.Y.
Kay Elemetrics, Pine Brook, N.J.
Nelson Ross Elctrns., Lake Success, N.Y. ..... p 536
Polarad Elctrn. Instrs., Lake Success, N.Y.
Quan-Tech, Whippany, N.J. ..... p 546
Rockland Sys. Corp., Blauvelt, N.Y.
Alden Elctrn. & Impulse Record. Equip., Westboro, Mass.
B & K Instrs., Inc., Cleveland, Ohio
B & W Elctrn. Resch. Labs., Dallas, Tex.
Baganoff Assocs., Inc., St. Louis, Mo.
Cambridge Sys., EG&G Inc., Waltham, Mass.
General Atronics, Military Elctrns., Phila., Pa.
Listening, Inc., Arlington, Mass.
NUS Corp., Paramus, N.J.
Sanders Assocs., Ocean Sys., So. Nashua, N.H.
Signal Analysis Inds. Corp., Hauppauge, N.Y.
Signatection, Inc., Waltham, Mass.
Sparton Corp., Jackson, Mich.
Spectral Dynamics Corp. San Diego, San Diego, Cal.
Spectrum Instrs., Inc., New Rochelle, N.Y.
Weston Instrs. Div., Hatboro, Pa
White Instrs., Inc., Austin, Tex.

Analyzers, Spectrum (Including Oscilloscopes With Plug-Ins)

Austron, Inc., Austin, Tex.
Bowmar Instr. Corp., Ft. Wayne, Ind.
Damon Corp., Needham Hgts., Mass.
EIP, Inc., Santa Clara, Cal.
Electro/Data, Inc., Garland, Tex. p 1559
Hewlett-Packard, Palo Alto, Cal.
Honeywell, Denver, Colo.
James Elctrns., Inc., Chicago, Ill.
Kay Elemetrics, Pine Brook, N.J.
Marconi Instrs., Englewood, N.J.
Nelson Ross Elctrns., Lake Success, N.Y. ..... p 536,537
Polarad Elctrn. Instrs., Lake Success, N.Y. ..... p 540
Quan-Tech, Whippany, N.J. ..... p 545,548
Rockland Sys. Corp., Blauvelt, N.Y.
Singer Instrumentation Los Angeles Oper., Los Angeles, Cal. ..... p 562
Singer Instrumentation Palo Alto Oper., Palo Alto, Cal. ..... p 562
Systron-Donner Corp., Concord, Cal. p 565
Systron-Donner Alpha Div., Oakland, Cal. ..... p 565
Systron-Donner Concord Instr. Div., Concord, Cal. ..... p 565
Systron-Donner Kruse Elctrns. Sub., Mountain View, Cal. ..... p 565
Tektronix, Inc., Beaverton, Ore.
Texscan Corp., Indianapolis, Ind. p 578
Watkins Johnson Co., Palo Alto, Cal.
AIL, Div. Cutler-Hammer, Inc., Deer Park, N.Y.
Alden Elctrn. & Impulse Record. Equip., Westboro, Mass.
Arco Systems Inc., Palo Alto, Cal
AUL Instrs., Inc., Flushng, N.Y.
B & K Instrs., Inc., Cleveland, Ohio
Baganoff Assocs., Inc., St. Louis, Mo.
Barry Resch. Corp., Palo Alto, Cal.
Beckman Instrs., (AISSD), Fullerton, Cal.
Bowmar/Ali, Inc., Acton, Mass.
Collins Radio Co., Cedar Rapids, Iowa
Collins Radio Co., Dallas, Tex.
Defense Elctrns., Inc., Rockville, Md.
Entron Inc., Morganville, N.J.
Fabri-Tek Instrs., Inc., Madison, Wisc.
Fairchild Electro-Metrics, Amsterdam, N.Y.
General Atronics, Military Elctrns., Phila., Pa.
General Radio Co., Concord, Mass.
Goodyear Aerospace Corp., Akron, Ohio
Hughes Aircraft Co, Culver City, Cal.
IRD Mechanalysis, Inc., Columbus, Ohio
Kinetic Tech., Inc., Santa Clara, Cal.
Lab Electro-Acoustique, 92-Rueil, Malmaison, France
Ling Elctrns., Anaheim, Calif.
Loral Elctrn. Sys., Bronx, N.Y.
MB Elctrns/Textron Co., New Haven, Conn.
Muirhead, Inc., Mountainside, N.J.
Novatronics, Inc., Pompano Beach, Fla.
Nuclear-Chicago, Des Plaines, Ill.
Packard Instrument Co., Inc., Downers Grove, Ill.
Philco-Ford Corp., Washington, D.C.
Sage Labs. Inc., Natick, Mass.
Schoeffel Instr. Corp., Westwood, N.J.
Siemens Corp., Comps. Div., Iselin, N.J.
Siemens Corp., Comm. Eq. Div., Iselin, N.J.
Signal Analysis Inds. Corp., Hauppauge, N.Y.
Signatection, Inc., Waltham, Mass.
Spectral Dynamics Corp. San Diego, San Diego, Cal.
Spectran Elctrns., Pompano Beach, Fla.
Spectrum Instrs., Inc., New Rochelle, N.Y.
Struthers Elctrns. Corp., Mamaroneck, N.Y.
Systems Engineering, Ltd., Grouse Creek, Utah
TEAC Corp. of Amer., Santa Monica, Cal
Technical Mat'l., Mamaroneck, N.Y.
Transducer Controls Corp., Covina, Calif.
Viewlex, Holbrook, N.Y.
Wandel & Goltermann, E. Hanover, N.J.
Weston Instruments, Inc., Newark, N.J.
Zeiss, Carl, Inc., New York, N.Y.

Analyzers, Surface—See Indicators, Surface Roughness

Analyzers, Telemetric Data

ADC Prods., Minneapolis, Minn.
Data-Control Systems, Danbury, Conn.
Nelson Ross Elctrns., Lake Success, N.Y. ..... p 537
Polarad Elctrn. Instrs., Lake Success, N.Y.
Solid State Elctrns., Sepulveda, Cal.
Watkins Johnson Co., Palo Alto, Cal.
Bell & Howell Co., Pasadena, Calif.
Defense Elctrns., Inc., Rockville, Md.
Dynamic Precision Controls, Hagerstown, Ind.
Harshaw Chem. Co., Cleveland, Ohio
Honeywell, Aerospace & Def., Minneapolis, Minn.
Hughes Aircraft Co, Fullerton, Cal.
Interlind Elctrns., Doraville, Ga.
Monitor Sys., Inc., Ft. Washington, Pa.
Signal Analysis Inds. Corp., Hauppauge, N.Y.
Spectral Dynamics Corp. San Diego, San Diego, Cal.
Taft Electrosystems, Inc., Metuchen, N. J.
Tau-Tron, Inc., Lowell, Mass.
Video Resch. Corp., Rockville, Md.

Analyzers, Transfer Function

Bafco, Inc., Warminster, Pa. ..... p 412
CELCO, Mahwah, N.J.
Dranetz Engrg. Labs., Plainfield, N.J. p 433,435
Hewlett-Packard, Palo Alto, Cal.
Ind'l. Control Co., Farmingdale, N.Y.
Marconi Instrs., Englewood, N.J. ... p 521
Quan-Tech, Whippany, N.J. ..... p 545
Universal Ad-Yu Elctrns., Inc., Passaic, N.J. ..... p 579,2752
Baganoff Assocs., Inc., St. Louis, Mo.
Ealing Corp., Cambridge, Mass.
Feedback, Inc., Berkeley Hghts., N.J.
General Radio Co., Concord, Mass.
Infrared Inds., Inc., Santa Barbara, Cal.
Ling Elctrns., Anaheim, Calif.
MB Elctrns/Textron Co., New Haven, Conn.
Optics Technology, Palo Alto, Calif.
Servo Corp. America, Hicksville, N.Y.
Signal Analysis Inds. Corp., Hauppauge, N.Y.
Singer - Tele-Signal, Woodbury, N.Y.
Spectral Dynamics Corp. San Diego, San Diego, Cal.
Systems Resch. Labs., Dayton, Ohio
Weston Instrs. Div., Hatboro, Pa
Zoomar, Inc., Glen Cove, N.Y.

Analyzers, Transistor—See Testers, Transistor

Analyzers, Ultrasonic

A. P. Circuit Corp., New York, N.Y.
Dranetz Engrg. Labs., Plainfield, N.J. p 436
James Elctrns., Inc., Chicago, Ill.
Nelson Ross Elctrns., Lake Success, N.Y. ..... p 536
Polarad Elctrn. Instrs., Lake Success, N.Y.
Quan-Tech, Whippany, N.J. ..... p 546
Advanced Patent Technology, Inc., Las Vegas, Nev.
B & K Instrs., Inc., Cleveland, Ohio
Chesapeake Instr. Corp., Shadyside, Md.
Delcon Div., Mt. View, Calif.
General Radio Co., Concord, Mass.
Lab Electro-Acoustique, 92-Rueil, Malmaison, France
Magnaflux Corp., Chicago, Ill.
NUS Corp., Paramus, N.J.
Shur-Lok Corp., Santa Ana, Calif.
Spectrum Instrs., Inc., New Rochelle, N.Y.
Techsonics, El Prado, N.M.
Weston Instrs. Div., Hatboro, Pa

Analyzers, Vibration

Bafco, Inc., Warminster, Pa. ..... p 412
Dytronics Co., Columbus, Ohio .... p 441
Frequency Engrg. Labs., Farmingdale, N.J.
Honeywell, Denver, Colo.
Kay Elemetrics, Pine Brook, N.J.
Metrix Instr. Co., Houston, Tex. ..... p 518
Nelson Ross Elctrns., Lake Success, N.Y.
Quan-Tech, Whippany, N.J.
Tektronix, Inc., Beaverton, Ore.
Universal Ad-Yu Elctrns., Inc., Passaic, N.J.
AGAC-Derritron, Inc., Alexandria, Va.
B & K Instrs., Inc., Cleveland, Ohio
Baganoff Assocs., Inc., St. Louis, Mo.
Balance Technology, Inc., Ann Arbor, Mich.
Bearing Inspection, Santa Fe Springs, Cal.
Bell & Howell Co., Pasadena, Calif.
Bell & Howell Co., Monrovia, Calif.
Bowmar/Ali, Inc., Acton, Mass.
Electrac, Inc., Anaheim, Calif.
Fabri-Tek Instrs., Inc., Madison, Wisc.
Fairchild Electro-Metrics, Amsterdam, N.Y.
General Radio Co., Concord, Mass.
Honeywell, Aerospace & Def., Minneapolis, Minn.
IRD Mechanalysis, Inc., Columbus, Ohio
Lab Electro-Acoustique, 92-Rueil, Malmaison, France
Ling Elctrns., Anaheim, Calif.
Listening, Inc., Arlington, Mass.
MB Elctrns/Textron Co., New Haven, Conn.
Micro Balancing, Inc., Farmingdale, N.Y.
Muirhead, Inc., Mountainside, N.J.
Philips Elctrn. Instrs., Mt. Vernon, N.Y.
Princeton Applied Resch. Corp., Princeton, N.J.
Reliance Elec. Co., Cleveland, Ohio
Robertshaw Controls Co., Anaheim, Cal.
Schenck Trebel Corp, Farmingdale, N. Y.
Signal Analysis Inds. Corp., Hauppauge, N.Y.
Spectral Dynamics Corp. San Diego, San Diego, Cal.
Spectrum Instrs., Inc., New Rochelle, N.Y.
Unholtz-Dickie Corp., Hamden, Conn.
Weston Instrs. Div., Hatboro, Pa
Wharton Unitools, Moosup, Conn.

Analyzers, Video

Nelson Ross Elctrns., Lake Success, N.Y. ..... p 537
Polarad Elctrn. Instrs., Lake Success, N.Y.
Quan-Tech, Whippany, N.J.
Tektronix, Inc., Beaverton, Ore.
Alden Elctrn. & Impulse Record. Equip., Westboro, Mass.
American Elctrn. Controls Co., Barrington, N.J.
Arco Systems Inc., Palo Alto, Cal
Collins Radio Co., Dallas, Tex.
Colorado Video, Inc., Boulder, Colo.
Denson Elctrns. Corp., Rockville, Conn.
Dynascan Corp., Chicago, Ill.
Fairchild Electro-Metrics, Amsterdam, N.Y.
ISC/Telephonics Div, Huntington, N.Y.
Lear Siegler, Inc., Santa Monica, Calif.
Rohde & Schwarz Sls., Passaic, N.J.
Siemens Corp., Comm. Eq. Div., Iselin, N.J.
Spectrum Instrs., Inc., New Rochelle, N.Y.
Systems Resch. Labs., Dayton, Ohio

Analyzers, Waveform—See Analyzers, Harmonic

Anechoic Chambers

Coax Devices Inc., Chelsea, Mass.
Eckel Inds., Inc., Cambridge, Mass.
Emerson & Cuming, Inc., Canton, Mass.
LectroMagnetics, Los Angeles, Cal.
Lindsay Structure, Evansville, Ind.
Radiation Sys., Inc., McLean, Va.
Ray Proof Corp., Norwalk, Conn.
Topper Mfg. Co., Inc., Great Neck, N.Y.

Angle-Of-Attack Indicators—See Indicators, Angle-Of-Attack

Annunciators—See Vol 2

Anodes, Electroplating—See Vol 3

Antenna Coils—See Coils, Antenna Loading—Vol 3

Antenna Couplers—See Couplers Antenna

Antenna Dummy Loads—See Dummy Loads—Vol 3

Antenna Feed Systems—See Vol 2

Antenna Filters—See Filters, Antenna—Vol 2

Antenna Housings-Also See Radomes

American Elctrn. Labs., Inc., Lansdale, Pa.
Adronics, Inc., Cedar Grove, N.J.
Andrew Corp., Orland Pk., Ill.
Basic Ceramics Inc., Hawthorne, N.J.
Ceram Corp., La Mesa, Calif.
Chu Assocs., Inc., Littleton, Mass.
Coax Devices Inc., Chelsea, Mass.
Corning Glass Works, Tech. Prods. Div., Corning, N.Y.
Dittmore-Freimuth Corp., Milwaukee, Wisc.
Hughes Aircraft Co, Fullerton, Cal.
Insulating Shapes, Inc., Bronx, N.Y.
Lance Inds., Sylmar, Calif.
Loral Elctrn. Sys., Bronx, N.Y.
LTV Electrosystems, Dallas, Tex.
Maxson Elctrns. Div., Great River, N.Y.
McMillan Radiation Labs, Inc., Ipswich, Mass.
Norelcom Inds., Inc., Farmingdale, N.Y.
Nurad, Inc., Baltimore, Md.
Radiation Sys., Inc., McLean, Va.
Scala Radio Corp., San Leandro, Cal.
Systron-Donner Microwave Div., Van Nuys, Cal.
TACO Div., Sherburne, N.Y.
Topper Mfg. Co., Inc., Great Neck, N.Y.
TRG Prods., E. Boston, Mass.
Dale Elctrns., Inc., Yankton, S.D.
GC Elctrns., Rockford, Ill.
Joslyn Elctrn. Sys., Goleta, Cal.
Saxton Prods., Congers, N.Y.
Anzac Elctrns., Waltham, Mass.
Ava Elctrns., Upper Darby, Pa.
Basic Ceramics Inc., Hawthorne, N.J.
Finney Co., Bedford, Ohio
Franklin Fibre-Lamitex, Wilmington, Del.
Hi-Lo Mfg. Corp., Chicago, Ill.
IE Mfg. Co., Chicago, Ill.
Lance Inds., Sylmar, Calif.
S & A Elctrns., Inc., Toledo, Ohio
Stainless, Inc., N. Wales, Pa.
TACO Div., Sherburne, N.Y.
Topper Mfg. Co., Inc., Great Neck, N.Y.
Tricraft Prods., Chicago, Ill.
VIKOA, Hoboken, N.J.

Antenna Lightning Arresters—See Arresters, Lightning—Vol 2

Antenna Pattern Analyzers—See Analyzers, Antenna Pattern

Antenna Pattern Recorders—See Recorders, Antenna Pattern

Antenna Position Indicators—See Indicators, Antenna Position

Antenna Reflectors

Frequency Engrg. Labs., Farmingdale, N.J.
Polarad Elctrn. Instrs., Lake Success, N.Y. ..... **p 540**
Advance Inds., Sioux City, Iowa
Ainslie Corp., S. Braintree, Mass.
Andrew Corp., Orland Pk., Ill.
Brooks & Perkins, Inc., Livonia, Mich.
Camusat Gueguen Telecom. Int'l., White Plains, N.Y.
Coax Devices Inc., Chelsea, Mass.
Dittmore-Freimuth Corp., Milwaukee, Wisc.
Elctrn. Comm., Inc., St. Petersburg, Fla.
Gabriel Elctrns. Corp., Saco, Me.
Goodyear Aerospace Corp., Akron, Ohio
Granite State Machine Co., Inc., Manchester, N.H.
GTE Sylvania Inc., Elctrn. Sys. Gp., Waltham, Mass.
Hughes Aircraft Co, Culver City, Cal.
Laminair, Inc., Los Angeles, Calif.
La Pointe Inds., Inc., Rockville, Conn.
Loral Elctrn. Sys., Bronx, N.Y.
LTV Electrosystems, Dallas, Tex.
MCS Corp., Monrovia, Calif.
Microflect Co., Salem, Ore.
Nurad, Inc., Baltimore, Md.
Philco-Ford Corp., Washington, D.C.
Prodelin, Inc., Hightstown, N.J.
Radiation Sys., Inc., McLean, Va.
RF Systems, Inc., Cohasset, Mass.
Rohn Mfg. Co., Peoria, Ill.
Scientific-Atlanta, Inc., Atlanta, Ga.
Sinclair Radio Labs., Maple, Ont., Can.
Stainless, Inc., N. Wales, Pa.
TACO Div., Sherburne, N.Y.
Teledyne Micronetics, San Diego, Calif.
TRG Prods., E. Boston, Mass.
Westinghouse Elec. Corp., Pittsburgh, Pa.

Antenna Rotators (Industrial & Military)

American Elctrn. Labs., Inc., Lansdale, Pa.
GC Elctrns., Rockford, Ill.
Ind'l. Control Co., Farmingdale, N.Y.
Alliance Mfg. Co., Alliance, Ohio
Allis, Louis Co., Milwaukee, Wisc.
Allis Louis Co., Greendale, Wisc.
Andrew Corp., Orland Pk., Ill.
Antenna Products Co., Austin, Texas
Blonder-Tongue Labs., Inc., Old Bridge, N.J.
Bogue Elec. Mfg. Co., Paterson, N.J.
Chu Assocs., Inc., Littleton, Mass.
Cornell-Dubilier Elctrns., Newark, N.J.
Gabriel Elctrns. Corp., Saco, Me.
GTE Sylvania Inc., Elctrn. Sys. Gp., Waltham, Mass.
Hughes Aircraft Co, Culver City, Cal.
IE Mfg. Co., Chicago, Ill.
Lear Siegler, Inc., Santa Monica, Calif.
Meltronics Inc., Wantagh, N.Y.
Philco-Ford Corp., Washington, D.C.
Scientific-Atlanta, Inc., Atlanta, Ga.
Struthers Elctrns. Corp., Mamaroneck, N.Y.
TACO Div., Sherburne, N.Y.
Task Corp., Anaheim, Calif.
Telrex Labs., Asbury Park, N.J.
TRG Prods., E. Boston, Mass.
Tri-Ex Tower Corp., Visalia, Calif.
USM Corp., Wakefield, Mass.

Antenna Switching Matrices

Applied Research Inc., Port Washington, N.Y.
Daico Inds., Inc., Compton, Cal.
Dow-Key, Santa Barbara, Cal.
LVC Ind's., Inc., Corona, N.Y.
Transco Prods., Inc., Venice, Cal. p 613
Trompeter Elctrns., Chatsworth, Cal.
Vega Precision Labs., Vienna, Va.
Adams-Russell Co., Waltham, Mass.
AMF Electrosystems Div., Vandalia, Ohio
Andrew Corp., Orland Pk., Ill.
Anritsu Electric Co., Ltd., Tokyo, Japan
Continental Elctrns. Mfg., Dallas, Tex.
Delta Elctrns., Alexandria, Va.
Elctrn. Resources Div., Los Angeles, Cal.
GTE Sylvania Inc., Elctrn. Sys. Gp., Waltham, Mass.
Hughes Aircraft Co, Culver City, Cal.
Loral Elctrn. Sys., Bronx, N.Y.
Matrix Sys. Corp., Chatsworth, Cal.
Microwave Div, Nashua, N.H.
Radiation Sys., Inc., McLean, Va.
Sanders Assocs., Nashua, N.H.
Scientific-Atlanta, Inc., Atlanta, Ga.
Sedco Sys., Inc., Farmingdale, N.Y.
Struthers Elctrns. Corp., Mamaroneck, N.Y.
Teledyne Micronetics, San Diego, Calif.
Virginia Elctrns. Co., Inc., Falls Church, Va.
Wheeler Lab. of Hazeltine Corp., Greenlawn, N.Y.

Antenna Towers & Supports

American Elctrn. Labs., Inc., Lansdale, Pa.
GC Elctrns., Rockford, Ill.
Adronics, Inc., Cedar Grove, N.J.
Advance Inds., Sioux City, Iowa
Ainslie Corp., S. Braintree, Mass.
American Tower Co., Shelby, Ohio
Antenna Products Co., Austin, Texas
Astro Resch. Corp., Santa Barbara, Cal
British Insulated Callender's Cables, Ltd., London WC1B 3QN, Eng.
Brooks & Perkins, Inc., Livonia, Mich.
Camusat Gueguen Telecom. Int'l., White Plains, N.Y.
Color/Craft Antenna Corp., N. Hollywood, Calif.
Copperweld Steel Co., Glassport, Pa.
Craig Sys. Corp., Lawrence, Mass.
E-Z Way Prods., Inc., Tampa, Fla.
Elctrn. Comm., Inc., St. Petersburg, Fla.
Finney Co., Bedford, Ohio
Granite State Machine Co., Inc., Manchester, N.H.
Hughes Aircraft Co, Culver City, Cal.
Hughes Aircraft Co, Fullerton, Cal.
IE Mfg. Co., Chicago, Ill.
Kline Iron & Steel Co., Inc., Columbia, S.C.
Lance Inds., Sylmar, Calif.
Mark Products Co., Skokie, Ill.
Microflect Co., Salem, Ore.
Philco-Ford Corp., Washington, D.C.
Radiation Sys., Inc., McLean, Va.
RCA Corp., Camden, N.J.
RF Systems, Inc., Cohasset, Mass.
Rohn Mfg. Co., Peoria, Ill.
Scientific-Atlanta, Inc., Atlanta, Ga.
Stainless, Inc., N. Wales, Pa.
TACO Div., Sherburne, N.Y.
Telrex Labs., Asbury Park, N.J.
Tri-Ex Tower Corp., Visalia, Calif.
Universal Prods. Engrg., Racine, Wisc.
Up-Right Scaffolds, Berkeley, Calif.
Western Coil & Elec. Co., Racine, Wisc.

Antennas, Airborne

American Elctrn. Labs., Inc., Lansdale, Pa.
American Nucleonics Corp., Woodland Hills, Cal. ..... **p 307**
Frequency Engrg. Labs., Farmingdale, N.J. ..... **p 605**
Norden Div., Norwalk, Conn.
Polarad Elctrn. Instrs., Lake Success, N.Y.
Transco Prods., Inc., Venice, Cal. p 613
Vega Precision Labs., Vienna, Va. p 615
Adams-Russell Co., Waltham, Mass.
AIL, Div. Cutler-Hammer, Inc., Deer Park, N.Y.
Ainslie Corp., S. Braintree, Mass.
Aircom, Inc., Union, N.H.
Amecom Div., College Park, Md.
Andrew Corp., Orland Pk., Ill.
Brooks & Perkins, Inc., Livonia, Mich.
Chu Assocs., Inc., Littleton, Mass.
Collins Radio Co., Cedar Rapids, Iowa
Collins Radio Co., Dallas, Tex.
Conductron Corp., St. Charles, Mo.
Copperweld Steel Co., Glassport, Pa.
Dalmo Victor, Belmont, Calif.
Dorne & Margolin, Inc., Bohemia, N.Y.
Elctrn. Comm., Inc., St. Petersburg, Fla.
Elctrn. Resources Div., Los Angeles, Cal.
General Dynamics, San Diego, Cal.
Goodyear Aerospace Corp., Akron, Ohio
Granite State Machine Co., Inc., Manchester, N.H.
GTE Sylvania Inc., Elctrn. Sys. Gp., Waltham, Mass.
Guide Inds., Inc., Sun Valley, Calif.
HRB-Singer, Inc., State College, Pa.
Hughes Aircraft Co, Culver City, Cal.
Hunter Spring, Hatfield, Pa.
Instru-Lec Corp., Mt. Vernon, N.Y.
ITT Aerospace, San Fernando, Cal.
Jerrold/Watkins Div., Toronto, 395, Ont., Can.
Kaman Nuclear, Colorado Springs, Colo.
Kevlin Mfg. Co., Woburn, Mass.
La Pointe Inds., Inc., Rockville, Conn.
Lockheed Aircraft Svc., Ont., Cal.
Loral Elctrn. Sys., Bronx, N.Y.
LTV Electrosystems, Dallas, Tex.
Maxson Elctrns. Div., Great River, N.Y.
Microwave Assocs., Inc., Burlington, Mass.
Microwave Div, Nashua, N.H.
Miller R.A. Inds., Inc., Grand Haven, Mich.
Narco Avionics, Ft. Washington, Pa.
New-Tronics Corp., Brookpark, Ohio
Nurad, Inc., Baltimore, Md.
Phelps Dodge Comm., North Haven, Conn.
Philco-Ford Corp., Washington, D.C.
Pickard & Burns Inc., Lindenhurst, N.Y.
Premier Microwave, Port Chester, N.Y.
Radiation Sys., Inc., McLean, Va.
Rantec Div., Calabasas, Calif.
Raytheon Co., Lexington, Mass.
RCA Govt. & Comm. Sys., Moorestown, N.J.
RF Systems, Inc., Cohasset, Mass.
Sanders Assocs., Nashua, N.H.
Sedco Sys., Inc., Farmingdale, N.Y.
Sinclair Radio Labs., Maple, Ont., Can.
Struthers Elctrns. Corp., Mamaroneck, N.Y.
Sunair Elctrn., Inc., Ft. Lauderdale, Fla.
Systron-Donner Microwave Div., Van Nuys, Cal.
TACO Div., Sherburne, N.Y.
Teledyne Micronetics, San Diego, Calif.
Titchener, E.H. & Co., Binghamton, N.Y.
TRG Prods., E. Boston, Mass.
Wheeler Lab. of Hazeltine Corp., Greenlawn, N.Y.

Antennas, Broadcasting (Commercial)

Alford Mfg. Co., Winchester, Mass.
American Elctrn. Labs., Inc., Lansdale, Pa.
Frequency Engrg. Labs., Farmingdale, N.J.
Advance Inds., Sioux City, Iowa
Ampex Corp., Redwood City, Calif.
CCA Elctrns. Corp., Gloucester, N.J.
Collins Radio Co., Dallas, Tex.
Continental Elctrns. Mfg., Dallas, Tex.
E-Z Way Prods., Inc., Tampa, Fla.
Electronics Missiles & Comms., White Haven, Pa.
Granite State Machine Co., Inc., Manchester, N.H.
Microwave Assocs., Inc., Burlington, Mass.
Radiation Sys., Inc., McLean, Va.
RCA Corp., Camden, N.J.
RF Systems, Inc., Cohasset, Mass.
Rohde & Schwarz Sls., Passaic, N.J.
Rohn Mfg. Co., Peoria, Ill.
Scala Radio Corp., San Leandro, Cal.
TACO Div., Sherburne, N.Y.
Thomson-CSF Inc., New York, N.Y.
Video Inds. Co., Port Chester, N.Y.

Antennas, Conical

American Elctrn. Labs., Inc., Lansdale, Pa.
American Nucleonics Corp., Woodland Hills, Cal
Electro-Mechanics Co., Austin, Tex. **p 452**
Frequency Engrg. Labs., Farmingdale, N.J. ..... **p 605**
GC Elctrns., Rockford, Ill.
Honeywell, Denver, Colo.
Vega Precision Labs., Vienna, Va.
AIL, Div. Cutler-Hammer, Inc., Deer Park, N.Y.
Amecom Div., College Park, Md.
Andrew Corp., Orland Pk., Ill.
Antenna Products Co., Austin, Texas
Chu Assocs., Inc., Littleton, Mass.
Color/Craft Antenna Corp., N. Hollywood, Calif.
Continental Elctrns. Mfg., Dallas, Tex.
Elctrn. Comm., Inc., St. Petersburg, Fla.
Elctrn. Resources Div., Los Angeles, Cal.
Engineering Assocs., Dayton, Ohio
Finney Co., Bedford, Ohio
Gavin Instrs., Somerville, N.J.
Granite State Machine Co., Inc., Manchester, N.H.
GTE Sylvania Inc., Elctrn. Sys. Gp., Waltham, Mass.
Hi-Lo Mfg. Corp., Chicago, Ill.
HRB-Singer, Inc., State College, Pa.
Hughes Aircraft Co, Culver City, Cal.
IE Mfg. Co., Chicago, Ill.
Kevlin Mfg. Co., Woburn, Mass.
Lance Inds., Sylmar, Calif.
Loral Elctrn. Sys., Bronx, N.Y.
LTV Electrosystems, Dallas, Tex.
Maspro Co., Inc., Nagoya-Shigai, Japan
Maxson Elctrns. Div., Great River, N.Y.
Microwave Div, Nashua, N.H.
Nurad, Inc., Baltimore, Md.
Philco-Ford Corp., Washington, D.C.
Radiation Sys., Inc., McLean, Va.
Rantec Div., Calabasas, Calif.
RF Systems, Inc., Cohasset, Mass.
S & A Elctrns., Inc., Toledo, Ohio
Sanders Assocs., Nashua, N.H.
Scientific-Atlanta, Inc., Atlanta, Ga.
Stainless, Inc., N. Wales, Pa.
Systron-Donner Microwave Div., Van Nuys, Cal.
TACO Div., Sherburne, N.Y.
Technical Mat'l., Mamaroneck, N.Y.
Teledyne Micronetics, San Diego, Calif.
Telrex Labs., Asbury Park, N.J.
TRG Prods., E. Boston, Mass.
Tricraft Prods., Chicago, Ill.

Trio Mfg. Co., Griggsville, Ill.
Wheeler Lab. of Hazeltine Corp., Greenlawn, N.Y.
Winegard Co., Burlington, Iowa

Antennas, Direction Finding

American Elctrn. Labs., Inc., Lansdale, Pa.
Cook Electric Co., Morton Grove, Ill.
Electro/Data, Inc., Garland, Tex.
Frequency Engrg. Labs., Farmingdale, N.J. ..... p 605
Vega Precision Labs., Vienna, Va.
Adams-Russell Co., Waltham, Mass.
Aerospace Resch. Inc., Boston, Mass.
AIL, Div. Cutler-Hammer, Inc., Deer Park, N.Y.
Amecom Div., College Park, Md.
Beukers Labs., Inc., Hauppauge, N.Y.
Chu Assocs., Inc., Littleton, Mass.
Collins Radio Co., Cedar Rapids, Iowa
Collins Radio Co., Dallas, Tex.
Conductron Corp., St. Charles, Mo.
Dittmore-Freimuth Corp., Milwaukee, Wisc.
Dorne & Margolin, Inc., Bohemia, N.Y.
Gold Line Connector, Inc., Norwalk, Conn.
Granite State Machine Co., Inc., Manchester, N.H.
GTE Sylvania Inc., Elctrn. Sys. Gp., Waltham, Mass.
Hermes Elctrns., Dartmouth N.S., Can.
HRB-Singer, Inc., State College, Pa.
Hughes Aircraft Co, Culver City, Cal.
Hughes Aircraft Co, Fullerton, Cal.
ITT Aerospace, San Fernando, Cal.
ITT Mackay Marine, Clark, N.J.
Kevlin Mfg. Co., Woburn, Mass.
Lance Inds., Sylmar, Calif.
Lockheed Aircraft Svc., Ont., Cal.
Loral Elctrn. Sys., Bronx, N.Y.
LTV Electrosystems, Dallas, Tex.
Maxson Elctrns. Div., Great River, N.Y.
Nurad, Inc., Baltimore, Md.
Philco-Ford Corp., Washington, D.C.
Premier Microwave, Port Chester, N.Y.
Radiation Sys., Inc., McLean, Va.
Rohde & Schwarz Sls., Passaic, N.J.
Scala Radio Corp., San Leandro, Cal.
Scientific-Atlanta, Inc., Atlanta, Ga.
Servo Corp. America, Hicksville, N.Y.
Systems Resch. Labs., Dayton, Ohio
TACO Div., Sherburne, N.Y.
Telrex Labs., Asbury Park, N.J.
Titchener, E.H. & Co., Binghamton, N.Y.
TRG Prods., E. Boston, Mass.
Wheeler Lab. of Hazeltine Corp., Greenlawn, N.Y.

Antennas, Ferrite

A.L.A. Inds., Inc., Harrison, N.Y.. p 1645
Automatic Coil, New Hyde Pk., N.Y.
Frequency Engrg. Labs., Farmingdale, N.J.
Miller, J.W. Co., Compton, Cal.
AIL, Div. Cutler-Hammer, Inc., Deer Park, N.Y.
Custom Components, Inc., Caldwell, N.J.
El-Rad Mfg. Co., Chicago, Ill.
Granite State Machine Co., Inc., Manchester, N.H.
GTE Sylvania Inc., Elctrn. Sys. Gp., Waltham, Mass.
Hughes Aircraft Co, Culver City, Cal.
Lance Inds., Sylmar, Calif.
National Moldite, Newark, N.J.
Pickard & Burns Inc., Lindenhurst, N.Y.
Premier Microwave, Port Chester, N.Y.
Radiation Sys., Inc., McLean, Va.
Rollan Electric Co., Chicago, Ill
Siemens Corp., Comps. Div., Iselin, N.J.
Superex Elctrns. Corp., Yonkers, N.Y.
TACO Div., Sherburne, N.Y.
TDK Elctrns. Corp., Long Island City, N.Y.
Workman Elctrn. Prods., Inc., Sarasota, Fla.

Antennas, Ground Plane

American Elctrn. Labs., Inc., Lansdale, Pa.
American Nucleonics Corp., Woodland Hills, Cal
Frequency Engrg. Labs., Farmingdale, N.J.
Honeywell, Denver, Colo.
Adronics, Inc., Cedar Grove, N.J.
Advance Inds., Sioux City, Iowa
Advance Ross Elctrns. Corp., Chicago, Ill.
AIL, Div. Cutler-Hammer, Inc., Deer Park, N.Y.
Ainslie Corp., S. Braintree, Mass.
Andrew Corp., Orland Pk., Ill.
Antenna Products Co., Austin, Texas
Chu Assocs., Inc., Littleton, Mass.
Communications Co., Inc., Coral Gables, Fla.
Decibel Prods., Inc., Dallas, Tex.
Dittmore-Freimuth Corp., Milwaukee, Wisc.
Elctrn. Comm., Inc., St. Petersburg, Fla.
Elctrn. Resources Div., Los Angeles, Cal.
Finney Co., Bedford, Ohio
Granite State Machine Co., Inc., Manchester, N.H.
GTE Sylvania Inc., Elctrn. Sys. Gp., Waltham, Mass.
Hughes Aircraft Co, Fullerton, Cal.
Hunter Spring, Hatfield, Pa.
Kreckman, Herb Co., Cresco, Pa.
Lindsay Antenna & Specialty Prods., Lindsay, Ont., Canada
Mark Products Co., Skokie, Ill.
Maspro Co., Inc., Nagoya-Shigai, Japan
Miller R.A. Inds., Inc., Grand Haven, Mich.
Mobil Elctrns., Inc., Anderson, Ind.
New-Tronics Corp., Brookpark, Ohio
Nurad, Inc., Baltimore, Md.
Pearce-Simpson, Miami, Fla.
Phelps Dodge Comm., North Haven, Conn.
Premax Prods. Div., Niagara Falls, N.Y.
Premier Microwave, Port Chester, N.Y.
Prodelin, Inc., Hightstown, N.J.
Radiation Sys., Inc., McLean, Va.
RF Communications, Inc., Rochester, N.Y.
RF Systems, Inc., Cohasset, Mass.
Scala Radio Corp., San Leandro, Cal.
Scientific-Atlanta, Inc., Atlanta, Ga.
Sinclair Radio Labs., Maple, Ont., Can.
Struthers Elctrns. Corp., Mamaroneck, N.Y.
Systron-Donner Microwave Div., Van Nuys, Cal.
TACO Div., Sherburne, N.Y.
Technical Mat'l., Mamaroneck, N.Y.
Telrex Labs., Asbury Park, N.J.
Ward Products Corp., Amsterdam, N.Y.
Wheeler Lab. of Hazeltine Corp., Greenlawn, N.Y.

Antennas, Helical

American Nucleonics Corp., Woodland Hills, Cal
Frequency Engrg. Labs., Farmingdale, N.J.
Transco Prods., Inc., Venice, Cal. p 613
Vega Precision Labs., Vienna, Va.
Adronics, Inc., Cedar Grove, N.J.
AIL, Div. Cutler-Hammer, Inc., Deer Park, N.Y.
Amecom Div., College Park, Md.
Andrew Corp., Orland Pk., Ill.
Antenna Products Co., Austin, Texas
Chu Assocs., Inc., Littleton, Mass.
Coax Devices Inc., Chelsea, Mass.
Collins Radio Co., Cedar Rapids, Iowa
Collins Radio Co., Dallas, Tex.
Elctrn. Comm., Inc., St. Petersburg, Fla.
Elctrn. Resources Div., Los Angeles, Cal.
Granite State Machine Co., Inc., Manchester, N.H.
GTE Sylvania Inc., Elctrn. Sys. Gp., Waltham, Mass.
Herley Inds., Inc., Syosset, N.Y.
HRB-Singer, Inc., State College, Pa.
Hughes Aircraft Co, Culver City, Cal.
Hunter Spring, Hatfield, Pa.
Jerrold/Watkins Div., Toronto, 395, Ont., Can.
Kevlin Mfg. Co., Woburn, Mass.
LTV Electrosystems, Dallas, Tex.
Mark Products Co., Skokie, Ill.
Premier Microwave, Port Chester, N.Y.
Radiation Sys., Inc., McLean, Va.
Rantec Div., Calabasas, Calif.
RF Systems, Inc., Cohasset, Mass.
Sinclair Radio Labs., Maple, Ont., Can.
TACO Div., Sherburne, N.Y.
TRG Prods., E. Boston, Mass.
Wheeler Lab. of Hazeltine Corp., Greenlawn, N.Y.

Antennas, Log-Periodic

American Elctrn. Labs., Inc., Lansdale, Pa.
American Nucleonics Corp., Woodland Hills, Cal
Electro/Data, Inc., Garland, Tex. p 1558
Frequency Engrg. Labs., Farmingdale, N.J.
GC Elctrns., Rockford, Ill.
Polarad Elctrn. Instrs., Lake Success, N.Y.
Vega Precision Labs., Vienna, Va.
Advance Inds., Sioux City, Iowa
AIL, Div. Cutler-Hammer, Inc., Deer Park, N.Y.
Amecom Div., College Park, Md.
Andrew Corp., Orland Pk., Ill.
Antenna Products Co., Austin, Texas
Blonder-Tongue Labs., Inc., Old Bridge, N.J.
Chu Assocs., Inc., Littleton, Mass.
Collins Radio Co., Dallas, Tex.
Color/Craft Antenna Corp., N. Hollywood, Calif.
Continental Elctrns. Mfg., Dallas, Tex.
Dalmo Victor, Belmont, Calif.
Elctrn. Comm., Inc., St. Petersburg, Fla.
Elctrn. Resources Div., Los Angeles, Cal.
Electrospace Systems, Richardson, Tex.
Granite State Machine Co., Inc., Manchester, N.H.
GTE Sylvania Inc., Elctrn. Sys. Gp., Waltham, Mass.
Hi-Lo Mfg. Corp., Chicago, Ill.
HRB-Singer, Inc., State College, Pa.
Hughes Aircraft Co, Culver City, Cal.
Jerrold Elctrns. Corp., Philadelphia, Pa.
Jerrold/Watkins Div., Toronto, 395, Ont., Can.
Kevlin Mfg. Co., Woburn, Mass.
Lance Inds., Sylmar, Calif.
Lindsay Antenna & Specialty Prods., Lindsay, Ont., Canada
LTV Electrosystems, Dallas, Tex.
Mark Products Co., Skokie, Ill.
Nurad, Inc., Baltimore, Md.
Phelps Dodge Comm., North Haven, Conn.
Philco-Ford Corp., Washington, D.C.
Prodelin, Inc., Hightstown, N.J.
Radiation Sys., Inc., McLean, Va.
RF Systems, Inc., Cohasset, Mass.
Rohde & Schwarz Sls., Passaic, N.J.
S & A Elctrns., Inc., Toledo, Ohio
Scala Radio Corp., San Leandro, Cal.
Scientific-Atlanta, Inc., Atlanta, Ga.
Sinclair Radio Labs., Maple, Ont., Can.
Stainless, Inc., N. Wales, Pa.
TACO Div., Sherburne, N.Y.
Telrex Labs., Asbury Park, N.J.
Tricraft Prods., Chicago, Ill.
Wheeler Lab. of Hazeltine Corp., Greenlawn, N.Y.

Antennas, Loop

A.L.A. Inds., Inc., Harrison, N.Y.. p 1645
Austron, Inc., Austin, Tex.
Connector Corp., Chicago, Ill. .... p 2613
Frequency Engrg. Labs., Farmingdale, N.J.
Honeywell, Denver, Colo.
Adronics, Inc., Cedar Grove, N.J.
Advance Ross Elctrns. Corp., Chicago, Ill.
Aerospace Resch. Inc., Boston, Mass.
AIL, Div. Cutler-Hammer, Inc., Deer Park, N.Y.
C.B.C. Inds., Inc., Ft. Washington, Pa.
El-Rad Mfg. Co., Chicago, Ill.
Elctrn. Comm., Inc., St. Petersburg, Fla.
Granite State Machine Co., Inc., Manchester, N.H.
GTE Sylvania Inc., Elctrn. Sys. Gp., Waltham, Mass.
Hermes Elctrns., Dartmouth N.S., Can.
Hi-Lo Mfg. Corp., Chicago, Ill.
HRB-Singer, Inc., State College, Pa.
Hughes Aircraft Co, Culver City, Cal.
Hughes Aircraft Co, Fullerton, Cal.
Miller R.A. Inds., Inc., Grand Haven, Mich.
Narco Avionics, Ft. Washington, Pa.
Pickard & Burns Inc., Lindenhurst, N.Y.
Radiation Sys., Inc., McLean, Va.
Rohde & Schwarz Sls., Passaic, N.J.
Rollan Electric Co., Chicago, Ill
S & A Elctrns., Inc., Toledo, Ohio
Servo Corp. America, Hicksville, N.Y.
Struthers Elctrns. Corp., Mamaroneck, N.Y.
TACO Div., Sherburne, N.Y.
Tricraft Prods., Chicago, Ill.
Wheeler Lab. of Hazeltine Corp., Greenlawn, N.Y.

Antennas, Microwave

Alford Mfg. Co., Winchester, Mass.
American Elctrn. Labs., Inc., Lansdale, Pa. ..... p 1552
American Nucleonics Corp., Woodland Hills, Cal..... p 307
Amphenol RF Div., Danburry, Conn.
Electro/Data, Inc., Garland, Tex. p 1558
Electro-Mechanics Co., Austin, Tex. p 452
Frequency Engrg. Labs., Farmingdale, N.J. ..... p 605
Microwave Cavity Labs., La Grange, Ill.
Nippon Electric/NEC America, N.Y., N.Y.
Polarad Elctrn. Instrs., Lake Success, N.Y. ..... p 540
Transco Prods., Inc., Venice, Cal. p 613
Vega Precision Labs., Vienna, Va. p 615
Waveline, Inc., W. Caldwell, N.J.
Adams-Russell Co., Waltham, Mass.
Advance Inds., Sioux City, Iowa
AIL, Div. Cutler-Hammer, Inc., Deer Park, N.Y.
Ainslie Corp., S. Braintree, Mass.
Aircom, Inc., Union, N.H.
Airtec, Inc., Roselle, N.J.
Amecom Div., College Park, Md.
Andrew Corp., Orland Pk., Ill.
Camusat Gueguen Telecom. Int'l., White Plains, N.Y.
Cardwell Condenser, Lindenhurst, N.Y.
Chu Assocs., Inc., Littleton, Mass.
Collins Radio Co., Dallas, Tex.
Conductron Corp., St. Charles, Mo.
Corning Glass Works, Tech. Prods. Div., Corning, N.Y.
Dalmo Victor, Belmont, Calif.
Decibel Prods., Inc., Dallas, Tex.
Dorne & Margolin, Inc., Bohemia, N.Y.
Elctrn. Resources Div., Los Angeles, Cal.
General Dynamics, San Diego, Cal.
Goodyear Aerospace Corp., Akron, Ohio
Granite State Machine Co., Inc., Manchester, N.H.
GTE Sylvania Inc., Elctrn. Sys. Gp., Waltham, Mass.
Guide Inds., Inc., Sun Valley, Calif.
Herley Inds., Inc., Syosset, N.Y.
Hughes Aircraft Co, Culver City, Cal.
Hughes Aircraft Co, Fullerton, Cal.
Jerrold/Watkins Div., Toronto, 395, Ont., Can.
Kevlin Mfg. Co., Woburn, Mass.
Loral Elctrn. Sys., Bronx, N.Y.
LTV Electrosystems, Dallas, Tex.
Mark Products Co., Skokie, Ill.
Maury Microwave Corp., Cucamonga, Calif.
Maxson Elctrns. Div., Great River, N.Y.
MCS Corp., Monrovia, Calif.
Microwave Assocs., Inc., Burlington, Mass.
Microwave Div. Nashua, N.H.
Microwave Filter Co., Inc., East Syracuse, N.Y.
Microwave Prods., Inc., Chatsworth, Cal.
Narda Microwave Corp., Plainview, N.Y.
Nurad, Inc., Baltimore, Md.
OKI Elctrns. America, Ft. Lauderdale, Fla.
Omega Labs., Inc., Rowley, Mass.
Premier Microwave, Port Chester, N.Y.
Prodelin, Inc., Hightstown, N.J.
Radiation Sys., Inc., McLean, Va.
Rantec Div., Calabasas, Calif.
Raytheon Data Systems Co., Norwood, Mass.
Raytheon Co., Lexington, Mass.
RCA Corp., Camden, N.J.
RF Systems, Inc., Cohasset, Mass.
Rohde & Schwarz Sls., Passaic, N.J.
Rohn Mfg. Co., Peoria, Ill.
Sanders Assocs., Nashua, N.H.
Scientific-Atlanta, Inc., Atlanta, Ga.
Sedco Sys., Inc., Farmingdale, N.Y.
Sinclair Radio Labs., Maple, Ont., Can.
Stainless, Inc., N. Wales, Pa.
Struthers Elctrns. Corp., Mamaroneck, N.Y.
Systron-Donner Microwave Div., Van Nuys, Cal.
TACO Div., Sherburne, N.Y.

Teledyne Micronetics, San Diego, Calif.
Torngren Co., Somerville, Mass.
TRG Prods., E. Boston, Mass.
Varian Assoc., Beverly, Mass
Victor Microwave, Inc., Wakefield, Mass.
Wheeler Lab. of Hazeltine Corp., Greenlawn, N.Y.

Antennas, Mobile

Frequency Engrg. Labs., Farmingdale, N.J.
Vega Precision Labs., Vienna, Va.
Adronics, Inc., Cedar Grove, N.J.
AIL, Div. Cutler-Hammer, Inc., Deer Park, N.Y.
Avco Corp., Cincinnati, Ohio
Craig Sys. Corp., Lawrence, Mass.
Decibel Prods., Inc., Dallas, Tex.
Dorne & Margolin, Inc., Bohemia, N.Y.
Francis Inds., Pataskala, Ohio
Hughes Aircraft Co, Culver City, Cal.
Hughes Aircraft Co, Fullerton, Cal.
Master Mobile Mounts, Fort Myers, Fla.
Microwave Assocs., Inc., Burlington, Mass.
Mobil Elctrns., Inc., Anderson, Ind.
New-Tronics Corp., Brookpark, Ohio
Pearce-Simpson, Miami, Fla.
Phelps Dodge Comm., North Haven, Conn.
Philco-Ford Corp., Washington, D.C.
Premax Prods. Div., Niagara Falls, N.Y.
Prodelin, Inc., Hightstown, N.J.
Rantec Div., Calabasas, Calif.
RF Communications, Inc., Rochester, N.Y.
Sinclair Radio Labs., Maple, Ont., Can.
TACO Div., Sherburne, N.Y.
Titchener, E.H. & Co., Binghamton, N.Y.
Ward Products Corp., Amsterdam, N.Y.

Antennas, Parabolic

American Elctrn. Labs., Inc., Lansdale, Pa.
American Nucleonics Corp., Woodland Hills, Cal
Arra Inc., Bayshore, N.Y.
Frequency Engrg. Labs., Farmingdale, N.J. ..... **p 605**
Nippon Electric/NEC America, N.Y., N.Y.
Vega Precision Labs., Vienna, Va.
Advance Inds., Sioux City, Iowa
AIL, Div. Cutler-Hammer, Inc., Deer Park, N.Y.
Ainslie Corp., S. Braintree, Mass.
Amecom Div., College Park, Md.
Andrew Corp., Orland Pk., Ill.
Brooks & Perkins, Inc., Livonia, Mich.
Camusat Gueguen Telecom. Int'l., White Plains, N.Y.
Chu Assocs., Inc., Littleton, Mass.
Collins Radio Co., Dallas, Tex.
Color/Craft Antenna Corp., N. Hollywood, Calif.
Dalmo Victor, Belmont, Calif.
Decibel Prods., Inc., Dallas, Tex.
Dittmore-Freimuth Corp., Milwaukee, Wisc.
Fedtro, Inc., Rockville Centre, N.Y.
Finney Co., Bedford, Ohio
Gabriel Elctrns. Corp., Saco, Me.
Goodyear Aerospace Corp., Akron, Ohio
Granite State Machine Co., Inc., Manchester, N.H.
GTE Sylvania Inc., Elctrn. Sys. Gp., Waltham, Mass.
Hughes Aircraft Co, Fullerton, Cal.
Jerrold/Watkins Div., Toronto, 395, Ont., Can.
Kevlin Mfg. Co., Woburn, Mass.
Laminair, Inc., Los Angeles, Calif.
Lance Inds., Sylmar, Calif.
La Pointe Inds., Inc., Rockville, Conn.
LTV Electrosystems, Dallas, Tex.
Mark Products Co., Skokie, Ill.
MCS Corp., Monrovia, Calif.
Microwave Filter Co., Inc., East Syracuse, N.Y.
Nurad, Inc., Baltimore, Md.
OKI Elctrns. America, Ft. Lauderdale, Fla.
Philco-Ford Corp., Washington, D.C.
Premier Microwave, Port Chester, N.Y.
Prodelin, Inc., Hightstown, N.J.
Radiation Sys., Inc., McLean, Va.
RCA Govt. & Comm. Sys., Moorestown, N.J.
RF Systems, Inc., Cohasset, Mass.
Rohde & Schwarz Sls., Passaic, N.J.
Scala Radio Corp., San Leandro, Cal.
Scientific-Atlanta, Inc., Atlanta, Ga.
Sinclair Radio Labs., Maple, Ont., Can.
Stainless, Inc., N. Wales, Pa.
TACO Div., Sherburne, N.Y.
Torngren Co., Somerville, Mass.
TRG Prods., E. Boston, Mass.
Wheeler Lab. of Hazeltine Corp., Greenlawn, N.Y.

Antennas, Phased Array

American Elctrn. Labs., Inc., Lansdale, Pa.
American Nucleonics Corp., Woodland Hills, Cal
Frequency Engrg. Labs., Farmingdale, N.J.
GC Elctrns., Rockford, Ill.
Adronics, Inc., Cedar Grove, N.J.
Aerospace Resch. Inc., Boston, Mass.
AIL, Div. Cutler-Hammer, Inc., Deer Park, N.Y.
Andrew Corp., Orland Pk., Ill.
Chu Assocs., Inc., Littleton, Mass.
Collins Radio Co., Dallas, Tex.
Color/Craft Antenna Corp., N. Hollywood, Calif.
Decibel Prods., Inc., Dallas, Tex.
Elctrn. Resources Div., Los Angeles, Cal.
General Atronics, Military Elctrns., Phila., Pa.
Goodyear Aerospace Corp., Akron, Ohio
Granite State Machine Co., Inc., Manchester, N.H.
GTE Sylvania Inc., Elctrn. Sys. Gp., Waltham, Mass.
Hermes Elctrns., Dartmouth N.S., Can.
HRB-Singer, Inc., State College, Pa.
Hughes Aircraft Co, Fullerton, Cal.
Jerrold/Watkins Div., Toronto, 395, Ont., Can.
La Pointe Inds., Inc., Rockville, Conn.
Loral Elctrn. Sys., Bronx, N.Y.
LTV Electrosystems, Dallas, Tex.
Mark Products Co., Skokie, Ill.
Maxson Elctrns. Div., Great River, N.Y.
Microwave Assocs., Inc., Burlington, Mass.
Microwave Div, Nashua, N.H.
Nurad, Inc., Baltimore, Md.
Philco-Ford Corp., Washington, D.C.
Premier Microwave, Port Chester, N.Y.
Radiation Sys., Inc., McLean, Va.
Rantec Div., Calabasas, Calif.
Raytheon Co., Lexington, Mass.
RCA Govt. & Comm. Sys., Moorestown, N.J.
RF Systems, Inc., Cohasset, Mass.
S & A Elctrns., Inc., Toledo, Ohio
Sanders Assocs., Nashua, N.H.
Scala Radio Corp., San Leandro, Cal.
Scientific-Atlanta, Inc., Atlanta, Ga.
Sedco Sys., Inc., Farmingdale, N.Y.
Sinclair Radio Labs., Maple, Ont., Can.
Sitco Antennas, Portland, Ore.
TACO Div., Sherburne, N.Y.
Technical Mat'l., Mamaroneck, N.Y.
Teledyne Micronetics, San Diego, Calif.
TRG Prods., E. Boston, Mass.
Trio Mfg. Co., Griggsville, Ill.
Wheeler Lab. of Hazeltine Corp., Greenlawn, N.Y.
Winegard Co., Burlington, Iowa

Antennas, Radar

American Nucleonics Corp., Woodland Hills, Cal
Frequency Engrg. Labs., Farmingdale, N.J. ..... **p 605**
Vega Precision Labs., Vienna, Va.
Aerospace Resch. Inc., Boston, Mass.
AIL, Div. Cutler-Hammer, Inc., Deer Park, N.Y.
Ainslie Corp., S. Braintree, Mass.
Airtec, Inc., Roselle, N.J.
Amecom Div., College Park, Md.
Andrew Corp., Orland Pk., Ill.
Avco Corp., Cincinnati, Ohio
Bedford Div., Bedford, Mass.
Brooks & Perkins, Inc., Livonia, Mich.
Chu Assocs., Inc., Littleton, Mass.
Collins Radio Co., Cedar Rapids, Iowa
Collins Radio Co., Dallas, Tex.
Conductron Corp., St. Charles, Mo.
Continental Elctrns. Mfg., Dallas, Tex.
Dalmo Victor, Belmont, Calif.
Dittmore-Freimuth Corp., Milwaukee, Wisc.
General Dynamics, San Diego, Cal.
Goodyear Aerospace Corp., Akron, Ohio
Granite State Machine Co., Inc., Manchester, N.H.
GTE Sylvania Inc., Elctrn. Sys. Gp., Waltham, Mass.
Guide Inds., Inc., Sun Valley, Calif.
Herley Inds., Inc., Syosset, N.Y.
Hughes Aircraft Co, Culver City, Cal.
Hughes Aircraft Co, Fullerton, Cal.
Kevlin Mfg. Co., Woburn, Mass.
Lance Inds., Sylmar, Calif.
La Pointe Inds., Inc., Rockville, Conn.
Lockheed Elctrns. Co., Watchung, N.J.
Loral Elctrn. Sys., Bronx, N.Y.
LTV Electrosystems, Dallas, Tex.
Maxson Elctrns. Div., Great River, N.Y.
Microwave Assocs., Inc., Burlington, Mass.
Miller R.A. Inds., Inc., Grand Haven, Mich.
Nurad, Inc., Baltimore, Md.
Premier Microwave, Port Chester, N.Y.
Prodelin, Inc., Hightstown, N.J.
Radiation Sys., Inc., McLean, Va.
Rantec Div., Calabasas, Calif.
Raytheon Co., Lexington, Mass.
RCA Govt. & Comm. Sys., Moorestown, N.J.
RF Systems, Inc., Cohasset, Mass.
Scientific-Atlanta, Inc., Atlanta, Ga.
Sedco Sys., Inc., Farmingdale, N.Y.
TACO Div., Sherburne, N.Y.
Teledyne Micronetics, San Diego, Calif.
Titchener, E.H. & Co., Binghamton, N.Y.
TRG Prods., E. Boston, Mass.
Wheeler Lab. of Hazeltine Corp., Greenlawn, N.Y.

Antennas, Rhombic

American Elctrn. Labs., Inc., Lansdale, Pa.
Frequency Engrg. Labs., Farmingdale, N.J.
Vega Precision Labs., Vienna, Va.
Advance Ross Elctrns. Corp., Chicago, Ill.
Antenna Products Co., Austin, Texas
Continental Elctrns. Mfg., Dallas, Tex.
Granite State Machine Co., Inc., Manchester, N.H.
GTE Sylvania Inc., Elctrn. Sys. Gp., Waltham, Mass.
Hughes Aircraft Co, Culver City, Cal.
Hughes Aircraft Co, Fullerton, Cal.
Maxson Elctrns. Div., Great River, N.Y.
Radiation Sys., Inc., McLean, Va.
Rohde & Schwarz Sls., Passaic, N.J.
Sinclair Radio Labs., Maple, Ont., Can.
Stainless, Inc., N. Wales, Pa.
TACO Div., Sherburne, N.Y.
Technical Mat'l., Mamaroneck, N.Y.

Antennas, Rotary Beam

Frequency Engrg. Labs., Farmingdale, N.J.
Aerospace Resch. Inc., Boston, Mass.
Antenna Products Co., Austin, Texas
Finney Co., Bedford, Ohio
Gabriel Elctrns. Corp., Saco, Me.
Granite State Machine Co., Inc., Manchester, N.H.
GTE Sylvania Inc., Elctrn. Sys. Gp., Waltham, Mass.
Hughes Aircraft Co, Culver City, Cal.
Hughes Aircraft Co, Fullerton, Cal.
Kreckman, Herb Co., Cresco, Pa.
Lance Inds., Sylmar, Calif.
La Pointe Inds., Inc., Rockville, Conn.
Maxson Elctrns. Div., Great River, N.Y.
New-Tronics Corp., Brookpark, Ohio
Radiation Sys., Inc., McLean, Va.
Scientific-Atlanta, Inc., Atlanta, Ga.
Sinclair Radio Labs., Maple, Ont., Can.
TACO Div., Sherburne, N.Y.
Telrex Labs., Asbury Park, N.J.
TRG Prods., E. Boston, Mass.
Wheeler Lab. of Hazeltine Corp., Greenlawn, N.Y.

Antennas, Scatter Propagation

Frequency Engrg. Labs., Farmingdale, N.J.
Andrew Corp., Orland Pk., Ill.
Camusat Gueguen Telecom. Int'l., White Plains, N.Y.
Collins Radio Co., Dallas, Tex.
Gabriel Elctrns. Corp., Saco, Me.
Granite State Machine Co., Inc., Manchester, N.H.
GTE Sylvania Inc., Elctrn. Sys. Gp., Waltham, Mass.
Hughes Aircraft Co, Culver City, Cal.
Hughes Aircraft Co, Fullerton, Cal.
Kaman Nuclear, Colorado Springs, Colo.
Kevlin Mfg. Co., Woburn, Mass.
Maxson Elctrns. Div., Great River, N.Y.
Nurad, Inc., Baltimore, Md.
Philco-Ford Corp., Washington, D.C.
Premier Microwave, Port Chester, N.Y.
Radiation Sys., Inc., McLean, Va.
RF Systems, Inc., Cohasset, Mass.
Sinclair Radio Labs., Maple, Ont., Can.
Stainless, Inc., N. Wales, Pa.
TACO Div., Sherburne, N.Y.
Telrex Labs., Asbury Park, N.J.
TRG Prods., E. Boston, Mass.

Antennas, Spiral

American Elctrn. Labs., Inc., Lansdale, Pa.
American Nucleonics Corp., Woodland Hills, Cal. ..... **p 307**
Arra Inc., Bayshore, N.Y.
Electro/Data, Inc., Garland, Tex. p 1558
Electro-Mechanics Co., Austin, Tex. p 452
Frequency Engrg. Labs., Farmingdale, N.J. ..... **p 605**
Transco Prods., Inc., Venice, Cal. p 613
Vega Precision Labs., Vienna, Va.
Amecom Div., College Park, Md.
Chu Assocs., Inc., Littleton, Mass.
Dalmo Victor, Belmont, Calif.
Dorne & Margolin, Inc., Bohemia, N.Y.
Elctrn. Comm., Inc., St. Petersburg, Fla.
Elctrn. Resources Div., Los Angeles, Cal.
Granite State Machine Co., Inc., Manchester, N.H.
GTE Sylvania Inc., Elctrn. Sys. Gp., Waltham, Mass.
Hi-Lo Mfg. Corp., Chicago, Ill.
HRB-Singer, Inc., State College, Pa.
Hughes Aircraft Co, Culver City, Cal.
Hunter Spring, Hatfield, Pa.
Kaman Nuclear, Colorado Springs, Colo.
Kevlin Mfg. Co., Woburn, Mass.
Mark Products Co., Skokie, Ill.
Maxson Elctrns. Div., Great River, N.Y.
Premier Microwave, Port Chester, N.Y.
Radiation Sys., Inc., McLean, Va.
Rantec Div., Calabasas, Calif.
Scientific-Atlanta, Inc., Atlanta, Ga.
Sedco Sys., Inc., Farmingdale, N.Y.
TACO Div., Sherburne, N.Y.
Teledyne Micronetics, San Diego, Calif.
Telrex Labs., Asbury Park, N.J.
Tricraft Prods., Chicago, Ill.
Wheeler Lab. of Hazeltine Corp., Greenlawn, N.Y.

Antennas, Telemetry, Tracking

American Elctrn. Labs., Inc., Lansdale, Pa.
Frequency Engrg. Labs., Farmingdale, N.J. ..... **p 605**
Transco Prods., Inc., Venice, Cal.
Vega Precision Labs., Vienna, Va.
Ainslie Corp., S. Braintree, Mass.
Amecom Div., College Park, Md.
Andrew Corp., Orland Pk., Ill.
Beukers Labs., Inc., Hauppauge, N.Y.
Chu Assocs., Inc., Littleton, Mass.
Defense Elctrns., Inc., Rockville, Md.
Elctrn. Comm., Inc., St. Petersburg, Fla.
General Dynamics, San Diego, Cal.
Granite State Machine Co., Inc., Manchester, N.H.
GTE Sylvania Inc., Elctrn. Sys. Gp., Waltham, Mass.
Hughes Aircraft Co, Fullerton, Cal.
Jerrold/Watkins Div., Toronto, 395, Ont., Can.
Kaman Nuclear, Colorado Springs, Colo.
Kevlin Mfg. Co., Woburn, Mass.
La Pointe Inds., Inc., Rockville, Conn.
Lieco, Inc., Lindenhurst, N.Y.
LTV Electrosystems, Dallas, Tex.
Miller R.A. Inds., Inc., Grand Haven, Mich.
Nurad, Inc., Baltimore, Md.
Philco-Ford Corp., Washington, D.C.
Prodelin, Inc., Hightstown, N.J.
Radiation Sys., Inc., McLean, Va.
Rantec Div., Calabasas, Calif.
RCA Govt. & Comm. Sys., Moorestown, N.J.
RF Systems, Inc., Cohasset, Mass.
Scala Radio Corp., San Leandro, Cal.
Scientific-Atlanta, Inc., Atlanta, Ga.
Stainless, Inc., N. Wales, Pa.
TACO Div., Sherburne, N.Y.

Teledyne Micronetics, San Diego, Calif.
TRG Prods., E. Boston, Mass.
Wheeler Lab. of Hazeltine Corp., Greenlawn, N.Y.

Antennas, Telescopic

American Elctrn. Labs., Inc., Lansdale, Pa.
Frequency Engrg. Labs., Farmingdale, N.J.
Geo Space Sys., Tampa, Fla. ..... p 486
Adronics, Inc., Cedar Grove, N.J.
Advance Ross Elctrns. Corp., Chicago, Ill.
Andrew Corp., Orland Pk., Ill.
Argent Inds., Inc., Dayton, Ohio
Aristo-Craft Distinctive Miniatures, New York, N.Y.
Craig Sys. Corp., Lawrence, Mass.
Gavin Instrs., Somerville, N.J.
Granite State Machine Co., Inc., Manchester, N.H.
GTE Sylvania Inc., Elctrn. Sys. Gp., Waltham, Mass.
K-W Engrg. Works, Menomonee Falls, Wisc.
Lance Inds., Sylmar, Calif.
Maspro Co., Inc., Nagoya-Shigai, Japan
Materials for Elctrns., Inc., Jamaica, N.Y.
Miller R.A. Inds., Inc., Grand Haven, Mich.
New-Tronics Corp., Brookpark, Ohio
Phelps Dodge Comm., North Haven, Conn.
Premax Prods. Div., Niagara Falls, N.Y.
Radiation Sys., Inc., McLean, Va.
RF Systems, Inc., Cohasset, Mass.
TACO Div., Sherburne, N.Y.
Tenatronics, Ltd., Cleveland, Ohio
Tri-Ex Tower Corp., Visalia, Calif.
Ward Products Corp., Amsterdam, N.Y.
Workman Elctrn. Prods., Inc., Sarasota, Fla.

Antennas, Troposcatter

Frequency Engrg. Labs., Farmingdale, N.J.
Ainslie Corp., S. Braintree, Mass.
Andrew Corp., Orland Pk., Ill.
Camusat Gueguen Telecom. Int'l., White Plains, N.Y.
Collins Radio Co., Dallas, Tex.
Gabriel Elctrns. Corp., Saco, Me.
Granite State Machine Co., Inc., Manchester, N.H.
GTE Sylvania Inc., Elctrn. Sys. Gp., Waltham, Mass.
Hughes Aircraft Co, Fullerton, Cal.
Kevlin Mfg. Co., Woburn, Mass.
LTV Electrosystems, Dallas, Tex.
Philco-Ford Corp., Washington, D.C.
Premier Microwave, Port Chester, N.Y.
Radiation Sys., Inc., McLean, Va.
RCA Govt. & Comm. Sys., Moorestown, N.J.
RF Systems, Inc., Cohasset, Mass.
TACO Div., Sherburne, N.Y.
Telrex Labs., Asbury Park, N.J.
TRG Prods., E. Boston, Mass.

Antennas, Tunable Dipole

American Nucleonics Corp., Woodland Hills, Cal
Frequency Engrg. Labs., Farmingdale, N.J.
Adronics, Inc., Cedar Grove, N.J.
Andrew Corp., Orland Pk., Ill.
Antenna Products Co., Austin, Texas
Avco Corp., Cincinnati, Ohio
Chu Assocs., Inc., Littleton, Mass.
Conductron Corp., St. Charles, Mo.
Continental Elctrns. Mfg., Dallas, Tex.
Delta Elctrns., Alexandria, Va.
Gavin Instrs., Somerville, N.J.
Hughes Aircraft Co, Fullerton, Cal.
Lattin Radio Labs., Owensboro, Ky.
Loral Elctrn. Sys., Bronx, N.Y.
Microwave Assocs., Inc., Burlington, Mass.
New-Tronics Corp., Brookpark, Ohio
Phelps Dodge Comm., North Haven, Conn.
Premier Microwave, Port Chester, N.Y.
Radiation Sys., Inc., McLean, Va.
RF Communications, Inc., Rochester, N.Y.
RF Systems, Inc., Cohasset, Mass.
Scientific-Atlanta, Inc., Atlanta, Ga.
Sedco Sys., Inc., Farmingdale, N.Y.
TACO Div., Sherburne, N.Y.
Wheeler Lab. of Hazeltine Corp., Greenlawn, N.Y.

Anti-Static Compounds & Coatings—See Coatings, Anti-Static—Vol 3

Arc Lamp Power Supplies—See Power Supplies, Arc Lamp

Armatures—See Motor & Generator Armatures, Rotors, Stators—Vol 2

Arms, Phono, Trascription—See Phonograph Arms, Transcription

Arresters, Electrical Surge-Also See Suppressors, Arc; Protectors, Surge—See Vol 2

Arresters, Lightning—See Vol 2

Asbestos—See Insulation Materials, Asbestos—Vol 3

Asphalt Insulation—See Insulating Compounds, Asphalt & Pitch—Vol 3

Attenuators, Audio

ADC Prods., Minneapolis, Minn.
Allen-Bradley Co., Milwaukee, Wisc.
Arra Inc., Bayshore, N.Y.
AVX Aerovox Corp., New Bedford, Mass.
General Resistance, Mt. Vernon, N.Y.
Hewlett-Packard, Palo Alto, Cal.
Ithaco, Inc., Ithaca, N.Y.
Kay Elemetrics, Pine Brook, N.J... p 508
Marconi Instrs., Englewood, N.J.
Ohmite Mfg. Co., Skokie, Ill.
Sennheiser Elctrn. Corp., New York, NY
Shallco, Inc., Smithfield, N.C.
Tech Labs., Inc., Palisades Pk., N.J. p 1957
Texscan Corp., Indianapolis, Ind. p 578
Weinschel Engrg. Co., Gaithersburg, Md.
Action Systems Co., Meriden, Conn.
Altec, Anaheim, Calif.
Arbor Sys., Inc., Ann Arbor, Mich.
AUL Instrs., Inc., Flushng, N.Y.
Barwood Elctrns., Inc., Glendale, Cal.
Carter Precision Elec. Co., Skokie, Ill.
Clarostat Mfg. Co., Inc., Dover, N.H.
Components Specialties, Inc., Freeport, N.Y.
Edison Elctrns. Div., Manchester, N.H.
Electro-Voice, Inc., Buchanan, Mich.
Elctrn. Sys. Engrg., Cushing, Okla.
Engelmann Microwave, Montville, N.J.
General Radio Co., Concord, Mass.
Gotham Audio Corp., New York, N.Y.
Hope Elctrns., Clifton, N.J.
Incor Instr., Plainview, N.Y.
Javex Elctrns., Cherry Valley, Calif.
Muirhead, Inc., Mountainside, N.J.
Narda Microwave Corp., Plainview, N.Y.
Rohde & Schwarz Sls., Passaic, N.J.
Singer - Tele-Signal, Woodbury, N.Y.
Stromberg Carlson Corp., Rochester, N.Y.
Vidaire Electronics Mfg. Corp., Freeport, N.Y.
Welwyn Elec., Ltd., Bedlington, Northumberland, England

Attenuators, Coaxial—See Vol 2

Attenuators, Decade

Arra Inc., Bayshore, N.Y.
Electro Impulse, Inc., Red Bank, N.J.
General Resistance, Mt. Vernon, N.Y.
Hewlett-Packard, Palo Alto, Cal.
Kay Elemetrics, Pine Brook, N.J. p 508,509
R L C Elctrns., Inc., Mt. Kisco, N.Y.
Shallco, Inc., Smithfield, N.C.
Tech Labs., Inc., Palisades Pk., N.J.
Waveline, Inc., W. Caldwell, N.J.
Weinschel Engrg. Co., Gaithersburg, Md. ..... p 1571
Altec, Anaheim, Calif.
Anritsu Electric Co., Ltd., Tokyo, Japan
A.O.I.P., 75/Paris 12eme, France
Astrolab Inc., Linden, N J
Edison Elctrns. Div., Manchester, N.H.
Engelmann Microwave, Montville, N.J.
Fairchild Electro-Metrics, Amsterdam, N.Y.
General Microwave Corp., Farmingdale, N.Y.
General Radio Co., Concord, Mass.
Gillette Elctrn. Prods. Co., Beverly, N.J.
Guide Inds., Inc., Sun Valley, Calif.
Hope Elctrns., Clifton, N.J.
Lab Electro-Acoustique, 92-Rueil, Malmaison, France
Muirhead, Inc., Mountainside, N.J.
Projects Unlimited, Inc., Dayton, Ohio
Rohde & Schwarz Sls., Passaic, N.J.
Siemens Corp., Comm. Eq. Div., Iselin, N.J.
Telonic Inds., Inc., Laguna Beach, Calif.

Attenuators, Fixed

ADC Prods., Minneapolis, Minn.
Applied Research Inc., Port Washington, N.Y. ..... p 1554
Arra Inc., Bayshore, N.Y. ..... p 1553
Bird Elctrn., Cleveland, Ohio..... p 420
General Resistance, Mt. Vernon, N.Y.
Hewlett-Packard, Palo Alto, Cal.
Kay Elemetrics, Pine Brook, N.J... p 508
R L C Elctrns., Inc., Mt. Kisco, N.Y. p 1563
Shallco, Inc., Smithfield, N.C.
Tech Labs., Inc., Palisades Pk., N.J.
Texscan Corp., Indianapolis, Ind. p 578
Trompeter Elctrns., Chatsworth, Cal.
Waveline, Inc., W. Caldwell, N.J. p 1567
Weinschel Engrg. Co., Gaithersburg, Md. ..... p 1571
Welwyn Int'l., Inc., Westlake, Ohio p 2900
Airtec, Inc., Roselle, N.J.
Altec, Anaheim, Calif.
Americon Corp., Waltham, Mass.
Astrolab Inc., Linden, N J
Bell P/A Prods. Corp., Columbus, Ohio
Bellaire Elctrns. Inc., Farmingdale, N.J.
Blonder-Tongue Labs., Inc., Old Bridge, N.J.
Dittmore-Freimuth Corp., Milwaukee, Wisc.
Dynographic Elctrns. Corp., Hicksville, N.Y.
Edison Elctrns. Div., Manchester, N.H.
Elcom Sys., Deer Pk., N.Y.
Electronautics, Littleton, Mass.
Elctrn. Specialty, Thomaston, Conn.
EMC Technology Inc, Philadelphia, Pa.
Engelmann Microwave, Montville, N.J.
Fairchild Electro-Metrics, Amsterdam, N.Y.
Filmohm Div., Long Island City, N.Y.
Finney Co., Bedford, Ohio
General Microwave Corp., Farmingdale, N.Y.
General Radio Co., Concord, Mass.
Guide Inds., Inc., Sun Valley, Calif.
Herley Inds., Inc., Syosset, N.Y.
Hope Elctrns., Clifton, N.J.
Industrial Microwave, Scotch Plains, N.J.
Jerrold Elctrns. Corp., Philadelphia, Pa.
Jerrold/Watkins Div., Toronto, 395, Ont., Can.
Kevlin Mfg. Co., Woburn, Mass.
Maury Microwave Corp., Cucamonga, Calif.
Meca Elctrns., Inc., Denville, N.J.
Microlab/FXR, Livingston, N.J.
Microwave Assocs., Inc., Burlington, Mass.
Microwave Development Labs., Inc., Needham Hgts., Mass.
Microwave Filter Co., Inc., East Syracuse, N.Y.
Narda Microwave Corp., Plainview, N.Y.
PRD Elctrns., Inc., Westbury, N.Y.
Premier Microwave, Port Chester, N.Y.
Rohde & Schwarz Sls., Passaic, N.J.
Sage Labs. Inc., Natick, Mass.
Stromberg Carlson Corp., Rochester, N.Y.
Struthers Elctrns. Corp., Mamaroneck, N.Y.
Systron-Donner Microwave Div., Van Nuys, Cal.
TRG Prods., E. Boston, Mass.
Varian Assocs., Palo Alto, Cal.
Welwyn Elec., Ltd., Bedlington, Northumberland, England

Attenuators, I-F

Arra Inc., Bayshore, N.Y. ..... p 1553
Daico Inds., Inc., Compton, Cal.
Kay Elemetrics, Pine Brook, N.J... p 508
R L C Elctrns., Inc., Mt. Kisco, N.Y.
Shallco, Inc., Smithfield, N.C.
Tech Labs., Inc., Palisades Pk., N.J.
Texscan Corp., Indianapolis, Ind. p 578
Weinschel Engrg. Co., Gaithersburg, Md.
AIL, Div. Cutler-Hammer, Inc., Deer Park, N.Y.
Astrolab Inc., Linden, N J
AUL Instrs., Inc., Flushng, N.Y.
Comdel, Inc., Beverly, Mass.
Dittmore-Freimuth Corp., Milwaukee, Wisc.
Elcom Sys., Deer Pk., N.Y.
Engelmann Microwave, Montville, N.J.
Fairchild Electro-Metrics, Amsterdam, N.Y.
Guide Inds., Inc., Sun Valley, Calif.
Hope Elctrns., Clifton, N.J.
Koch Inds., Anaheim, Cal.
Meca Elctrns., Inc., Denville, N.J.
Merrimac Resch. & Dev., Inc., West Caldwell, N.J.
Mini-Circuits Lab., Brooklyn, N.Y.
Muirhead, Inc., Mountainside, N.J.
Narda Microwave Corp., Plainview, N.Y.
Olektron Corp., Dudley, Mass.
PRD Elctrns., Inc., Westbury, N.Y.
Relcom, Mt. View, Calif.
Sinclair Radio Labs., Maple, Ont., Can.
Special Microwave Devices Oper., Waltham, Mass.
Telonic Inds., Inc., Laguna Beach, Calif.
Varian Assocs., Palo Alto, Cal.

Attenuators, Impedance Matching

ADC Prods., Minneapolis, Minn.
Allen-Bradley Co., Milwaukee, Wisc.
Applied Research Inc., Port Washington, N.Y. ..... p 1554
AVX Aerovox Corp., New Bedford, Mass.
Centralab, Elctrns., Milwaukee, Wisc.
General Resistance, Mt. Vernon, N.Y.
Ohmite Mfg. Co., Skokie, Ill.
R L C Elctrns., Inc., Mt. Kisco, N.Y.
Shallco, Inc., Smithfield, N.C.
Tech Labs., Inc., Palisades Pk., N.J.
Texscan Corp., Indianapolis, Ind. p 578
Trompeter Elctrns., Chatsworth, Cal.
Altec, Anaheim, Calif.
Astrolab Inc., Linden, N J
Ava Elctrns., Upper Darby, Pa.
Barth Elctrns., Inc., Cleveland, Ohio
Barwood Elctrns., Inc., Glendale, Cal.
Bell P/A Prods. Corp., Columbus, Ohio
Dittmore-Freimuth Corp., Milwaukee, Wisc.
Dynographic Elctrns. Corp., Hicksville, N.Y.
Edison Elctrns. Div., Manchester, N.H.
Elcom Sys., Deer Pk., N.Y.
Engelmann Microwave, Montville, N.J.
Hope Elctrns., Clifton, N.J.
Incor Instr., Plainview, N.Y.
Jerrold/Watkins Div., Toronto, 395, Ont., Can.
Kings Elctrns., Tuckahoe, N.Y.
Meca Elctrns., Inc., Denville, N.J.
Merrimac Resch. & Dev., Inc., West Caldwell, N.J.
Microlab/FXR, Livingston, N.J.
Narda Microwave Corp., Plainview, N.Y.
Olektron Corp., Dudley, Mass.
Premier Microwave, Port Chester, N.Y.
Rohde & Schwarz Sls., Passaic, N.J.
Sinclair Radio Labs., Maple, Ont., Can.

Attenuators, Logarithmic

Allen-Bradley Co., Milwaukee, Wisc.
Arra Inc., Bayshore, N.Y.
Carter Mfg. Corp., Hudson, Mass.
Ithaco, Inc., Ithaca, N.Y.
R L C Elctrns., Inc., Mt. Kisco, N.Y.
Sennheiser Elctrn. Corp., New York, NY
Tech Labs., Inc., Palisades Pk., N.J.
Altec, Anaheim, Calif.
Arenberg Ultrasonic Lab., Inc., Jamaica Plain, Mass.
Edison Elctrns. Div., Manchester, N.H.
Koch Inds., Anaheim, Cal.
Telonic Inds., Inc., Laguna Beach, Calif.
Thomson-CSF Electron Tubes, N.Y., N.Y.

Attenuators, Microwave—
See Vol 2

Attenuators, Programmable
American Aerospace Controls, Farmingdale, N.Y.
Arra Inc., Bayshore, N.Y.
Computer Labs, Greensboro, N.C.
Daico Inds., Inc., Compton, Cal.
Dow-Key, Santa Barbara, Cal.
Ithaco, Inc., Ithaca, N.Y.
Kay Elemetrics, Pine Brook, N.J... p 508
Lorch-Adret Corp., Englewood, N.J. p 517
Lorch Elctrns. Corp., Englewood, N.J.
Marconi Instrs., Englewood, N.J.
Shallco, Inc., Smithfield, N.C.
Tech Labs., Inc., Palisades Pk., N.J. p 1957
Texscan Corp., Indianapolis, Ind. p 578
Weinschel Engrg. Co., Gaithersburg, Md.
Edison Elctrns. Div., Manchester, N.H.
Engelmann Microwave, Montville, N.J.
Fairchild Electro-Metrics, Amsterdam, N.Y.
Fifth Dimension, Princeton, N.J.
General Microwave Corp., Farmingdale, N.Y.
Guide Inds., Inc., Sun Valley, Calif.
Hughes Aircraft Co, Fullerton, Cal.
Hyletronics Corp., Littleton, Mass.
Koch Inds., Anaheim, Cal.
Micro-Tel Corp., Baltimore, Md.
Mini-Circuits Lab., Brooklyn, N.Y.
Narda Microwave Corp., Plainview, N.Y.
PRD Elctrns., Inc., Westbury, N.Y.
Relcom, Mt. View, Calif.
Rohde & Schwarz Sls., Passaic, N.J.
Wandel & Goltermann, E. Hanover, N.J.
Weston Instrs. Div., Hatboro, Pa
Wiltron Co., Palo Alto, Calif.

Attenuators, R-F
American Elctrn. Labs., Inc., Lansdale, Pa.
Amphenol RF Div., Danburry, Conn.
Applied Research Inc., Port Washington, N.Y. ..... p 1554
Arra Inc., Bayshore, N.Y. ..... p 1553
Bird Elctrn., Cleveland, Ohio..... p 420
Daico Inds., Inc., Compton, Cal.
Damon Corp., Needham Hgts., Mass.
Dow-Key, Santa Barbara, Cal.
E-H Resch. Labs., Inc., Oakland, Cal.
Electro Impulse, Inc., Red Bank, N.J.
Hewlett-Packard, Palo Alto, Cal.
Honeywell, Denver, Colo.
Kay Elemetrics, Pine Brook, N.J. p 508,509
Lorch-Adret Corp., Englewood, N.J.
Lorch Elctrns. Corp., Englewood, N.J.
Marconi Instrs., Englewood, N.J.
RF Interonics, Bay Shore, N.Y.
R L C Elctrns., Inc., Mt. Kisco, N.Y. p 1563
Shallco, Inc., Smithfield, N.C.
Tech Labs., Inc., Palisades Pk., N.J. p 1957
Texscan Corp., Indianapolis, Ind. p 578
Trompeter Elctrns., Chatsworth, Cal.
Waveline, Inc., W. Caldwell, N.J. p 1567
Weinschel Engrg. Co., Gaithersburg, Md. ..... p 1571
Welwyn Int'l., Inc., Westlake, Ohio
Americon Corp., Waltham, Mass.
Anaren Microwave, Inc., Syracuse, N.Y.
Anzac Elctrns., Waltham, Mass.
Astrolab Inc., Linden, N J
AUL Instrs., Inc., Flushng, N.Y.
Aviel Electronics Inc, Burbank, Calif.
Barth Elctrns., Inc., Cleveland, Ohio
Bell P/A Prods. Corp., Columbus, Ohio
Blonder-Tongue Labs., Inc., Old Bridge, N.J.
Core-Tronics, Inc., Orange, N.J.
Custom Comps., Fairfield, N.J.
Dittmore-Freimuth Corp., Milwaukee, Wisc.
Dynographic Elctrns. Corp., Hicksville, N.Y.
Edison Elctrns. Div., Manchester, N.H.
Elcom Sys., Deer Pk., N.Y.
Elctrn. Navigation Inds., Inc., Rochester, N.Y.
Elctrn. Specialty, Thomaston, Conn.
EMC Technology Inc, Philadelphia, Pa.
Engelmann Microwave, Montville, N.J.
Entron, Inc., Silver Spring, Md.
Fairchild Electro-Metrics, Amsterdam, N.Y.
Fifth Dimension, Princeton, N.J.
Filmohm Div., Long Island City, N.Y.
Finney Co., Bedford, Ohio
General Microwave Corp., Farmingdale, N.Y.
General Radio Co., Concord, Mass.
Guide Inds., Inc., Sun Valley, Calif.
Herley Inds., Inc., Syosset, N.Y.
Hope Elctrns., Clifton, N.J.
Hughes Aircraft Co, Fullerton, Cal.
Hyletronics Corp., Littleton, Mass.
ITT Gremar, Inc., Woburn, Mass.
Jerrold Elctrns. Corp., Philadelphia, Pa.
Jerrold/Watkins Div., Toronto, 395, Ont., Can.
Kevlin Mfg. Co., Woburn, Mass.
Kings Elctrns., Tuckahoe, N.Y.
Koch Inds., Anaheim, Cal.
Litton Inds., San Carlos, Calif.
Maury Microwave Corp., Cucamonga, Calif.
Meca Elctrns., Inc., Denville, N.J.
Merrimac Resch. & Dev., Inc., West Caldwell, N.J.
Microlab/FXR, Livingston, N.J.
Microwave Assocs., Inc., Burlington, Mass.
Microwave Development Labs., Inc., Needham Hgts., Mass.
Mini-Circuits Lab., Brooklyn, N.Y.
Muirhead, Inc., Mountainside, N.J.
Narda Microwave Corp., Plainview, N.Y.
Olektron Corp., Dudley, Mass.
OMNI Spectra, Farmington, Mich.
Philco-Ford Corp., Washington, D.C.
PRD Elctrns., Inc., Westbury, N.Y.
Premier Microwave, Port Chester, N.Y.
Pyrofilm Corp., Whippany, N.J.
Radio Resch. Co., Rockaway, N.J.
Rafec Elctrns., Temple City, Calif.
Relcom, Mt. View, Calif.
Rohde & Schwarz Sls., Passaic, N.J.
Sage Labs. Inc., Natick, Mass.
Special Microwave Devices Oper., Waltham, Mass.
Struthers Elctrns. Corp., Mamaroneck, N.Y.
Teledyne Microwave, Sunnyvale, Cal.
Telonic Inds., Inc., Laguna Beach, Calif.
Varian Assocs., Palo Alto, Cal.
VIKOA, Hoboken, N.J.
Wald Sound, Sun Valley, Calif.
Wandel & Goltermann, E. Hanover, N.J.
Weston Instrs. Div., Hatboro, Pa
Winegard Co., Burlington, Iowa

Attenuators, Turret
Arra Inc., Bayshore, N.Y. ..... p 1553
Hewlett-Packard, Palo Alto, Cal.
Kay Elemetrics, Pine Brook, N.J... p 508
R L C Elctrns., Inc., Mt. Kisco, N.Y. p 1563
Shallco, Inc., Smithfield, N.C.
Texscan Corp., Indianapolis, Ind. p 578
Weinschel Engrg. Co., Gaithersburg, Md. ..... p 1571
Astrolab Inc., Linden, N J
Dynographic Elctrns. Corp., Hicksville, N.Y.
Edison Elctrns. Div., Manchester, N.H.
Engelmann Microwave, Montville, N.J.
Fairchild Electro-Metrics, Amsterdam, N.Y.
Filmohm Div., Long Island City, N.Y.
General Microwave Corp., Farmingdale, N.Y.
Herley Inds., Inc., Syosset, N.Y.
Jerrold/Watkins Div., Toronto, 395, Ont., Can.
Maury Microwave Corp., Cucamonga, Calif.
Meca Elctrns., Inc., Denville, N.J.
Microlab/FXR, Livingston, N.J.
Narda Microwave Corp., Plainview, N.Y.
Premier Microwave, Port Chester, N.Y.
Rohde & Schwarz Sls., Passaic, N.J.
Telonic Inds., Inc., Laguna Beach, Calif.

Attenuators, Variable
Alford Mfg. Co., Winchester, Mass.
Allen-Bradley Co., Milwaukee, Wisc.
American Aerospace Controls, Farmingdale, N.Y.
American Elctrn. Labs., Inc., Lansdale, Pa.
Arra Inc., Bayshore, N.Y. ..... p 1553
Automation Dev., Culver City, Cal.
Carter Mfg. Corp., Hudson, Mass.
Centralab, Elctrns., Milwaukee, Wisc.
E & M Labs., Westlake Village, Cal.
Electro Impulse, Inc., Red Bank, N.J.
Hewlett-Packard, Palo Alto, Cal.
Kay Elemetrics, Pine Brook, N.J. p 508,509
Lorch-Adret Corp., Englewood, N.J.
Lorch Elctrns. Corp., Englewood, N.J.
Ohmite Mfg. Co., Skokie, Ill.
R L C Elctrns., Inc., Mt. Kisco, N.Y. p 1563
Shallco, Inc., Smithfield, N.C.
Singer Instrumentation Palo Alto Oper., Palo Alto, Cal.
Tech Labs., Inc., Palisades Pk., N.J.
Texscan Corp., Indianapolis, Ind. p 578
Vega Precision Labs., Vienna, Va.
Waveline, Inc., W. Caldwell, N.J. p 1567
Weinschel Engrg. Co., Gaithersburg, Md. ..... p 1571
AIL, Div. Cutler-Hammer, Inc., Deer Park, N.Y.
Altec, Anaheim, Calif.
Anaren Microwave, Inc., Syracuse, N.Y.
Anritsu Electric Co., Ltd., Tokyo, Japan
Arenberg Ultrasonic Lab., Inc., Jamaica Plain, Mass.
Artech Corp., Falls Church, Va.
Astrolab Inc., Linden, N J
AUL Instrs., Inc., Flushng, N.Y.
Blonder-Tongue Labs., Inc., Old Bridge, N.J.
Carter Precision Elec. Co., Skokie, Ill.
Clarostat Mfg. Co., Inc., Dover, N.H.
Coax Devices Inc., Chelsea, Mass.
Comdel, Inc., Beverly, Mass.
Dittmore-Freimuth Corp., Milwaukee, Wisc.
Dynographic Elctrns. Corp., Hicksville, N.Y.
Edison Elctrns. Div., Manchester, N.H.
Elctrn. Specialty, Thomaston, Conn.
Engelmann Microwave, Montville, N.J.
ESCA, Jupiter, Fla.
Fairchild Electro-Metrics, Amsterdam, N.Y.
Filmohm Div., Long Island City, N.Y.
FKS Comms., Inc., New Hyde Park, N.Y.
General Microwave Corp., Farmingdale, N.Y.
General Radio Co., Concord, Mass.
Gotham Audio Corp., New York, N.Y.
GRFF, Port Salerno, Fla.
Guide Inds., Inc., Sun Valley, Calif.
Herley Inds., Inc., Syosset, N.Y.
Hyletronics Corp., Littleton, Mass.
Industrial Microwave, Scotch Plains, N.J.
Kevlin Mfg. Co., Woburn, Mass.
Kings Elctrns., Tuckahoe, N.Y.
Koch Inds., Anaheim, Cal.
Lecroy Resch. Sys. Corp., West Nyack, N.Y.
Lieco, Inc., Lindenhurst, N.Y.
Maury Microwave Corp., Cucamonga, Calif.
MCS Corp., Monrovia, Calif.
Meca Elctrns., Inc., Denville, N.J.
Merrimac Resch. & Dev., Inc., West Caldwell, N.J.
Microlab/FXR, Livingston, N.J.
Microwave Assocs., Inc., Burlington, Mass.
Microwave Development Labs., Inc., Needham Hgts., Mass.
Microwave Div, Nashua, N.H.
Microwave Filter Co., Inc., East Syracuse, N.Y.
Mini-Circuits Lab., Brooklyn, N.Y.
Muirhead, Inc., Mountainside, N.J.
Narda Microwave Corp., Plainview, N.Y.
Olektron Corp., Dudley, Mass.
Omega Labs., Inc., Rowley, Mass.
PRD Elctrns., Inc., Westbury, N.Y.
Premier Microwave, Port Chester, N.Y.
Rohde & Schwarz Sls., Passaic, N.J.
Sanders Assocs., Nashua, N.H.
Siemens Corp., Comm. Eq. Div., Iselin, N.J.
Sinclair Radio Labs., Maple, Ont., Can.
Special Microwave Devices Oper., Waltham, Mass.
Struthers Elctrns. Corp., Mamaroneck, N.Y.
Systron-Donner Microwave Div., Van Nuys, Cal.
Telonic Inds., Inc., Laguna Beach, Calif.
Thomson-CSF Electron Tubes, N.Y., N.Y.
TRG Prods., E. Boston, Mass.
Vectronics Microwave Corp., Middlesex, N.J.
Victor Microwave, Inc., Wakefield, Mass.
Wandel & Goltermann, E. Hanover, N.J.
Welwyn Elec., Ltd., Bedlington, Northumberland, England
Winslow Tele-Tronics, Inc., Eatontown, N.J.

Attitude Indicators—See Indicators, Attitude

Audible Warning Devices—
See Alarms & Alarm Systems-Also See Bells, Buzzers, Gongs, Sirens and Aural Warning Device—Vol 2

Audio Equipment—See Amplifiers; Microphones; Speakers; etc.

Audiometers
Bausch & Lomb, Rochester, N.Y.
Beltone Electronics Corp., Chicago, Ill.
Farrall Instr. Co., Grand Island, Neb.
Massey Dickinson Co., Inc., Saxonville, Mass.
Princeton Applied Resch. Corp., Princeton, N.J.
Telex Comm. Div., Minneapolis, Minn.
Tracor, Inc., Austin, Tex.
AUL Instrs., Inc., Flushng, N.Y.

Autocollimators—See Collimators—Vol 2

Autotransformers—See Transformers, Autotransformer—Vol 3

Averagers, Signal
Austron, Inc., Austin, Tex.
Digital Equip. Corp., Maynard, Mass.
Hewlett-Packard, Palo Alto, Cal.
Intronics, Inc., Newton, Mass.
Teledyne Philbrick, Dedham, Mass.
Applied Control Co., Fairfield, N.J.
Biomation Corp., Palo Alto, Cal
Fabri-Tek Instrs., Inc., Madison, Wisc.
Hird Brown America, Livingston, N.J.
Hughes Aircraft Co, Fullerton, Cal.
Nuclear-Chicago, Des Plaines, Ill.
Nuclear Data, Inc., Palatine, Ill.
Princeton Applied Resch. Corp., Princeton, N.J.
Spectral Dynamics Corp. San Diego, San Diego, Cal.
Technical Instrs., Inc., No. Haven, Conn.
Unholtz-Dickie Corp., Hamden, Conn.

Azimuth Indicators—See Indicators, Azimuth

Backlighted Panel Displays—See display Panels—Vol 2

Badges, Radiation Indicating—See Services, Film Badge—Vol 3

Baffles, Acoustic Material—See Materials, Acoustic, Sound Absorbing—Vol 3

Baffles, Speaker—See Enclosures, Speaker

Bails, Stands & Supports (For Equipment, Instruments, etc.)—See Vol 3

Balancing Equipment, Dynamic
Dytronics Co., Columbus, Ohio
Metrix Instr. Co., Houston, Tex.
AMF Electical Prods., Alexandria, Va.
Annis, R.B. Co., Indianapolis, Ind.
Balance Technology, Inc., Ann Arbor, Mich.
Bear Mfg. Corp., Rock Island, Ill.
Custom Comps., Fairfield, N.J.
Dynamic Data Corp., Columbus, Ohio
Exact Weight Scale Co., Columbus, Ohio
IRD Mechanalysis, Inc., Columbus, Ohio
Micro Balancing, Inc., Farmingdale, N.Y.
Possis Mach., Minneapolis, Minn.
Reliance Elec. Co., Cleveland, Ohio
Schenck Trebel Corp, Farmingdale, N. Y.
Spectral Dynamics Corp. San Diego, San Diego, Cal.

Ten Bosch, M., Inc., Pleasantville, N.Y.
Westinghouse Elec. Int'l., New York, N.Y.
Wharton Unitools, Moosup, Conn.

Ball & Socket Joints—See Joints, Ball & Socket—Vol 3

Ballast Tubes—See Tubes, Ballast—Vol 2

Baluns—See Transformers, Matching—Vol 3

Banding Tools, C-Core—See Vol 3

Bars, Shorting—See Vol 3

Barretters—See Resistors, Barretter—Vol 3

Bases, Antenna—See Mounts, Antenna

Baths, Controlled Temperature (Air & Liquid)

Beckman Instrs., Cedar Grove, N.J.
Blue M Engrg. Co., Blue Island, Ill. p 389
Harrel, Inc., E. Norwalk, Conn.
Julie Research Lab., New York, N.Y.
Alpha-Monarch Corp., Dallas, Tex.
American Instr. Co., Silver Spring, Md.
Atlas Engrg. Corp., W. Hartford, Conn.
Bailey Instrs., Inc., Saddle Brook, N.J.
Beckman Instrs., (AISSD), Fullerton, Cal.
Brinkmann Instrs., Inc., Westbury, N.Y.
Brookfield Engrg. Labs., Inc., Stoughton, Mass.
Cambridge Thermionic, Cambridge, Mass
Cincinnati Sub-Zero Prods., Cincinnati, Ohio
Custom Sci. Instrs., Inc., Whippany, N.J.
Electrical Instr. Svc., Inc., Mt. Vernon, N.Y.
Eppley Lab., Inc., Newport, R.I.
Fisher Sci. Co., Pittsburgh, Pa.
Forma Scientific, Marietta, Ohio
Gruenberg Elec. Co., Inc., Williamsport, Pa.
Guildline Instrs., Inc., Larchmont, N.Y.
Hallmark Standards, Inc., Mt. Vernon, N.Y.
Harris Mfg. Co., Inc., Cambridge, Mass.
Hotpack Corp., Phila., Pa.
Hydor Therme Corp., Pennsauken, N.J.
Instr. & Control Sys., Inc., Addison, Ill.
Jersey Tech. Consits., Morristown, N.J.
Kahl Scientific Instr. Corp., El Cajon, Calif.
Lab-Line Instrs., Inc., Melrose Park, Ill.
Leeds & Northrup Corp., No. Wales, Pa.
Mechanical Technology, Inc., Latham, N.Y.
Precision Sci. Co., Chicago, Ill.
Projects Unlimited, Inc., Dayton, Ohio
Rosemount Engrg. Co., Minneapolis, Minn.
Standard Cabinet Co., Inc., Totowa, N.J.
Statham Instrs., Inc., Oxnard, Cal.
Tenney Engrg., Inc., Union, N.J.
3M Co., St. Paul, Minn.
VWR Scientific, San Francisco, Cal.
Zeva Elec. Corp., Hanover, N.J.

Baths, Ultrasonic—See Cleaners, Ultrasonic

Batteries, Bi-Polar

RCA Elctrns. Comps., Harrison, N.J.
Heliotek, Sylmar, Calif.
Hughes Aircraft Co, Culver City, Cal.
Leclanche S A, CH 1401-Yverdon, Switzerland
Power Applications, Inc., Bayside, N.Y.

Batteries, Carbon Zinc

Marathon Battery Co., Cold Spring, N.Y. p 810,811
RCA Elctrns. Comps., Harrison, N.J.
Allied Elctrns. Corp., Chicago, Ill.
Burgess Battery/Gould Inc., Freeport, Ill.
Leclanche S A, CH 1401-Yverdon, Switzerland
Power Applications, Inc., Bayside, N.Y.
Westinghouse Elec., Elmira, N.Y.

Batteries, Chemically Heated

Catalyst Resch. Corp., Baltimore, Md.
Hughes Aircraft Co, Culver City, Cal.
Power Applications, Inc., Bayside, N.Y.

Batteries, Dry, Flashlight, Transistor, etc.

Marathon Battery Co., Cold Spring, N.Y. p 810,811
Power Inc., Burnsville, Minn. ..... p 831
RCA Elctrns. Comps., Harrison, N.J.
Union Carbide, Consumer Prods., New York, N.Y. ..... p 710
Acme Battery Corp., Stamford, Conn.
Allied Elctrns. Corp., Chicago, Ill.
Bright Star Inds., Inc., Clifton, N.J.
Burgess Battery/Gould Inc., Freeport, Ill.
Carbone Corp., Boonton, N.J.
Hammarlund Mfg. Co., Red Bank, N.J.
Leclanche S A, CH 1401-Yverdon, Switzerland
Mallory Battery, Tarrytown, N.Y.
Photo Tech. Prods., Garden City, N.Y.
Power Applications, Inc., Bayside, N.Y.
Ray-O-Vac Co., Madison, Wisc.
Shigoto Inds., Ltd., New York, N.Y.
Westinghouse Elec., Elmira, N.Y.

Batteries, Lead-Acid

Power Inc., Burnsville, Minn.
Union Carbide, Consumer Prods., New York, N.Y. ..... p 710
Aristo-Craft Distinctive Miniatures, New York, N.Y.
C & D Batteries, Plymouth Meeting, Pa.
Dual-Lite Co., Newtown, Conn.
Electronic Batteries, Inc., Brooklyn, N.Y.
Exide Power Sys. Div., Philadelphia, Pa.
General Battery Corp., Reading, Pa.
Globe-Union Inc., Milwaukee, Wisc.
Gould Inc., Trenton, NJ
Gould, Inc., St. Paul, Minn.
Hobby & Brown Elctrn., Rockville Centre, N.Y.
Hughes Aircraft Co, Culver City, Cal.
Leclanche S A, CH 1401-Yverdon, Switzerland
Power Applications, Inc., Bayside, N.Y.

Batteries, Lead-Dioxide

C & D Batteries, Plymouth Meeting, Pa.
Globe-Union Inc., Milwaukee, Wisc.
Hughes Aircraft Co, Culver City, Cal.
Leclanche S A, CH 1401-Yverdon, Switzerland
Power Applications, Inc., Bayside, N.Y.

Batteries, Lithium

Catalyst Resch. Corp., Baltimore, Md.
Honeywell, Aerospace & Def., Minneapolis, Minn.
Hughes Aircraft Co, Culver City, Cal.
Power Applications, Inc., Bayside, N.Y.

Batteries, Magnesium-Air

Marathon Battery Co., Cold Spring, N.Y.
Power Applications, Inc., Bayside, N.Y.

Batteries, Manganese Alkaline

Power Inc., Burnsville, Minn.
RCA Elctrns. Comps., Harrison, N.J.
Union Carbide, Consumer Prods., New York, N.Y. ..... p 710
Bright Star Inds., Inc., Clifton, N.J.
Burgess Battery/Gould Inc., Freeport, Ill.
Leclanche S A, CH 1401-Yverdon, Switzerland
Mallory Battery, Tarrytown, N.Y.
Power Applications, Inc., Bayside, N.Y.
Ray-O-Vac Co., Madison, Wisc.

Batteries, Mercury

Power Inc., Burnsville, Minn.
RCA Elctrns. Comps., Harrison, N.J.
Union Carbide, Consumer Prods., New York, N.Y. ..... p 710
Burgess Battery/Gould Inc., Freeport, Ill.
Leclanche S A, CH 1401-Yverdon, Switzerland
Mallory Battery, Tarrytown, N.Y.
Power Applications, Inc., Bayside, N.Y.
Ray-O-Vac Co., Madison, Wisc.

Batteries, Nickel-Alkaline

Power Inc., Burnsville, Minn.
Exide Power Sys. Div., Philadelphia, Pa.
Heliotek, Sylmar, Calif.
Hughes Aircraft Co, Culver City, Cal.
Leclanche S A, CH 1401-Yverdon, Switzerland
Power Applications, Inc., Bayside, N.Y.

Batteries, Nickel-Cadmium

General Elec. Co., Schenectady, N.Y. p 719
Marathon Battery Co., Cold Spring, N.Y. p 810
Mauratron, Inc., Dallas, Tex. ..... p 815
Power Inc., Burnsville, Minn. ..... p 831
Union Carbide, Consumer Prods., New York, N.Y. ..... p 710
Avionics Resch. Prods., Los Angeles, Calif.
Burgess Battery/Gould Inc., Freeport, Ill.
Dual-Lite Co., Newtown, Conn.
Eagle-Picher Inds., Inc., Joplin, Mo.
Edmund Scientific Co., Barrington, N.J.
Exide Power Sys. Div., Philadelphia, Pa.
Fanon Elctrns., Hillside, N.J.
Gould, Inc., St. Paul, Minn.
Heliotek, Sylmar, Calif.
Hughes Aircraft Co, Culver City, Cal.
Leclanche S A, CH 1401-Yverdon, Switzerland
Power Applications, Inc., Bayside, N.Y.
Ramsay Engrg. Co., Anaheim, Calif.
Ray-O-Vac Co., Madison, Wisc.

Batteries, Nickel-Zinc

Eagle-Picher Inds., Inc., Joplin, Mo.
Hughes Aircraft Co, Culver City, Cal.
Power Applications, Inc., Bayside, N.Y.

Batteries, Nuclear

Sanders Nuclear Corp, Nashua, N H

Batteries, Photoflash

General Elec. Co., Schenectady, N.Y. p 719
Marathon Battery Co., Cold Spring, N.Y. p 810
Power Inc., Burnsville, Minn. ..... p 831
RCA Elctrns. Comps., Harrison, N.J.
Union Carbide, Consumer Prods., New York, N.Y. ..... p 710
Burgess Battery/Gould Inc., Freeport, Ill.
Leclanche S A, CH 1401-Yverdon, Switzerland
Mallory Battery, Tarrytown, N.Y.
Ray-O-Vac Co., Madison, Wisc.

Batteries, Silver-Cadmium

Power Inc., Burnsville, Minn.
Eagle-Picher Inds., Inc., Joplin, Mo.
Hughes Aircraft Co, Culver City, Cal.
Leclanche S A, CH 1401-Yverdon, Switzerland
Power Applications, Inc., Bayside, N.Y.
Ray-O-Vac Co., Madison, Wisc.

Batteries, Silver-Zinc

Mauratron, Inc., Dallas, Tex.
Power Inc., Burnsville, Minn.
RCA Elctrns. Comps., Harrison, N.J.
Union Carbide, Consumer Prods., New York, N.Y. ..... p 710
Artech Corp., Falls Church, Va.
Eagle-Picher Inds., Inc., Joplin, Mo.
Epic, Inc., New York, N.Y.
Exide Power Sys. Div., Philadelphia, Pa.
Gould, Inc., St. Paul, Minn.
Hughes Aircraft Co, Culver City, Cal.
Leclanche S A, CH 1401-Yverdon, Switzerland
Power Applications, Inc., Bayside, N.Y.
Ray-O-Vac Co., Madison, Wisc.

Batteries, Solar—See Cells, Photovoltaic—Vol 2

Batteries, Standard Cell

Biddle, James G., Plymouth Meeting, Pa.
A.O.I.P., 75/Paris 12eme, France
Bailey Instrs., Inc., Saddle Brook, N.J.
C & D Batteries, Plymouth Meeting, Pa.
Electrical Instr. Svc., Inc., Mt. Vernon, N.Y.
Eppley Lab., Inc., Newport, R.I.
Globe-Union Inc., Milwaukee, Wisc.
Guildline Instrs., Inc., Larchmont, N.Y.
Hallmark Standards, Inc., Mt. Vernon, N.Y.
Leclanche S A, CH 1401-Yverdon, Switzerland
Mallory Battery, Tarrytown, N.Y.
Muirhead, Inc., Mountainside, N.J.
Power Applications, Inc., Bayside, N.Y.
Shigoto Inds., Ltd., New York, N.Y.

Batteries, Storage

General Elec. Co., Schenectady, N.Y. p 719
Geo Space Sys., Tampa, Fla. ..... p 486
Marathon Battery Co., Cold Spring, N.Y. p 810
Power Inc., Burnsville, Minn. ..... p 831
C & D Batteries, Plymouth Meeting, Pa.
Dual-Lite Co., Newtown, Conn.
Electronic Batteries, Inc., Brooklyn, N.Y.
Exide Power Sys. Div., Philadelphia, Pa.
General Battery Corp., Reading, Pa.
Globe-Union Inc., Milwaukee, Wisc.
Gould Inc., Trenton, NJ
Heliotek, Sylmar, Calif.
Leclanche S A, CH 1401-Yverdon, Switzerland
Power Applications, Inc., Bayside, N.Y.
Shigoto Inds., Ltd., New York, N.Y.

Batteries, Thermal

Catalyst Resch. Corp., Baltimore, Md.
Eagle-Picher Inds., Inc., Joplin, Mo.
Honeywell, Aerospace & Def., Minneapolis, Minn.
Power Applications, Inc., Bayside, N.Y.

Batteries, Transistor—See Batteries, Dry, Flashlight, Transistor, etc.

Batteries, Water Activated

ACR Elctrns. Div., Carle Place, N.Y.
Aristo-Craft Distinctive Miniatures, New York, N.Y.
Burgess Battery/Gould Inc., Freeport, Ill.
Carbone Corp., Boonton, N.J.
Chemalloy Elctrns., Santee, Cal.
Crimpco Engrg., Cangoga Park, Calif.
Eagle-Picher Inds., Inc., Joplin, Mo.
Exide Power Sys. Div., Philadelphia, Pa.
Globe-Union Inc., Milwaukee, Wisc.
Leclanche S A, CH 1401-Yverdon, Switzerland
Power Applications, Inc., Bayside, N.Y.
Sparton Corp., Jackson, Mich.

Batteries, Zinc-Air

Eagle-Picher Inds., Inc., Joplin, Mo.
Power Applications, Inc., Bayside, N.Y.

Battery Chargers—See Chargers, Battery

Battery Clips—See Clips, Battery—Vol 3

Battery Eliminators—See Eliminators, Battery

Battery Holders—See Retainers, Battery—Vol 3

Battery Plugs—See Connectors, Battery—Vol 3

Battery Retainers—See Retainers, Battery—Vol 3

Battery Testers—See Testers, Battery Bearings

Bearings—See Vol 3

Bearings & Assemblies, Jewel—See Vol 3

Bearings, Miniature—See Vol 3

Bearings, Self-Lubricating—See Vol 3

Bellows—See Vol 3

Bells, Buzzers, Gongs, Sirens & Aural Warning Devices—See Vol 2

Belts, Dial Drive—See Cords & Cable, Dial Drive—Vol 2

Belts, Drive (All Types)—See Vol 2

Benches, Optical—See Vol 2

Benches, Consoles, Stools, Tables (Lab & Shop)-Also See Cabinets & Accessories, Metal—See Vol 3

Bends & Twists, Microwave—See Vol 2

Beryllium Fabricating Facilities—See Vol 3

Bezels, Shielded & Unshielded—See Vol 2

Bi-Metals, Thermostatic—See Vol 3

Binary Scalers—See Scalers, Binary

Binding Posts—See Posts, Binding—Vol 3

Blocks, Terminal—See Vol 3

Blood-Pressure Recorders—See Recorders, Blood Pressure

Blower Cabinets—See Blowers & Fans, & Accessories—Vol 3

Blowers & Fans & Accessories—See Vol 3

Blueprint Machines—See Vol 3

Boards, Graphic, Visual Control

Interswitch, Burlingame, Cal.
K.C.C. Shokai, Ltd., Naka-ku, Kobe, Japan
LVC Ind's., Inc., Corona, N.Y.
Avery Prods. Graphics Div., Santa Ana, Calif
Best Mfg. Co., Kansas City, Mo.
Hughes Aircraft Co, Culver City, Cal.
N/P Co., Temple City, Calif.
Rol-a-chart Div., Somerset, Cal.
Sanders Data Sys., Nashua, N.H.
TEC, Inc., Eden Prairie, Minn.
Virginia Elctrns. Co., Inc., Falls Church, Va.

Boards, Plotting

Bolt Beranek & Newman, Santa Ana, Calif.
K.C.C. Shokai, Ltd., Naka-ku, Kobe, Japan ..... **p 1479**
National Tel-Tronics Corp., Great Neck, N.Y.
Accurate Elctrns. Corp., Elyria, Ohio
Arvin Sys., Inc., Dayton, Ohio
Brooks & Perkins, Inc., Livonia, Mich.
Concord Control, Boston, Mass.
Data Technology Inc., Watertown, Mass.
Dittmore-Freimuth Corp., Milwaukee, Wisc.
Dura Plastics N.Y., Inc., Westport, Conn.
Eagle-Picher Inds., Inc., Joplin, Mo.
Ferranti Ltd., Hollinwood, Lancs., England
Franklin Fibre-Lamitex, Wilmington, Del.
Gerber Sci. Instr. Co., Hartford, Conn.
Hartman Sys. Div. A-T-O, Inc., Huntington Sta., N.Y.
Hughes Aircraft Co, Culver City, Cal.
Hughes Aircraft Co, Fullerton, Cal.
Insulating Shapes, Inc., Bronx, N.Y.
Loral Elctrn. Sys., Bronx, N.Y.
Maxson Elctrns. Div., Great River, N.Y.
McElroy Elctrns. Corp., Shirley, Mass.
Mechanical Engraving Co., Inc., Bronx, N.Y.
Mid-West Metal Prods., Kansas City, Kans.
Milgo Electrn. Corp., Miami, Fla.
Miller Dial, El Monte, Calif.
Photo Chemical Prods. Cal., Santa Monica, Cal.
Plastic Assocs., Inc., Inwood, N.Y.
Pryor Marking Prods., Chicago, Ill.
Sillcocks-Miller Co., Maplewood, N.J.
Soderberg Mfg. Co., Inc., Alhambra, Cal.
Universal Drafting Mach., Bedford Hgts., Ohio
Varian Data Machines, Palo Alto, Cal.
Xynetics, Inc., Canoga Pk., Cal.

Boards, Plug-In—See Vol 3

Boards, Printed Circuit—See Printed Circuit Boards—Vol 2

Boards, Printed Wiring, Universal—See Vol 2

Boards, Programming

A. D. Data Sys., Inc., Rochester, N.Y.
Amp Inc., Harrisburg, Pa. ..... **p 331**
Elctrn. Molding Corp., Woonsocket, R.I. **p 2626**
Interswitch, Burlingame, Cal. ..... **p 1927**
K.C.C. Shokai, Ltd., Naka-ku, Kobe, Japan
LVC Ind's., Inc., Corona, N.Y. ..... **p 2617**
National Tel-Tronics Corp., Great Neck, N.Y.
(NES) Nationwide Elctrn. Sys., Itasca, Ill.
Program Data Co., Torrance, Cal. **p 2706**
Sealectro Corp., Mamaroneck, N.Y. **p 2711**
SRC Div., Newport Bch., Cal.
Trompeter Elctrns., Chatsworth, Cal. **p 1958**
Vector Elctrn. Co., Inc., Sylmar, Cal. **p 2722**
Virginia Panel Corp., Waynesboro, Va. **p 2723**
Accurate Elctrns. Corp., Elyria, Ohio
American Pamcor, Inc., Paoli, Pa
Basler Elec. Co., Highland, Ill.
Century Strand, Inc., Clifton, N.J.
Electrol Co., Inc., York, Pa.
Elctrn. Control Sys., Fairmont, W. Va.
Hughes Aircraft Co, Culver City, Cal.
Hughes Aircraft Co, Fullerton, Cal.
Info-Lite Corp., Ft. Lee, N.J.
Keiser's Inds., Inc., Mt. Holly Springs, Pa.
Loral Elctrn. Sys., Bronx, N.Y.
Mac Panel Co., High Pt., N.C.
Malco Mfg. Co., Chicago, Ill.
Matrix Science, Torrance, Cal.
Maxson Elctrns. Div., Great River, N.Y.
Methode Elctrns., Inc., Chicago, Ill.
Micro Instr., Hawthorne, Cal.
Stanford Applied Engrg., Santa Clara, Cal.
Virginia Elctrns. Co., Inc., Falls Church, Va.
Wiring Services Co, Santa Ana, Cal.

Boards, Terminal—See Vol 3

Boats & Crucibles—See Vol 3

Bobbins, Winding, Coil & Transformer-Also See Coil Forms—See Vol 3

Bolometers, Infrared

Advanced Kinetics, Costa Mesa, Calif.
Barnes Engrg. Co., Stamford, Conn.
Hughes Aircraft Co, Culver City, Cal.
Mikron Instr. Co., Ridgewood, N.J.
Molectron Corp., Sunnyvale, Cal.
Omega Engrg., Inc., Stamford, Conn.
Optoelectronics, Inc., Petaluma, Cal.
Servo Corp. America, Hicksville, N.Y.
Victory Engrg. Corp., Springfield, N.J.

Bolometers, Microwave

Weinschel Engrg. Co., Gaithersburg, Md. ..... **p 1571**
Coax Devices Inc., Chelsea, Mass.
Filmohm Div., Long Island City, N.Y.
General Microwave Corp., Farmingdale, N.Y.
Helitronics Corp., Newark, N.J.
Maury Microwave Corp., Cucamonga, Calif.
Microlab/FXR, Livingston, N.J.
MSI Elctrns. Inc., Woodside, N.Y.
Narda Microwave Corp., Plainview, N.Y.
OMNI Spectra, Farmington, Mich.
PRD Elctrns., Inc., Westbury, N.Y.
Struthers Elctrns. Corp., Mamaroneck, N.Y.
TRG Prods., E. Boston, Mass.
Victor Microwave, Inc., Wakefield, Mass.

Bolts—See Fasteners—Vol 3

Bonding Jumpers—See Jumpers, Bonding—Vol 3

Books—See Technical Books—Vol 3

Booms, Stands, Holders & Accessories, Microphone

RCA Elctrns. Comps., Harrison, N.J.
American Geloso Elctrns., Inc., New York, N.Y.
Atlas Sound Div., Parsippany, N.J.
Carpenter Co., Skokie, Ill.
Conrac Corp., New York, N.Y.
Electro-Voice, Inc., Buchanan, Mich.
Ercona Corp., Bellmore, N.Y.
Philmore Mfg. Co., Richmond Hill, N.Y.
R-Columbia Prods., Inc., Highland Park, Ill.
Shure Bros., Inc., Evanston, Ill.
University Sound, Anaheim, Cal.

Boots, Switch Handle—See Vol 2

Boxes, Circuit Board—See Boxes, Component (Subassembly Handling)—Vol 3

Boxes, Component/Subassembly Handling (Production)—See Vol 3

Boxes, Decade—See Decade Boxes

Boxes, Dry

Apollo Corp., Shinagawa-Ku, Tokyo, Japan
Baker Co., Inc., Biddeford, Me.
Blickman, S., Inc., Weehawken, N.J.
Edcraft Inds., Inc., Linden, N.J.
Gruenberg Elec. Co., Inc., Williamsport, Pa.
Lindberg Hevi-Duty, Chicago, Ill.
Mid-West Metal Prods., Kansas City, Kans.
Nuclear Equip. Chem. Corp., Farmingdale, N.Y.
Plasmadyne, Santa Ana, Calif.
Ray Prods., Inc., Alhambra, Calif.
Research Instr. Co., Westbury, N.Y.
Standard Cabinet Co., Inc., Totowa, N.J.
T-M Vacuum Prods., Riverton, N.J.
Techni-Tool, Inc., Philadelphia, Pa.

Boxes, Echo

Gotham Audio Corp., New York, N.Y.
Guide Inds., Inc., Sun Valley, Calif.
Hughes-Treitler Mfg. Corp., Garden City, N.Y.
Itek Corp., Lexington, Mass.
Narda Microwave Corp., Plainview, N.Y.
PRD Elctrns., Inc., Westbury, N.Y.
Premier Microwave, Port Chester, N.Y.
Struthers Elctrns. Corp., Mamaroneck, N.Y.
United Resch. Lab., Corp., New York, N.Y.
Wandel & Goltermann, E. Hanover, N.J.

Boxes, Glove

Abesto Corp., Bloomfield, N.J.
Baker Co., Inc., Biddeford, Me.
Blickman, S., Inc., Weehawken, N.J.
Edcraft Inds., Inc., Linden, N.J.
Fisher Sci. Co., Pittsburgh, Pa.
Forma Scientific, Marietta, Ohio
Kahl Scientific Instr. Corp., El Cajon, Calif.
Kirk & Blum Mfg. Co., Cincinnati, Ohio
Matthews Resch., Inc., Alexandria, Va.
Mid-West Metal Prods., Kansas City, Kans.
Minor Rubber Co., Inc., Bloomfield, N.J.
Neumade Prods. Corp., Scarsdale, N.Y.
Nuclear Equip. Chem. Corp., Farmingdale, N.Y.
NVF Co., Yorklyn, Del.
Ray Prods., Inc., Alhambra, Calif.
Research Instr. Co., Westbury, N.Y.
Royal Inds, El Segundo, Calif
Soltec Corp., No. Hollywood, Cal.
Standard Cabinet Co., Inc., Totowa, N.J.
T-M Vacuum Prods., Riverton, N.J.
Techni-Tool, Inc., Philadelphia, Pa.
VWR Scientific, San Francisco, Cal.

Boxes, Junction & Wall Plate—See Vol 3

Boxes, Metal & Plastic—See Cabinets; Cans; Cases; Containers—Vol 3

Boxes, Plug-In—See Plug-In Module Enclosures—Vol 3

Boxes, Power Outlet—See Boxes, Junction & Wall Plate—Vol 3

Boxes, Shipping (Reusable)—See Transit Cases—Vol 3

Boxes, Tote—See Boxes, Components / Subassembly Handling—Vol 3

Brackets, Antenna—See Mounts, Antenna

Braid, Cable & Wire Shielding—See Vol 3

Brakes, Magnetic—See Vol 2

Brakes, Mechanical—See Vol 2

Brazing Flux—See Flux, Brazing & Soldering—Vol 3

Breadboard Kits—See Kits, Breadboarding—Vol 2

Breakdown Testers—See Testers, Insulation Breakdown

Breakers, Circuit—See Circuit Breakers—Vol 2

Bridges, Admittance

Boonton Elctrns., Parsippany, N.J. **p 423**
Boonton Electronics Corp., Parsippany, N.J. ..... **p 423**
Dranetz Engrg. Labs., Plainfield, N.J.
Freed Transformer Co., Bklyn., N.Y. **p 481**
Hewlett-Packard, Palo Alto, Cal.
General Radio Co., Concord, Mass.
Rohde & Schwarz Sls., Passaic, N.J.

Bridges, Antenna—See Bridges, R-F

Bridges, Audio

Dranetz Engrg. Labs., Plainfield, N.J.
Electro Sci. Inds., Portland, Ore. .. **p 455**
Freed Transformer Co., Bklyn., N.Y. **p 481**
Hewlett-Packard, Palo Alto, Cal.
Ind'l. Test Equip., Port Washington, N.Y.
Marconi Instrs., Englewood, N.J. .. **p 520**
Altec, Anaheim, Calif.
A.O.I.P., 75/Paris 12eme, France
General Radio Co., Concord, Mass.
Lab Electro-Acoustique, 92-Rueil, Malmaison, France
Lionmount & Co., Ltd., New Southgate, London, England
Mechanical Technology, Inc., Latham, N.Y.
Rohde & Schwarz Sls., Passaic, N.J.
Wiltron Co., Palo Alto, Calif.

Bridges, Bolometer

Weinschel Engrg. Co., Gaithersburg, Md. ..... **p 1571**
Anritsu Electric Co., Ltd., Tokyo, Japan
General Microwave Corp., Farmingdale, N.Y.
Narda Microwave Corp., Plainview, N.Y.
PRD Elctrns., Inc., Westbury, N.Y.
Weston Instruments, Inc., Newark, N.J.

Bridges, Calorimeter

Electro Impulse, Inc., Red Bank, N.J. **p 450**
Hewlett-Packard, Palo Alto, Cal.
General Microwave Corp., Farmingdale, N.Y.
Narda Microwave Corp., Plainview, N.Y.
PRD Elctrns., Inc., Westbury, N.Y.

Bridges, Capacitance

Beckman Instrs., Cedar Grove, N.J. **p 415**
Biddle, James G., Plymouth Meeting, Pa.

Boonton Elctrns., Parsippany, N.J. p 422,423
Boonton Electronics Corp., Parsippany, N.J. ..... p 423
Dranetz Engrg. Labs., Plainfield, N.J.
Electro Sci. Inds., Portland, Ore... p 454
Freed Transformer Co., Bklyn., N.Y. p 481
General Elec. Co., Schenectady, N.Y.
Hewlett-Packard, Palo Alto, Cal.
Hickok Elect. Instr., Cleveland, Ohio
Ind'l. Control Co., Farmingdale, N.Y.
Ind'l. Test Equip., Port Washington, N.Y.
London Co., Cleveland, Ohio
Marconi Instrs., Englewood, N.J... p 520
Quan-Tech, Whippany, N.J.
Simpson Elec. Co., Chicago, Ill.
Sprague Elec. Co., No. Adams, Mass.
Aladdin Controls, Nashville, Tenn.
A.O.I.P., 75/Paris 12eme, France
B & K Instrs., Inc., Cleveland, Ohio
Bendix Corp., Davenport, Iowa
Canadian Research Institute, Don Mills, Ont., Canada
Clippard Instr., Inc., Cincinnati, Ohio
Consolidated Resistance Sls., Yonkers, N.Y.
Davidson Elctrn. Dev. Co., Erie, Pa.
Decker Corp., Bala-Cynwyd, Pa.
Eico Electronic Instrument Co., Inc., Brooklyn, N.Y.
Electronic Meas. Corp., New York, N.Y.
Epic, Inc., New York, N.Y.
Freudenberg, B., Inc., New York, N.Y.
Gencom Div., Plainview, N.Y.
General Radio Co., Concord, Mass.
Guildline Instrs., Inc., Larchmont, N.Y.
Heath Co., Benton Harbor, Mich.
Kahl Scientific Instr. Corp., El Cajon, Calif.
Lion Precision Div., Newton, Mass.
Lionmount & Co., Ltd., New Southgate, London, England
Mechanical Technology, Inc., Latham, N.Y.
Micro Instr., Hawthorne, Cal.
MSE, Inc., Westlake, Ohio
New London Instr. Co., Inc., New London, Conn.
Rohde & Schwarz Sls., Passaic, N.J.
Siemens Corp., Measuring Instrs. Div., Iselin, N.J.
Siemens Corp., Comm. Eq. Div., Iselin, N.J.
Teradyne, Inc., Boston, Mass.

Bridges, Deviation

Beckman Instrs., Cedar Grove, N.J.
Dranetz Engrg. Labs., Plainfield, N.J.
Electro Sci. Inds., Portland, Ore.
General Resistance, Mt. Vernon, N.Y.
Ind'l. Test Equip., Port Washington, N.Y.
Julie Research Lab., New York, N.Y. p 503
Shallcross, Selma, N.C.
Slaughter Co., Ardmore, Okla.
A.O.I.P., 75/Paris 12eme, France
B & K Instrs., Inc., Cleveland, Ohio
Cole Instr., Costa Mesa, Cal.
Davidson Elctrn. Dev. Co., Erie, Pa.
General Radio Co., Concord, Mass.
Mechanical Technology, Inc., Latham, N.Y.
Neutronic Corp., Bridgeton, Mo.
RDF Corp., Hudson, N.H.
Rohde & Schwarz Sls., Passaic, N.J.
Teradyne, Inc., Boston, Mass.

Bridges, Impedance

Alford Mfg. Co., Winchester, Mass. p 598
Beckman Instrs., Cedar Grove, N.J.
Boonton Elctrns., Parsippany, N.J.
Dranetz Engrg. Labs., Plainfield, N.J.
Dytronics Co., Columbus, Ohio
Electro Sci. Inds., Portland, Ore... p 454
Fluke, John Mfg. Co., Inc., Seattle, Wash.
Freed Transformer Co., Bklyn., N.Y. p 481
Hewlett-Packard, Palo Alto, Cal.
Ind'l. Test Equip., Port Washington, N.Y. p 497
London Co., Cleveland, Ohio
Marconi Instrs., Englewood, N.J... p 520
Millen, James Mfg., Malden, Mass.
Sennheiser Elctrn. Corp., New York, NY
Simpson Elec. Co., Chicago, Ill.
Texscan Corp., Indianapolis, Ind.
Anritsu Electric Co., Ltd., Tokyo, Japan
A.O.I.P., 75/Paris 12eme, France
B & K Instrs., Inc., Cleveland, Ohio
Bristol Div, Waterbury, Conn
Davidson Elctrn. Dev. Co., Erie, Pa.
Delta Elctrns., Alexandria, Va.
Eico Electronic Instrument Co., Inc., Brooklyn, N.Y.
General Instr. Corp., Westwood, Mass.
General Microwave Corp., Farmingdale, N.Y.
General Radio Co., Concord, Mass.
Heath Co., Benton Harbor, Mich.
Lab Electro-Acoustique, 92-Rueil, Malmaison, France
Leader Instr. Corp., Long Island City, N.Y.
Leeds & Northrup Corp., No. Wales, Pa.
Mechanical Technology, Inc., Latham, N.Y.
MSE, Inc., Westlake, Ohio
New London Instr. Co., Inc., New London, Conn.
Olektron Corp., Dudley, Mass.
PRD Elctrns., Inc., Westbury, N.Y.
Radiation Devices Co., Baltimore, Md.
RFL Inds., Comms. Div., Boonton, N.J.
Rohde & Schwarz Sls., Passaic, N.J.
Siemens Corp., Comm. Eq. Div., Iselin, N.J.
Solar Elctrns. Co., Hollywood, Calif.
Telonic Inds., Inc., Laguna Beach, Calif.
Wiltron Co., Palo Alto, Calif.

Bridges, Inductance

Biddle, James G., Plymouth Meeting, Pa.
Boonton Elctrns., Parsippany, N.J. p 423
Boonton Electronics Corp., Parsippany, N.J. ..... p 423
Dranetz Engrg. Labs., Plainfield, N.J.
Electro Sci. Inds., Portland, Ore... p 454
Freed Transformer Co., Bklyn., N.Y. p 481
Hewlett-Packard, Palo Alto, Cal.
Ind'l. Test Equip., Port Washington, N.Y.
London Co., Cleveland, Ohio
Marconi Instrs., Englewood, N.J... p 520
Quan-Tech, Whippany, N.J.
Simpson Elec. Co., Chicago, Ill.
B & K Instrs., Inc., Cleveland, Ohio
Cryotronics, Inc., High Bridge, N.J.
Davidson Elctrn. Dev. Co., Erie, Pa.
Gencom Div., Plainview, N.Y.
General Instr. Corp., Westwood, Mass.
General Radio Co., Concord, Mass.
Leader Instr. Corp., Long Island City, N.Y.
Malaker Corp., High Bridge, N.J.
MSE, Inc., Westlake, Ohio
New London Instr. Co., Inc., New London, Conn.
Rohde & Schwarz Sls., Passaic, N.J.
Siemens Corp., Comm. Eq. Div., Iselin, N.J.

Bridges, Kelvin

Beckman Instrs., Cedar Grove, N.J.
Biddle, James G., Plymouth Meeting, Pa. ..... p 419
Boonton Elctrns., Parsippany, N.J.
Boonton Electronics Corp., Parsippany, N.J.
Electro Sci. Inds., Portland, Ore... p 454
Penn Airborne Prods., Southampton, Pa. ..... p 534
Shallcross, Selma, N.C. ..... p 555
Vishay Resistor Prod. Div., Malvern, Pa.
A.O.I.P., 75/Paris 12eme, France
AUL Instrs., Inc., Flushng, N.Y.
Canadian Research Institute, Don Mills, Ont., Canada
Consolidated Resistance Sls., Yonkers, N.Y.
Davidson Elctrn. Dev. Co., Erie, Pa.
Ealing Corp., Cambridge, Mass.
Epic, Inc., New York, N.Y.
Freudenberg, B., Inc., New York, N.Y.
General Radio Co., Concord, Mass.
Guildline Instrs., Inc., Larchmont, N.Y.
Hallmark Standards, Inc., Mt. Vernon, N.Y.
Leeds & Northrup Corp., No. Wales, Pa.
Neutronic Corp., Bridgeton, Mo.
Rohde & Schwarz Sls., Passaic, N.J.
Stark Elctrn. Instrs., Ltd., Ajax, Ont., Canada
Yewtec Corporation, Larchmont, N.Y.

Bridges, Limit—See Bridges (Specific Types)

Bridges, Magnetic Susceptibility

Cryotronics, Inc., High Bridge, N.J.
Malaker Corp., High Bridge, N.J.
Oxford Instr. Corp., Annapolis, Md.
Siemens Corp., Measuring Instrs. Div., Iselin, N.J.

Bridges, Megohm—See Bridges, Resistance

Bridges, Power, R-F

Bird Elctrn., Cleveland, Ohio..... p 421
Dranetz Engrg. Labs., Plainfield, N.J.
Dynamics Instr. Co., Monterey Pk., Cal. p 432
Hewlett-Packard, Palo Alto, Cal.
Multitech Power Sys., Costa Mesa, Cal.
Weinschel Engrg. Co., Gaithersburg, Md. ..... p ,1571
AUL Instrs., Inc., Flushng, N.Y.
Essex Int'l., Inc., Decatur, Ill.
General Microwave Corp., Farmingdale, N.Y.
Narda Microwave Corp., Plainview, N.Y.
New-Tronics Corp., Brookpark, Ohio
Olektron Corp., Dudley, Mass.
PRD Elctrns., Inc., Westbury, N.Y.

Bridges, Programmable—See Bridges (Specific Types)

Bridges, Q

Boonton Elctrns., Parsippany, N.J. p 422

Bridges, Ratio—See Testers, Ratio Voltage-Also See Meters, Ratio

Bridges, Resistance

A. D. Data Sys., Inc., Rochester, N.Y.
American Aerospace Controls, Farmingdale, N.Y.
Beckman Instrs., Cedar Grove, N.J. p 414
Biddle, James G., Plymouth Meeting, Pa. ..... p 419
Boonton Elctrns., Parsippany, N.J.
Boonton Electronics Corp., Parsippany, N.J.
Chronetics, Inc., Mt. Vernon, N.Y.
Dale Elctrns., Inc., Columbus, Neb.
Dranetz Engrg. Labs., Plainfield, N.J.
Electro Sci. Inds., Portland, Ore... p 454
Freed Transformer Co., Bklyn., N.Y. p 481,483
General Resistance, Mt. Vernon, N.Y.
Hewlett-Packard, Palo Alto, Cal.
Hickok Elect. Instr., Cleveland, Ohio p 488
Hipotronics, Inc., Brewster, N.Y.
Ind'l. Test Equip., Port Washington, N.Y.
Julie Research Lab., New York, N.Y. p 503
London Co., Cleveland, Ohio
Marconi Instrs., Englewood, N.J... p 520
Penn Airborne Prods., Southampton, Pa. ..... p 534
Precision Standards Corp., Santa Ana, Cal. ..... p 542
Quan-Tech, Whippany, N.J.
Quindar Elctrns., Inc., Springfield, N.J.
RFL Inds., Instr. Div., Boonton, N.J.
Shallcross, Selma, N.C.
Simpson Elec. Co., Chicago, Ill.
Slaughter Co., Ardmore, Okla.
Sticht, Herman H. Co., Inc., New York, N.Y.
Vishay Resistor Prod. Div., Malvern, Pa.
A. J. Abrams Co., Westport, Conn.
Aladdin Controls, Nashville, Tenn.
Amstro Corp., Fairfield, N.J.
A.O.I.P., 75/Paris 12eme, France
Bristol Div, Waterbury, Conn
Canadian Research Institute, Don Mills, Ont., Canada
Clippard Instr., Inc., Cincinnati, Ohio
Consolidated Ohmic Devices, Carle Pl., N.Y.
Consolidated Resistance Sls., Yonkers, N.Y.
Cryotronics, Inc., High Bridge, N.J.
Davidson Elctrn. Dev. Co., Erie, Pa.
Ealing Corp., Cambridge, Mass.
Eico Electronic Instrument Co., Inc., Brooklyn, N.Y.
Electrical Instr. Svc., Inc., Mt. Vernon, N.Y.
Freudenberg, B., Inc., New York, N.Y.
Gencom Div., Plainview, N.Y.
General Radio Co., Concord, Mass.
Guildline Instrs., Inc., Larchmont, N.Y.
Hallmark Standards, Inc., Mt. Vernon, N.Y.
Heath Co., Benton Harbor, Mich.
Hy-Cal Engrg., Santa Fe Springs, Cal.
Keithley Instrs., Inc., Cleveland, Ohio
Leeds & Northrup Corp., No. Wales, Pa.
Magnetico, Inc., E. Northport, N.Y.
Malaker Corp., High Bridge, N.J.
Medistor Instr. Co., Seattle, Wash.
MSE, Inc., Westlake, Ohio
Neutronic Corp., Bridgeton, Mo.
New London Instr. Co., Inc., New London, Conn.
Oxford Instr. Corp., Annapolis, Md.
RDF Corp., Hudson, N.H.
RFL Inds., Comms. Div., Boonton, N.J.
Rohde & Schwarz Sls., Passaic, N.J.
Rosemount Engrg. Co., Minneapolis, Minn.
Solatron Enterprises, Inglewood, Calif.
Stark Elctrn. Instrs., Ltd., Ajax, Ont., Canada
Teradyne, Inc., Boston, Mass.
Winslow Tele-Tronics, Inc., Eatontown, N.J.
Yewtec Corporation, Larchmont, N.Y.

Bridges, R-F

Alford Mfg. Co., Winchester, Mass. p 598
Boonton Elctrns., Parsippany, N.J. p 423
Boonton Electronics Corp., Parsippany, N.J. ..... p 423
Hewlett-Packard, Palo Alto, Cal.
Millen, James Mfg., Malden, Mass.
Texscan Corp., Indianapolis, Ind.
Weinschel Engrg. Co., Gaithersburg, Md. ..... p 1571
Automation Dynamics, Northvale, N.J.
Blonder-Tongue Labs., Inc., Old Bridge, N.J.
Carco Elctrns., Menlo Park, Calif.
Delta Elctrns., Alexandria, Va.
Edison Elctrns. Div., Manchester, N.H.
General Microwave Corp., Farmingdale, N.Y.
General Radio Co., Concord, Mass.
Gold Line Connector, Inc., Norwalk, Conn.
Jerrold Elctrns. Corp., Philadelphia, Pa.
Jerrold/Watkins Div., Toronto, 395, Ont., Can.
Mechanical Technology, Inc., Latham, N.Y.
Narda Microwave Corp., Plainview, N.Y.
New-Tronics Corp., Brookpark, Ohio
Olektron Corp., Dudley, Mass.
Radiation Devices Co., Baltimore, Md.
Rohde & Schwarz Sls., Passaic, N.J.
Telonic Inds., Inc., Laguna Beach, Calif.
Wiltron Co., Palo Alto, Calif.

Bridges, Schering

Beckman Instrs., Cedar Grove, N.J. p 415
Biddle, James G., Plymouth Meeting, Pa.
Epic, Inc., New York, N.Y.
Guildline Instrs., Inc., Larchmont, N.Y.
Hallmark Standards, Inc., Mt. Vernon, N.Y.
Rohde & Schwarz Sls., Passaic, N.J.

Bridges, Self-Balancing

Beckman Instrs., Cedar Grove, N.J.
Electro Sci. Inds., Portland, Ore.
Julie Research Lab., New York, N.Y.
Quan-Tech, Whippany, N.J.
Weinschel Engrg. Co., Gaithersburg, Md. ..... p 1571
Barber-Colman Co., Electro-Mechanical Prods. Div., Rockford, Ill.
Bendix Corp., Davenport, Iowa
Bristol Div, Waterbury, Conn
Davidson Elctrn. Dev. Co., Erie, Pa.
Doric Sci. Corp., San Diego, Calif.
Freudenberg, B., Inc., New York, N.Y.
General Radio Co., Concord, Mass.
Leeds & Northrup Corp., No. Wales, Pa.
Mechanical Technology, Inc., Latham, N.Y.
Rohde & Schwarz Sls., Passaic, N.J.
Teradyne, Inc., Boston, Mass.

Bridges, Silicon Cell—See Vol 2

Bridges, Strain Gauge

Biddle, James G., Plymouth Meeting, Pa. ..... p 419
Gould, Inc., Cleveland, Ohio
PPM, Inc., Bedford, Ohio ..... p 535
Precision Monolithics, Santa Clara, Cal.
Raytheon Co., Quincy, Mass.
A.O.I.P., 75/Paris 12eme, France
Applied Control Co., Fairfield, N.J.
Biocom, Inc., Culver City, Cal.
Bristol Div, Waterbury, Conn
Doric Sci. Corp., San Diego, Calif.
General Oceanology, Inc., Cambridge, Mass.
Incor Instr., Plainview, N.Y.
Kenney Engrg. Corp., Monrovia, Cal.
Measurement Sys., Inc., Norwalk, Conn.
Micro-Strain, Inc., Spring City, Pa.
Sensotec, Inc., Columbus, Ohio
Thwing-Albert Instr. Co., Philadelphia, Pa.
Transducers, Inc., Santa Fe Springs, Calif.
Tyco Instr. Div., Waltham, Mass.
Vishay Instrs., Malvern, Pa.
Waters Instrs., Inc., Rochester, Minn
West Coast Resch. Corp., Los Angeles, Calif.

Bridges, Synchro & Resolver

Astrosystems, Lake Success, N.Y. p 406,408
Control Technology Co., L.I.C., N.Y.
Julie Research Lab., New York, N.Y. p 502
Kratos Instrument Div., Pasadena, Cal p 510
North Atlantic Inds., Plainview, N.Y. p 530
Singer-General Precision, Inc., Little Falls, N.J.
Theta Instr. Corp., Fairfield, N.J.

Bridges, Temperature

Beckman Instrs., Cedar Grove, N.J.
Biddle, James G., Plymouth Meeting, Pa. ..... p 419
Electro Sci. Inds., Portland, Ore.
Harrel, Inc., E. Norwalk, Conn.
RFL Inds., Thermocontrol Div., Boonton, N.J.
Simpson Elec. Co., Chicago, Ill.
A. J. Abrams Co., Westport, Conn.
Amstro Corp., Fairfield, N.J.
A.O.I.P., 75/Paris 12eme, France
Automatic Control Elctrns. Co., San Antonio, Tex.
Barber-Colman Co., Electro-Mechanical Prods. Div., Rockford, Ill.
Betzelt GMBH, Trogerstr. 32, W. Germany
Biocom, Inc., Culver City, Cal.
Canadian Research Institute, Don Mills, Ont., Canada
CGS/Datametrics, Watertown, Mass.
Climatronics Corp., Hauppauge, N.Y.
Consolidated Ohmic Devices, Carle Pl., N.Y.
Cryotronics, Inc., High Bridge, N.J.
Doric Sci. Corp., San Diego, Calif.
Ealing Corp., Cambridge, Mass.
Electronic Design Labs., Inc., Phila., Pa.
General Oceanology, Inc., Cambridge, Mass.
Genisco Tech. Corp., Instr. Div., Compton, Cal.
Gow-Mac Instr. Co., Madison, N.J.
Guildline Instrs., Inc., Larchmont, N.Y.
Hallmark Standards, Inc., Mt. Vernon, N.Y.
K West, Westminster, Calif.
Kahl Scientific Instr. Corp., El Cajon, Calif.
Keithley Instrs., Inc., Cleveland, Ohio
Leeds & Northrup Corp., No. Wales, Pa.
Lewis Engrg. Co., Naugatuck, Conn.
Malaker Corp., High Bridge, N.J.
Medistor Instr. Co., Seattle, Wash.
Omega Engrg., Inc., Stamford, Conn.
RDF Corp., Hudson, N.H.
Rosemount Engrg. Co., Minneapolis, Minn.
T & T Controls Co., Media, Pa.
Thermometrics, Inc., Edison, N.J.
Victory Engrg. Corp., Springfield, N.J.
Waters Instrs., Inc., Rochester, Minn

Bridges, Thermistor

Simpson Elec. Co., Chicago, Ill.
Weinschel Engrg. Co., Gaithersburg, Md.
Aladdin Controls, Nashville, Tenn.
Automatic Control Elctrns. Co., San Antonio, Tex.
Canadian Research Institute, Don Mills, Ont., Canada
Climatronics Corp., Hauppauge, N.Y.
Cooke Vacuum Prods., S. Norwalk, Conn.
Gas Analysis Sys., Inc., Basking Ridge, N.J.
General Microwave Corp., Farmingdale, N.Y.
General Oceanology, Inc., Cambridge, Mass.
Guildline Instrs., Inc., Larchmont, N.Y.
Kahl Scientific Instr. Corp., El Cajon, Calif.
Medistor Instr. Co., Seattle, Wash.
Narda Microwave Corp., Plainview, N.Y.
Omega Engrg., Inc., Stamford, Conn.
Pennsylvania Elctrns. Technology, Pittsburgh, Pa.
PRD Elctrns., Inc., Westbury, N.Y.
Ramsay Engrg. Co., Anaheim, Calif.
Thermometrics, Inc., Edison, N.J.
Victory Engrg. Corp., Springfield, N.J.
Waters Instrs., Inc., Rochester, Minn
West Coast Resch. Corp., Los Angeles, Calif.
Yellow Springs Instr. Co., Inc., Yellow Springs, Ohio

Bridges, Wenner

Eppley Lab., Inc., Newport, R.I.
Guildline Instrs., Inc., Larchmont, N.Y.
Leeds & Northrup Corp., No. Wales, Pa.

Bridges, Wheatstone

Beckman Instrs., Cedar Grove, N.J. p 414
Biddle, James G., Plymouth Meeting, Pa. ..... p 419
Chronetics, Inc., Mt. Vernon, N.Y.
Electro Sci. Inds., Portland, Ore. ... p 454
Freed Transformer Co., Bklyn., N.Y. p 483
General Resistance, Mt. Vernon, N.Y.
Penn Airborne Prods., Southampton, Pa. ..... p 534
Precision Standards Corp., Santa Ana, Cal. ..... p 542
Shallcross, Selma, N.C. ..... p 555
Sticht, Herman H. Co., Inc., New York, N.Y.
Amstro Corp., Fairfield, N.J.
A.O.I.P., 75/Paris 12eme, France
A.R.F. Products, Inc., Raton, N.M.
Barber-Colman Co., Electro-Mechanical Prods. Div., Rockford, Ill.
Canadian Research Institute, Don Mills, Ont., Canada
Central Scientific Co., Chicago, Ill.
Consolidated Resistance Sls., Yonkers, N.Y.
Ealing Corp., Cambridge, Mass.
Epic, Inc., New York, N.Y.
General Radio Co., Concord, Mass.
Guildline Instrs., Inc., Larchmont, N.Y.
Hallmark Standards, Inc., Mt. Vernon, N.Y.
Heath Co., Benton Harbor, Mich.
Leeds & Northrup Corp., No. Wales, Pa.
Lionmount & Co., Ltd., New Southgate, London, England
McKee-Pedersen Instrs., Danville, Calif.
Medistor Instr. Co., Seattle, Wash.
Millivac Instrs., Schenectady, N.Y.
Muirhead, Inc., Mountainside, N.J.
Neutronic Corp., Bridgeton, Mo.
New London Instr. Co., Inc., New London, Conn.
RDF Corp., Hudson, N.H.
Rohde & Schwarz Sls., Passaic, N.J.
Scientific Educational Prods., N.Y., N.Y.
Stark Elctrn. Instrs., Ltd., Ajax, Ont., Canada
Winslow Tele-Tronics, Inc., Eatontown, N.J.
Yewtec Corporation, Larchmont, N.Y.

Brushes & Brush Assemblies —See Vol 2

Buffer Memories, Computer-Also See Memory Systems

American Astrionics, Hollywood, Cal p 335
Andersen Labs. Inc., Bloomfield, Conn.
Computer Devices, Commack, N.Y. p 2739
Datacom, Inc., Ft. Walton Bch., Fla.
Digital Equip. Corp., Maynard, Mass.
Multitech Data Prods., Monterey Pk., Cal.
(NES) Nationwide Elctrn. Sys., Itasca, Ill.
Signalite, Neptune, N.J.
Ampex Corp., Redwood City, Calif.
Cognitronics Corp., Mt. Kisco, N.Y.
Control Logic, Natick, Mass.
Corning Glass Works, Raleigh, N.C.
Data Disc Inc., Computer Prods., Sunnyvale, Cal.
Di/An Controls, Inc., Boston, Mass.
Fairchild Semiconductor, Mountain View, Calif.
GTE Sylvania Inc., Elctrn. Sys. Gp., Waltham, Mass.
Hughes Aircraft Co, Culver City, Cal.
RCA Govt. & Comm. Sys., Moorestown, N.J.
Sanders Assocs., Nashua, N.H.
Texas Instruments, Inc., Houston, Tex.

Bulbs—See Lamps—Vol 2

Bumpers—See Vol 3

Burnishers, Contact—See Vol 3

Bus Bars & Systems—See Vol 3

Bushings, Glass, Plastic, Metal, etc.—See Vol 3

Bushings, Hermetically Sealed—See Vol 3

Buzzers—See Bells, Buzzers, Gongs, Sirens & Aural Warning Devices—Vol 2

Cabinet Coolers, Blowers & Fans—See Blowers & Fans —Vol 3

Cabinet Pressurization Systems—See Pressurization Systems, Equipment Cabinet —Vol 3

Cabinets & Accessories, Metal—See Vol 3

Cabinets, Metal Shielded—See Vol 3

Cabinets, Plastic—See Vol 3

Cabinets, Sliding Drawer—See Vol 3

Cabinets, Speaker—See Enclosures, Speaker

Cabinets, Wood (Excluding Kits)—See Vol 3

Cable, Audio—See Vol 3

Cable, Battery Booster—See Vol 3

Cable, Coaxial—See Vol 3

Cable, Control—See Cable, Multiconductor—Vol 3

Cable, Dial—See Cords & Cable, Dial Drive—Vol 2

Cable, Fault Locators—See Locators, Cable & Line Fault

Cable, Flat, Collated (Flat or Round Conductors)—See Vol 3

Cable, Flat, Etched—See Vol 3

Cable, Flexible—See Cable, Flat—Vol 3

Cable, Heater—See Vol 3

Cable, High Voltage—See Vol 3

Cable, Irradiated—See Vol 3

Cable, Low-Capacitance—See Vol 3

Cable, Microphone—See Vol 3

Cable, Multiconductor—See Vol 3

Cable, Power—See Vol 3

Cable, Retractile—See Cords, Retractile—Vol 3

Cable, Ribbon—See Cable, Flat—Vol 3

Cable, Rotator, Antenna—See Vol 3

Cable, Shielded—See Vol 3

Cable, Solid Dielectric—See Vol 3

Cable, TFE Insulated—See Vol 3

Cable, TV Camera—See Vol 3

Cable, Telephone—See Vol 3

Cable, Transmission Line—See Vol 3

Cable, Triaxial—See Vol 3

Cable Assemblies & Harnesses—See Vol 3

Cable Clamps & Clips—See Clamps & Clips, Cable—Vol 3

Cable-End Sealing Kits—See Kits, Cable-End Sealing—Vol 3

Cable Pressurization Equipment

Adel Div., Burbank, Calif.
Andrew Corp., Orland Pk., Ill.
Lectrodryer Div., Pittsburgh, Pa.
Phelps Dodge Comm., North Haven, Conn.
Puregas Equip. Corp., Copiague, N.Y.
Superior Continental Corp., Hickory, N.C.

Cable Retractors—See Vol 3

Cable Testers—See Testers, Cable

Cages, Circuit Board—See Racks, Circuit—Vol 3

Calculators, Electrical & Electronic-Also See Computers, Desk Top

Data-Control Systems, Danbury, Conn.
Hewlett-Packard, Palo Alto, Cal.
C-Thru Ruler Co., Bloomfield, Conn.
Cintra Inc., Sunnyvale, Cal.
Control Equip. Corp., New England, Lowell, Mass.
Facit-Odhner, Inc., Secaucus, N.J.
Friden Div., San Leandro, Calif.
Innovatek Enterprise, Millerton, N.Y.
Matsushita Comm. Ind'l. Co., Ltd., Yokohama, Japan
Monroe, Orange, N.J.
Transitron Elctrn. Corp., Wakefield, Mass.
Wang Labs., Inc., Tewksbury, Mass.

Calibration Services—See Services, Calibration & Instrument Repair—Vol 3

Calibrators, Accelerometer

North Hills Elctrns., Inc., Glen Cove, N.Y.
AGAC-Derritron, Inc., Alexandria, Va.
AMBAC Inds., Garden City, N.Y.
Anchor Specialty Mfg., Teterboro, N.J.
B & K Instrs., Inc., Cleveland, Ohio
Endevco, Pasadena, Calif.
Gaertner Scientific Corp., Chicago, Ill.
General Radio Co., Concord, Mass.
Genisco Tech. Corp., Instr. Div., Compton, Cal.
Kistler Instr. Co., Redmond, Wash.
Ling Elctrns., Anaheim, Calif.

MB Elctrns/Textron Co., New Haven, Conn.
Rohde & Schwarz Sls., Passaic, N.J.
Unholtz-Dickie Corp., Hamden, Conn.

Calibrators, Attenuation

Weinschel Engrg. Co., Gaithersburg, Md. ..... p 1571
AIL, Div. Cutler-Hammer, Inc., Deer Park, N.Y.
Collins, G.L. Corp., Long Beach, Calif.
Guildline Instrs., Inc., Larchmont, N.Y.
Maury Microwave Corp., Cucamonga, Calif.
Micro-Tel Corp., Baltimore, Md.
Narda Microwave Corp., Plainview, N.Y.
PRD Elctrns., Inc., Westbury, N.Y.
Scientific-Atlanta, Inc., Atlanta, Ga.

Calibrators, Crystal

Austron, Inc., Austin, Tex.
Data-Control Systems, Danbury, Conn.
Dranetz Engrg. Labs., Plainfield, N.J.
Fork Standards, W. Chicago, Ill.
Hewlett-Packard, Palo Alto, Cal.
Meloy Laboratories, Springfield, Va.
RFL Inds., Instr. Div., Boonton, N.J. p 554
Drake, R.L., Co., Miamisburg, Ohio
Edison Elctrns. Div., Manchester, N.H.
Heath Co., Benton Harbor, Mich.
Microwave/Sys., Inc., E. Syracuse, N.Y.
Olektron Corp., Dudley, Mass.
Rohde & Schwarz Sls., Passaic, N.J.

Calibrators, Current

American Aerospace Controls, Farmingdale, N.Y.
Electronic Dev. Corp., Boston, Mass. p 456
Fluke, John Mfg. Co., Inc., Seattle, Wash. ..... p 475,476
General Resistance, Mt. Vernon, N.Y.
Julie Research Lab., New York, N.Y.
North Hills Elctrns., Inc., Glen Cove, N.Y.
RFL Inds., Instr. Div., Boonton, N.J. p 554
Systron-Donner Concord Instr. Div., Concord, Cal.
Victoreen Instr., Cleveland, Ohio
Computer Test Corp., Cherry Hill, N.J.
Electrical Instr. Svc., Inc., Mt. Vernon, N.Y.
Guildline Instrs., Inc., Larchmont, N.Y.
Holt Instr. Labs., Oconto, Wisc.
Keithley Instrs., Inc., Cleveland, Ohio
Optimation, Inc., Sun Valley, Calif.
United Sys. Corp., Dayton, Ohio

Calibrators, Frequency

Atec, Inc., Houston, Tex.
Austron, Inc., Austin, Tex.
Data-Control Systems, Danbury, Conn.
Fluke, John Mfg. Co., Inc., Seattle, Wash. ..... p 476
Fork Standards, W. Chicago, Ill.
Frequency Control, Inc., Austin, Tex.
Frequency Elctrns., New Hyde Pk., N.Y.
Frequency Engrg. Labs., Farmingdale, N.J.
Hewlett-Packard, Palo Alto, Cal.
Hickok Elect. Instr., Cleveland, Ohio
Lorch-Adret Corp., Englewood, N.J.
Meloy Laboratories, Springfield, Va.
PPM, Inc., Bedford, Ohio
Solid State Elctrns., Sepulveda, Cal.
Sonex, Inc., Bethayres, Pa.
A & M Instrument, Inc., Great Neck, N.Y.
Aerospace Resch. Inc., Boston, Mass.
California Instrs. Co., San Diego, Cal.
Collins Radio Co., Dallas, Tex.
General Microwave Corp., Farmingdale, N.Y.
General Radio Co., Concord, Mass.
Hammarlund Mfg. Co., Red Bank, N.J.
Heath Co., Benton Harbor, Mich.
Leader Instr. Corp., Long Island City, N.Y.
Micro-Now Instr., Chicago, Ill.
Micro-Tel Corp., Baltimore, Md.
Microwave/Sys., Inc., E. Syracuse, N.Y.
Optimation, Inc., Sun Valley, Calif.
Philco-Ford Corp., Washington, D.C.
Radiation Devices Co., Baltimore, Md.
Riverbank Labs., Geneva, Ill.
Rohde & Schwarz Sls., Passaic, N.J.
Telonic Inds., Inc., Laguna Beach, Calif.
Tracor, Inc., Austin, Tex.
VIKOA Cable Div., Freehold, N.J.

Calibrators, LVDT

North Atlantic Inds., Plainview, N.Y.
Automatic Control Elctrns. Co., San Antonio, Tex.
Collins, G.L. Corp., Long Beach, Calif.
Custom Sci. Instrs., Inc., Whippany, N.J.
IKL, Inc., Newport Beach, Calif.
Robinson-Halpern Co., W. Conshohocken, Pa.
Transducer Systems, Inc., Willow Grove, Pa.

Calibrators, Magnetic Field

Electro-Mechanics Co., Austin, Tex. p 452
ISC Magnetics Div., Huntington, N.Y.
RFL Inds., Instr. Div., Boonton, N.J. p 554
Advanced Kinetics, Costa Mesa, Calif.
Thomas & Skinner, Inc., Indianapolis, Ind.

Calibrators, Meter—See Testers, Meter

Calibrators, Microphone

B & K Instrs., Inc., Cleveland, Ohio
General Radio Co., Concord, Mass.

Calibrators, Noise

AIL, Div. Cutler-Hammer, Inc., Deer Park, N.Y.
B & K Instrs., Inc., Cleveland, Ohio

Calibrators, Oscilloscope

Accutronics, Inc., Geneva, Ill.
E-H Resch. Labs., Inc., Oakland, Cal.
Meloy Laboratories, Springfield, Va.
Tektronix, Inc., Beaverton, Ore.
BAC Elctrns., Pennsauken, N.J.
Broadview Inds. Corp., Hempstead, N.Y.
Dumont Oscilloscope Labs., Inc., W. Caldwell, N.J.
Eico Electronic Instrument Co., Inc., Brooklyn, N.Y.
Kikusui Elctrns. Corp., Kawasaki City, Kanagawa-Pref., Japan
Medistor Instr. Co., Seattle, Wash.

Calibrators, Radar Range

Metric Sys., Ft. Walton Beach, Fla. p 359
Weinschel Engrg. Co., Gaithersburg, Md.
Loral Elctrn. Sys., Bronx, N.Y.
Philips Elctrns. Inds., Ltd., Toronto 17, Can.
RCA Govt. & Comm. Sys., Moorestown, N.J.
Sage Labs. Inc., Natick, Mass.

Calibrators, Sweep—See Generators, Sweep

Calibrators, Synchro

Astrosystems, Lake Success, N.Y.
Data-Control Systems, Danbury, Conn.
Dranetz Engrg. Labs., Plainfield, N.J.
Ind'l. Control Co., Farmingdale, N.Y.
Jonard Inds. Corp., Bronx, N.Y.
Julie Research Lab., New York, N.Y.
North Atlantic Inds., Plainview, N.Y. p 530
Defense Elctrns., Inc., Rockville, Md.
Dorsett Elctrns., Tulsa, Okla.
Theta Instr. Corp., Fairfield, N.J.

Calibrators, Telemetering—See Telemetering Testers

Calibrators, Time-Base

Austron, Inc., Austin, Tex.
Automated Meas., Oakland, Calif. p 447
E-H Resch. Labs., Inc., Oakland, Cal. p 447
Fork Standards, W. Chicago, Ill.
Frequency Control, Inc., Austin, Tex.
Hewlett-Packard, Palo Alto, Cal.
Meloy Laboratories, Springfield, Va.
PPM, Inc., Bedford, Ohio
Specific Products, Monrovia, Cal. p 325
Tektronix, Inc., Beaverton, Ore.
Aerospace Resch. Inc., Boston, Mass.
General Microwave Corp., Farmingdale, N.Y.
Gralex Inds., Inc., Farmingdale, N.Y.
Phelps Dodge Comm., North Haven, Conn.
Radiation Devices Co., Baltimore, Md.
Tracor, Inc., Austin, Tex.

Calibrators, Voltage

Beckman Instrs., Cedar Grove, N.J.
Data-Control Systems, Danbury, Conn. p 345
Electro Sci. Inds., Portland, Ore... p 455
Electronic Dev. Corp., Boston, Mass. p 456,457
Fluke, John Mfg. Co., Inc., Seattle, Wash. ..... p 475,476
General Resistance, Mt. Vernon, N.Y.
Hewlett-Packard, Palo Alto, Cal.
Hickok Elect. Instr., Cleveland, Ohio
Kepco, Inc., Flushing, N.Y.
Lorch-Adret Corp., Englewood, N.J.
North Hills Elctrns., Inc., Glen Cove, N.Y.
Power Designs, Westbury, N.Y.
Precision Standards Corp., Santa Ana, Cal. ..... p 542
RFL Inds., Instr. Div., Boonton, N.J.
Ross Engrg. Corp., Campbell, Cal.
Simpson Elec. Co., Chicago, Ill.
Sonex, Inc., Bethayres, Pa. ..... p 955
Systron-Donner Corp., Concord, Cal. p 565
Systron-Donner Alpha Div., Oakland, Cal. ..... p 565
Systron-Donner Concord Instr. Div., Concord, Cal. ..... p 565
Systron-Donner Kruse Elctrns. Sub., Mountain View, Cal. ..... p 565
Tektronix, Inc., Beaverton, Ore.
A & M Instrument, Inc., Great Neck, N.Y.
Analogic, Wakefield, Mass.
BAC Elctrns., Pennsauken, N.J.
Canadian Research Institute, Don Mills, Ont., Canada
Chicago Condenser Corp., Chicago, Ill.
Coax Devices Inc., Chelsea, Mass.
Cohu Elctrns., Inc., San Diego, Calif.
Computer Diode, Fair Lawn, N.J.
Computer Test Corp., Cherry Hill, N.J.
Constant Voltage Co., Chicago, Ill.
Delta-Tronics Corp., Tempe, Ariz.
Doric Sci. Corp., San Diego, Calif.
Electrical Instr. Svc., Inc., Mt. Vernon, N.Y.
General Microwave Corp., Farmingdale, N.Y.
Guildline Instrs., Inc., Larchmont, N.Y.
Hallmark Standards, Inc., Mt. Vernon, N.Y.
Holt Instr. Labs., Oconto, Wisc.
Horex Elctrns., Inc., Santa Monica, Calif.
Idalee Elctrns. Corp., Valley Stream, N.Y.
Infrared Inds., Inc., Santa Barbara, Cal.
Keithley Instrs., Inc., Cleveland, Ohio
Kistler Instr. Co., Redmond, Wash.
Medistor Instr. Co., Seattle, Wash.
Optimation, Inc., Sun Valley, Calif.
Pioneer Magnetics, Santa Monica, Cal.
United Sys. Corp., Dayton, Ohio
Weston Instruments, Inc., Newark, N.J.
Westronics, Inc., Ft. Worth, Tex.

Calibrators, VSWR

Alford Mfg. Co., Winchester, Mass.
Signalite, Neptune, N.J.
Weinschel Engrg. Co., Gaithersburg, Md. ..... p 1571
Automation Dynamics, Northvale, N.J.
General Microwave Corp., Farmingdale, N.Y.
General Radio Co., Concord, Mass.
Heath Co., Benton Harbor, Mich.
Narda Microwave Corp., Plainview, N.Y.
PRD Elctrns., Inc., Westbury, N.Y.
Radiation Devices Co., Baltimore, Md.
Rantec Div., Calabasas, Calif.
Telonic Inds., Inc., Laguna Beach, Calif.
Wiltron Co., Palo Alto, Calif.

Calling Sytems—See Intercommunication Systems

Calorimeters, Heat Transfer

Andonian Assocs., Inc., Waltham, Mass.
Custom Sci. Instrs., Inc., Whippany, N.J.
Exotic Materials, Inc., Costa Mesa, Cal.
Hy-Cal Engrg., Santa Fe Springs, Cal.
Plasmadyne, Santa Ana, Calif.
RDF Corp., Hudson, N.H.
Scientific Educational Prods., N.Y., N.Y.
Sparton Southwest, Inc., Albuquerque, N.M.
VWR Scientific, San Francisco, Cal.

Calorimeters, Laser

Chemalloy Elctrns., Santee, Cal.
EG & G, Inc., Salem, Mass.
Hadron Inc., Westbury, N.Y.
Hy-Cal Engrg., Santa Fe Springs, Cal.
Korad Mat'ls. Sys. Div., Santa Monica, Cal.
Quantronix Corp., Smithtown, N.Y.
Raytheon Co., Waltham, Mass.

Calorimeters, Microwave

Bendix, Franklin, Ind.
Bird Elctrn., Cleveland, Ohio..... p 421
Electro Impulse, Inc., Red Bank, N.J. p 450
Hewlett-Packard, Palo Alto, Cal.
Aircom, Inc., Union, N.H.
Chemalloy Elctrns., Santee, Cal.
General Microwave Corp., Farmingdale, N.Y.
Kahl Scientific Instr. Corp., El Cajon, Calif.
Microlab/FXR, Livingston, N.J.
Narda Microwave Corp., Plainview, N.Y.
Philco-Ford Corp., Washington, D.C.
PRD Elctrns., Inc., Westbury, N.Y.
Raytheon Co., Waltham, Mass.
Reeve Elctrns., Inc., Chicago, Ill.
TRG Prods., E. Boston, Mass.
Varian Assocs., Palo Alto, Cal.
Varian Assocs.Electron Tube & Device Grp., Palo Alto, Cal.

Calorimeters, Optical—See Vol 2

Cameras, Data Recording—See Vol 2

Cameras, Image Converter—See Vol 2

Cameras, Image Dissection—See Vol 2

Cameras, Infrared—See Vol 2

Cameras, Microcircuit Processing—See Vol 2

Cameras, Oscilloscope—See Vol 2

Cameras, Rotating Mirror & Drum—See Vol 2

Cameras, TV (Black And White) & Accessories

Circon Corp., Goleta, Cal.
Nippon Electric/NEC America, N.Y., N.Y.
Action Systems Co., Meriden, Conn.
Alcor, Inc., Ithaca, N.Y.
Ampex Corp., Redwood City, Calif.
ASC Sys. Corp., Chicago, Ill.
ATV Research, Dakota City, Neb.
Blonder-Tongue Labs., Inc., Old Bridge, N.J.
CBS Laboratories, Stamford, Conn.
Cohu Elctrns., Inc., San Diego, Calif.
Colorado Video, Inc., Boulder, Colo.
Commercial Elctrns., Inc., Mountain View, Cal.
Concord Elctrns., Los Angeles, Cal.
D-Vel Resch. Labs., Inc., Bedford Hills, N.Y.
Dalmo Victor, Belmont, Calif.
Data Disc, Video Div., Sunnyvale, Cal.
Denson Elctrns. Corp., Rockville, Conn.
Dynair Elctrns. Inc., San Diego, Calif.
Edo Western Corp., Salt Lake City, Utah
GBC Closed Circuit TV Corp., New York, N.Y.
Gencom Div., Plainview, N.Y.
General Electrodynamics Corp., Garland, Tex.
Jerrold Elctrns. Corp., Philadelphia, Pa.
Jerrold/Watkins Div., Toronto, 395, Ont., Can.
Kalart Victor, Plainville, Conn.
Lear Siegler, Inc., Santa Monica, Calif.
Lear Siegler, Anaheim, Cal.
Lenox Instr. Co., Philadelphia, Pa.
Link Div., Binghamton, N.Y.
Matsushita Comm. Ind'l. Co., Ltd., Yokohama, Japan
Merix Chem. Co., Chicago, Ill.
Multi Media Engrg., Inc., Rockville, Md.
Nelson-Hershfield Elctrns., Phoenix, Ariz.

Philips Broadcast Equipment Corp., Montvale, N.J.
Photo Tech. Prods., Garden City, N.Y.
RCA Corp., Camden, N.J.
RCA Govt. & Comm. Sys., Moorestown, N.J.
Shibaden Corp. Amer., Woodside, N.Y.
Tel-Instr. Elctrns. Corp., Carlstadt, N.J.
Teledyne Camera Sys., Arcadia, Cal.
Teletronics, Inc., Orange, Calif.
Texas Instruments, Inc., Dallas, Tex.
Thomson-CSF Inc., New York, N.Y.
VIKOA, Hoboken, N.J.
Visual Educom, Michigan City, Ind.
Westinghouse Elec., Pittsburgh, Pa.
Zoomar, Inc., Glen Cove, N.Y.

Cameras, TV (Color) & Accessories

Nippon Electric/NEC America, N.Y., N.Y.
Ampex Corp., Redwood City, Calif.
CBS Laboratories, Stamford, Conn.
Cohu Elctrns., Inc., San Diego, Calif.
Commercial Elctrns., Inc., Mountain View, Cal.
D-Vel Resch. Labs., Inc., Bedford Hills, N.Y.
Data Disc, Video Div., Sunnyvale, Cal.
Denson Elctrns. Corp., Rockville, Conn.
Dynair Elctrns. Inc., San Diego, Calif.
GBC Closed Circuit TV Corp., New York, N.Y.
Matsushita Comm. Ind'l. Co., Ltd., Yokohama, Japan
Multi Media Engrg., Inc., Rockville, Md.
Philips Broadcast Equipment Corp., Montvale, N.J.
Photo Tech. Prods., Garden City, N.Y.
Rank Precision Inds., W. Nyack, N.Y.
RCA Corp., Camden, N.J.
RCA Govt. & Comm. Sys., Moorestown, N.J.
Shibaden Corp. Amer., Woodside, N.Y.
Teletronics, Inc., Orange, Calif.
Thomson-CSF Inc., New York, N.Y.
Visual Elctrns. Corp., New York, N.Y.
Zoomar, Inc., Glen Cove, N.Y.

Cameras, TV, Infrared

Dynarad, Inc., Norwood, Mass. .... p 439
Alcor, Inc., Ithaca, N.Y.
Cohu Elctrns., Inc., San Diego, Calif.
Edo Western Corp., Salt Lake City, Utah
General Electrodynamics Corp., Garland, Tex.
Hughes Aircraft Co, Culver City, Cal.
Philips Broadcast Equipment Corp., Montvale, N.J.
Rank Precision Inds., W. Nyack, N.Y.
RCA Govt. & Comm. Sys., Moorestown, N.J.
Texas Instruments, Inc., Dallas, Tex.

Cameras, X-Ray

Abtronics, Inc., Livermore, Calif.
General Electrodynamics Corp., Garland, Tex.
Heitz, Karl, Inc., New York, N.Y.
Materials Resch. Corp., Orangeburg, N.Y.
Matsushita Comm. Ind'l. Co., Ltd., Yokohama, Japan
Multi Media Engrg., Inc., Rockville, Md.
Philips Elctrn. Instrs., Mt. Vernon, N.Y.
Photomechanisms Div., Inc., Huntington Sta., N.Y.
Teledyne Camera Sys., Arcadia, Cal.
Thomson-CSF Inc., New York, N.Y.

Cams—See Vol 3

Cans & Flat Packs, Integrated Circuit—See Packages, Integrated Circuit—Vol 2

Cans, Capacitor—See Vol 3

Cans, Crystal—See Vol 3

Cans, Relay—See Vol 3

Cans, Semiconductor—See Vol 3

Cans, Transformer—See Vol 3

Capacitance Comparators—See Bridges, Capacitance

Capacitor Leakage Indicators—See Testers, Capacitor

Capacitors, Air Cooled—See Vol 3

Capacitors, Chip (For Microcircuits)—See Vol 3

Capacitors, Fixed, Air—See Vol 3

Capacitors, Fixed, Bathtub—See Vol 3

Capacitors, Fixed, Ceramic—See Vol 3

Capacitors, Fixed, Ceramic Disc—See Vol 3

Capacitors, Fixed, Decade—See Vol 3

Capacitors, Fixed, Electrolytic (All Types)—See Vol 3

Capacitors, Fixed, Feedthru—See Vol 3

Capacitors, Fixed, Film—See Vol 3

Capacitors, Fixed, Gas Filled—See Vol 3

Capacitors, Fixed, Glass—See Vol 3

Capacitors, Fixed, High Capacitance-Low Voltage—See Vol 3

Capacitors, Fixed, High Temperature—See Vol 3

Capacitors, Fixed, High Voltage—See Vol 3

Capacitors, Fixed, Laboratory Standard—See Vol 3

Capacitors, Fixed, Mica—See Vol 3

Capacitors, Fixed, Motor Run—See Vol 3

Capacitors, Fixed, Motor-Starting—See Vol 3

Capacitors, Fixed, Mylar—See Vol 3

Capacitors, Fixed, Mylar, Metallized—See Vol 3

Capacitors, Fixed, Niobium—See Vol 3

Capacitors, Fixed, Oil—See Vol 3

Capacitors, Fixed, Paper—See Vol 3

Capacitors, Fixed, Paper, Metallized—See Vol 3

Capacitors, Fixed, Photoflash—See Vol 3

Capacitors, Fixed, Polycarbonate—See Vol 3

Capacitors, Fixed, Polycarbonate, Metallized—See Vol 3

Capacitors, Fixed, Polystyrene—See Vol 3

Capacitors, Fixed, Porcelain, Enamel—See Vol 3

Capacitors, Fixed, Power Factor Correction—See Vol 3

Capacitors, Fixed, Pulse-Forming Network—See Vol 3

Capacitors, Fixed, Silvered Mica—See Vol 3

Capacitors, Fixed, Tantalum—See Vol 3

Capacitors, Fixed, TFE—See Vol 3

Capacitors, Fixed, TFE, Metallized—See Vol 3

Capacitors, Fixed, Temperature Compensating—See Vol 3

Capacitors, Fixed, Vacuum—See Vol 3

Capacitors, Overvoltage Protected—See Vol 3

Capacitors, Variable, Air—See Vol 3

Capacitors, Variable, Ceramic—See Vol 3

Capacitors, Variable, Film—See Vol 3

Capacitors, Variable, Gas—See Vol 3

Capacitors, Variable, Glass—See Vol 3

Capacitors, Variable, High Temperature—See Vol 3

Capacitors, Variable, HV (Lab Type)-Also See Decade Boxes,Capacitance—See Vol 3

Capacitors, Variable, Motor Driven—See Vol 3

Capacitors, Variable, Mica—See Vol 3

Capacitors, Variable, Neutralizing—See Vol 3

Capacitors, Variable, Oil—See Vol 3

Capacitors, Variable, Padder—See Vol 3

Capacitors, Variable, Piston—See Capacitors, Variable, Trimmer (All Types)—Vol 3

Capacitors, Variable, Quartz—See Vol 3

Capacitors, Variable, Silicone—See Vol 3

Capacitors, Variable, TFE—See Vol 3

Capacitors, Variable, Temperature Compensating—See Vol 3

Capacitors, Variable, Trimmer (All Types)—See Vol 3

Capacitors, Variable, Vacuum—See Vol 3

Capacitors, Water Cooled—See Vol 3

Caps, Connector—See Vol 3

Caps, Forms & Tapes, Heat Shrinkable-Also See Tubing, Heat Shrinkable—See Vol 3

Caps, Grid & Plate—See Clips & Caps, Grid & Plate—Vol 3

Caps, Lens, Indicator Light—See Vol 2

Caps, Wire-Splicing—See Splicers, Wire (Butt & Cap Types)—Vol 3

Carbides—See Vol 3

Carbon—See Vol 3

Card Holders, Circuit Board—See Racks, Circuit Board—Vol 3

Card Readers—See Punched Card Equipment

Cards, Linear Function (With Discrete Components)—See Vol 2

Cards, Linear Function (With IC'S)—See Vol 2

Cards, Logic (With Discrete Components)

A. D. Data Sys., Inc., Rochester, N.Y.
Automation Dev., Culver City, Cal. p 1310
Centralab, Elctrns., Milwaukee, Wisc.
Clare, C.P. & Co., Chicago, Ill.
Delco Elctrns. Div., Kokomo, Ind.
Digital Equip. Corp., Maynard, Mass. p 348
Digitron Corp., Norristown, Pa.
Dynamics Instr. Co., Monterey Pk., Cal.
Elctrn. Engrg. Co. Cal., Santa Ana, Cal.
Geo Space Sys., Tampa, Fla.
Grigsby-Barton, Inc., Rolling Meadows, Ill. ..... p 1711
Ind'l Elctrn. Engrs., Van Nuys, Cal.
Metric Sys., Ft. Walton Beach, Fla.p 359
New Prod. Engrg., Wabash, Ind.
Raytheon Computer, Santa Ana, Cal. p 375
Re-el Circuits, Inc., Totowa Boro, N.J. p 326,327
Solid State Elctrns., Sepulveda, Cal.
Tempo/UTI Div., Chatsworth, Cal. p 384
A C Electronics Co., Santa Monica, Cal.
Allegri-Tech, Inc., Nutley, N.J.
AMBAC Inds., Garden City, N.Y.
Analog Devices, Inc., Norwood, Mass.
Analogic, Wakefield, Mass.
A.O.I.P., 75/Paris 12eme, France
Atlantic Instrs. Corp., Watertown, Mass.
Automatic Control Elctrns. Co., San Antonio, Tex.
Aydin Data Systems, Ft. Washington, Pa
Cambridge Thermionic, Cambridge, Mass
CGS Units, Inc., Rochester, N.Y.
Clifton Div., Clifton Hgts., Pa.
Control Logic, Natick, Mass.
Data Technology Corp., Palo Alto, Cal.
Di/An Controls, Inc., Boston, Mass.
Digiac Corp., Plainview, N.Y.
Digital Prods., San Pedro, Calif.
General Comps., Inc., St. Petersburg, Fla.
GTE Sylvania Inc., Seneca Falls, N.Y.
Gulton Inds., Albuquerque, N.M.
Heath Co., Benton Harbor, Mich.
Interlind Elctrns., Doraville, Ga.
Iso-Switch Corp., Costa Mesa, Cal.
ITT Semiconductors, W. Palm Beach, Fla.
Kentrox Inds., Inc., Portland, Ore.
Lear Siegler, Inc., Santa Monica, Calif.
Lehigh Valley Elctrn., Inc., Fogelsville, Pa.
Midland Standard Inc., Elgin, Ill.
Monitor Sys., Inc., Ft. Washington, Pa.
Philco-Ford Corp., Washington, D.C.
Ragen Precision Inds., Inc., N. Arlington, N.J.
Robinson-Nugent, New Albany, Ind.
Standard Logic, Santa Ana, Cal.
Struthers-Dunn, Inc., Pitman, N.J.
Superior Elec., Bristol, Conn.
Transducer Controls Corp., Covina, Calif.
Xerox Data Sys., El Segundo, Cal
Y.T. & T. Corp., Roslyn Hgts., N.Y.

Cards, Logic (With IC'S)

A. D. Data Sys., Inc., Rochester, N.Y.
Automation Dev., Culver City, Cal.
Centralab, Elctrns., Milwaukee, Wisc.
Clare, C.P. & Co., Chicago, Ill.
Computer Prods., Ft. Lauderdale, Fla. p 341

Data Technology, Palo Alto, Cal... p 429
Datacom, Inc., Ft. Walton Bch., Fla.
Datascan, Inc., Clifton, N.J..... p 428
Digital Equip. Corp., Maynard, Mass. p 348
Digitron Corp., Norristown, Pa.
Dytro Corp., Hicksville, N.Y.
Elctrn. Engrg. Co. Cal., Santa Ana, Cal.
Geo Space Sys., Tampa, Fla.
Ind'l Elctrn. Engrs., Van Nuys, Cal.
(NES) Nationwide Elctrn. Sys., Itasca, Ill.
Raytheon Computer, Santa Ana, Cal. p 375
Re-el Circuits, Inc., Totowa Boro, N.J. p 326,327
Tempo/UTI Div., Chatsworth, Cal. p 384
A C Electronics Co., Santa Monica, Cal.
Allegri-Tech, Inc., Nutley, N.J.
AMBAC Inds., Garden City, N.Y.
Analog Devices, Inc., Norwood, Mass.
Analogic, Wakefield, Mass.
Atlantic Instrs. Corp., Watertown, Mass.
Automatic Control Elctrns. Co., San Antonio, Tex.
Aydin Data Systems, Ft. Washington, Pa
BECO Solid State Systems, Salem, Va.
Broadview Inds. Corp., Hempstead, N.Y.
Cambridge Thermionic, Cambridge, Mass
CGS Units, Inc., Rochester, N.Y.
Clifton Div., Clifton Hgts., Pa.
Control Logic, Natick, Mass.
Data Technology Corp., Palo Alto, Cal.
De-Tec-Tronic Corp., Chicago, Ill.
Di/An Controls, Inc., Boston, Mass.
Digital Prods., San Pedro, Calif.
Dynamic Sys. Elctrns. Corp., Tempe, Ariz.
Elctrn. Modules Corp., Timonium, Md.
General Comps., Inc., St. Petersburg, Fla.
Goodyear Aerospace Corp., Akron, Ohio
Gulton Inds., Albuquerque, N.M.
Heath Co., Benton Harbor, Mich.
Interlind Elctrns., Doraville, Ga.
Iso-Switch Corp., Costa Mesa, Cal.
ITT Semiconductors, W. Palm Beach, Fla.
Kentrox Inds., Inc., Portland, Ore.
Lear Siegler, Inc., Santa Monica, Calif.
Midland Standard Inc., Elgin, Ill.
Monitor Sys., Inc., Ft. Washington, Pa.
Morey Corp, Downers Grove, Ill.
Philco-Ford Corp., Washington, D.C.
Ragen Precision Inds., Inc., N. Arlington, N.J.
Robinson-Nugent, New Albany, Ind.
Signal Analysis Inds. Corp., Hauppauge, N.Y.
Standard Logic, Santa Ana, Cal.
Stanford Applied Engrg., Santa Clara, Cal.
Struthers-Dunn, Inc., Pitman, N.J.
Struthers-Dunn, Inc., Bettendorf, Iowa
Tenor Co., Inc., New Berlin, Wisc.
Transducer Controls Corp., Covina, Calif.
Wyle Labs., El Segundo, Calif.
Xerox Data Sys., El Segundo, Cal
Y.T. & T. Corp., Roslyn Hgts., N.Y.

Carriages, Probe—See Vol 2

Carrier Current Systems—See Comm. Systems, Carrier Current

Carriers—See Holders & Carriers—Vol 2

Cartridges, Microphone

Rye Inds., Inc., Mamaroneck, N.Y.
Action Systems Co., Meriden, Conn.
American Geloso Elctrns., Inc., New York, N.Y.
Astatic Corp., Conneaut, Ohio
B & K Instrs., Inc., Cleveland, Ohio
Bourns Security Sys., Smithtown, N.Y.
Conrac Corp., New York, N.Y.
Conrac Corp., Cedar Rapids, Iowa
Dyna Magnetic Devices, Inc., Hicksville, N.Y.
Philmore Mfg. Co., Richmond Hill, N.Y.
Shigoto Inds., Ltd., New York, N.Y.
Shure Bros., Inc., Evanston, Ill.
Sonotone Corp., Elmsford, N.Y.
Stanford Int'l., San Carlos, Cal.

Cartridges, Phono, Ceramic

Astatic Corp., Conneaut, Ohio
Components Specialties, Inc., Freeport, N.Y.
EV/Game, Inc., Freeport, N.Y.
Vidaire Electronics Mfg. Corp., Freeport, N.Y.

Cartridges, Phono, Crystal

Astatic Corp., Conneaut, Ohio
Components Specialties, Inc., Freeport, N.Y.
EV/Game, Inc., Freeport, N.Y.
Philmore Mfg. Co., Richmond Hill, N.Y.
Shigoto Inds., Ltd., New York, N.Y.
Vidaire Electronics Mfg. Corp., Freeport, N.Y.

Cartridges, Phono, Magnetic

Audio Dynamics Corp., New Milford, Conn.
Bourns Security Sys., Smithtown, N.Y.
EV/Game, Inc., Freeport, N.Y.
Elpa Mktg. Inds., New Hyde Park, N.Y.
Empire Scientific Corp., Garden City, N.Y.
Grado Labs., Inc., Brooklyn, N.Y.
Ortofon Div., New Hyde Park, N.Y.
Pickering & Co., Inc., Plainview, N.Y.
Shigoto Inds., Ltd., New York, N.Y.
Shure Bros., Inc., Evanston, Ill.
Stanton Magnetics, Inc., Plainview, N.Y.
Vidaire Electronics Mfg. Corp., Freeport, N.Y.

Carts, Instrument & Equipment—See Vol 3

Cases, Delay Line—See Vol 3

Cases, Equipment, Instrument, Meter (Portable)—See Vol 3

Cases, Equipment, Instrument, Meter (Stationary)—See Vol 3

Cases, Relay—See Cans, Relay—Vol 3

Cases, Semiconductor—See Cans, Semiconductor—Vol 3

Cases, Shielded—See Containers, Shielded—Vol 3

Cases, Transit—See Transit Cases—Vol 3

Castings—See Metal Parts, Cast—Vol 3

Cathode-Ray Readout Tubes —See Tubes, Readout—Vol 2

Catv Systems & Equipment

American Elctrn. Labs., Inc., Lansdale, Pa.
C-COR Elctrns., State College, Pa.
Cunningham, Honeoye Falls, N.Y. p 322
Data-Control Systems, Danbury, Conn.
JFD Elctrns./Sub. Riker-Maxson, Bklyn., N.Y.
Texscan Corp., Indianapolis, Ind.
Advance Inds., Sioux City, Iowa
Alcor, Inc., Ithaca, N.Y.
Ameco, Inc., Phoenix, Ariz.
American Pamcor, Inc., Paoli, Pa
Ampex Corp., Redwood City, Calif.
Avantek, Inc., Santa Clara, Cal.
Benco Television Assoc., Rexdale, Ont., Can.
Blonder-Tongue Labs., Inc., Old Bridge, N.J.
Cohu Elctrns., Inc., San Diego, Calif.
Concord Elctrns., Los Angeles, Cal.
Conrac Div., Covina, Calif.
Copperweld Steel Co., Glassport, Pa.
Delcon Div., Mt. View, Calif.
Denson Elctrns. Corp., Rockville, Conn.
Entron, Inc., Silver Spring, Md.
Entron Inc., Morganville, N.J.
Essex Int'l., Inc., Decatur, Ill.
General Microwave Corp., Farmingdale, N.Y.
Int'l. Microwave, Cos Cob, Conn.
Jerrold Elctrns. Corp., Philadelphia, Pa.
Kaiser CATV, Phoenix, Ariz
Kalart Victor, Plainville, Conn.
Lear Siegler, Anaheim, Cal.
Maspro Co., Inc., Nagoya-Shigai, Japan
Memorex Corp., Santa Clara, Cal.
Microwave Assocs., Inc., Burlington, Mass.
Multi Media Engrg., Inc., Rockville, Md.
Nurad, Inc., Baltimore, Md.
Olektron Corp., Dudley, Mass.
Raytheon Data Systems Co., Norwood, Mass.
RCA Corp., Camden, N.J.
RF Systems, Inc., Cohasset, Mass.
Rohde & Schwarz-Sls., Passaic, N.J.
Scientific-Atlanta, Inc., Atlanta, Ga.
Shibaden Corp. Amer., Woodside, N.Y.
Shigoto Inds., Ltd., New York, N.Y.
Sitco Antennas, Portland, Ore.
Superior Continental Corp., Hickory, N.C.
TACO Div., Sherburne, N.Y.
Technical Mat'l., Mamaroneck, N.Y.
Visual Educom, Michigan City, Ind.
Visual Elctrns. Corp., New York, N.Y.
Workman Elctrn. Prods., Inc., Sarasota, Fla.

Cavities, Microwave—See Vol 2

Cells, Electrolytic (Timing)—See Timers, Electrolytic Cell —Vol 2

Cells, Fuel—See Fuel Cells

Cells, Kerr—See Vol 2

Cells, Load—See Vol 2

Cells, Photoconductive—See Vol 2

Cells, Photoemissive-Also See Tubes, Photomultiplier —See Vol 2

Cells, Photovoltaic—See Vol 2

Cells, Solar—See Cells, Photovoltaic—Vol 2

Cements—See Adhesives—Vol 3

Centrifuges-Also See Simulators, Motion

Schaevitz Engrg., Pennsauken, N.J. p 390
AMF Electrosystems Div., Vandalia, Ohio
Anchor Specialty Mfg., Teterboro, N.J.
Auto Control Labs., Los Angeles, Calif.
Beckman Instrs., (AISSD), Fullerton, Cal.
Central Scientific Co., Chicago, Ill.
Custom Sci. Instrs., Inc., Whippany, N.J.
Fisher Sci. Co., Pittsburgh, Pa.
Genisco Tech. Corp., Instr. Div., Compton, Cal.
Goerz Optical Co., Inc., Pittsburgh, Pa.
Lab-Line Instrs., Inc., Melrose Park, Ill.
Pennwalt Corp., Phila., Pa.
Precision Sci. Co., Chicago, Ill.
Trio-Tech, Inc. of Calif., Burbank, Calif.
VWR Scientific, San Francisco, Cal.

Ceramic Resonators—See Vol 2

Ceramics—See Insulation Parts, Ceramic—Vol 3

Chambers, Acoustical Test, High-Intensity Noise

Data-Control Systems, Danbury, Conn.
B & K Instrs., Inc., Cleveland, Ohio
Emerson & Cuming, Inc., Canton, Mass.
Flame Resch., Inc., Pittsburgh, Pa.
General Acoustics Corp., Los Angeles, Calif.
Hotpack Corp., Phila., Pa.
Hughes Aircraft Co, Fullerton, Cal.
L.A.B. Corp., Skaneateles, N.Y.
LectroMagnetics, Los Angeles, Cal.
Lindgren, Erik A. & Assoc., Chicago, Ill.
Lindsay Structure, Evansville, Ind.
Ling Elctrns., Anaheim, Calif.
Ray Proof Corp., Norwalk, Conn.
Wyle Labs., El Segundo, Calif.

Chambers, Altitude

Associated Testing Labs., Inc., Wayne, N.J. ..... p 388
Gerorator Corp., Manassas, Va.
American Resch. Corp., Farmington, Conn.
Anchor Specialty Mfg., Teterboro, N.J.
Atlas Engrg. Corp., W. Hartford, Conn.
Auto Control Labs., Los Angeles, Calif.
Bendix, Rochester, N.Y.
Cincinnati Sub-Zero Prods., Cincinnati, Ohio
Denton Vacuum, Inc., Cherry Hill, N.J.
Develco, Inc., Norwalk, Conn.
High Vacuum Equip. Corp., Hingham, Mass.
Hughes Aircraft Co, Vacuum Tube Prods. Div/Vacuum Equip., Oceanside, Calif
Hull Corp., Hatboro, Pa.
Kinney Vacuum Co., Boston, Mass.
Middlesex Gen'l. Inds., Somerville, Mass.
Puritan-Zep, El Segundo, Cal.
Standard Cabinet Co., Inc., Totowa, N.J.
T-M Vacuum Prods., Riverton, N.J.
Tenney Engrg., Inc., Union, N.J.
Thermotron Corp., Holland, Mich.
Torr Labs., Los Angeles, Cal.
Vacuum Equip. Div., Newton, Mass.
Varian Assocs., Palo Alto, Cal.
Webber Mfg. Co., Inc., Indianapolis, Ind.

Chambers, Anechoic—See Anechoic Chambers

Chambers, Explosion

Atlas Engrg. Corp., W. Hartford, Conn.
Auto Control Labs., Los Angeles, Calif.
Benthos, Inc., N. Falmouth, Mass.
Cincinnati Sub-Zero Prods., Cincinnati, Ohio
Hotpack Corp., Phila., Pa.
Middlesex Gen'l. Inds., Somerville, Mass.
So-Low Environmental Equip., Cincinnati, Ohio
Standard Cabinet Co., Inc., Totowa, N.J.
Tenney Engrg., Inc., Union, N.J.

Chambers, Humidity

Associated Testing Labs., Inc., Wayne, N.J. ..... p 388
Blue M Engrg. Co., Blue Island, Ill. p 389
American Instr. Co., Silver Spring, Md.
American Resch. Corp., Farmington, Conn.
Atlas Electric Devices, Chicago, Ill.
Atlas Engrg. Corp., W. Hartford, Conn.
Atmosphere Control Co., Inc., Philadelphia, Pa.
Auto Control Labs., Los Angeles, Calif.
Blickman, S., Inc., Weehawken, N.J.
Caig Labs., Inc., Westbury, N.Y.
Cambridge Sys., EG&G Inc., Waltham, Mass.
Cincinnati Sub-Zero Prods., Cincinnati, Ohio
Develco, Inc., Norwalk, Conn.
Forma Scientific, Marietta, Ohio
Hotpack Corp., Phila., Pa.
Hughes Aircraft Co, Fullerton, Cal.
Hygrodynamics, Inc., Silver Spring, Md.
Integrated Dev. & Mfg. Co., Chagrin Falls, Ohio
Jersey Tech. Conslts., Morristown, N.J.
Kahl Scientific Instr. Corp., El Cajon, Calif.
Lab-Line Instrs., Inc., Melrose Park, Ill.
Lindsay Structure, Evansville, Ind.
Precision Sci. Co., Chicago, Ill.
So-Low Environmental Equip., Cincinnati, Ohio
Standard Cabinet Co., Inc., Totowa, N.J.
Tenney Engrg., Inc., Union, N.J.
Thermotron Corp., Holland, Mich.
Vestal Modern Design Corp., Vestal, N.Y.
VWR Scientific, San Francisco, Cal.
Webber Mfg. Co., Inc., Indianapolis, Ind.

Chambers, Ionization

General Elec. Co., Schenectady, N.Y.
Victoreen Instr., Cleveland, Ohio
Artronix, Inc., St. Louis, Mo.
Avco Elctrns., Tulsa, Okla.
Cary Instrs., Monrovia, Calif.
Cooke Vacuum Prods., S. Norwalk, Conn.
Eberline Instr. Corp., Santa Fe, N.M.
Landsverk Electrometer Co., Glendale, Cal.
Norton Co., Newton, Mass.
Nuclear-Chicago, Des Plaines, Ill.
Nuclear Corp. Amer., Denville, N.J.
Nuclear Equip. Chem. Corp., Farmingdale, N.Y.
Nuclear Supply Co., Washington, D.C.
Ohmart Corp., Cincinnati, Ohio
Reuter-Stokes, Cleveland, Ohio
Soltec Corp., No. Hollywood, Cal.
Torr Labs., Los Angeles, Cal.
Vacuum Equip. Div., Newton, Mass.
Westinghouse Elec., Elmira, N.Y.

Chambers, Magnetic Environment

Electro-Mechanics Co., Austin, Tex. p 452
High Voltage Engrg. Corp., Burlington, Mass.
LectroMagnetics, Los Angeles, Cal.
Lindgren, Erik A. & Assoc., Chicago, Ill.
Ray Proof Corp., Norwalk, Conn.

Chambers, Pressure

Associated Testing Labs., Inc., Wayne, N.J. p 388
American Resch. Corp., Farmington, Conn.
Atlas Engrg. Corp., W. Hartford, Conn.
Auto Control Labs., Los Angeles, Calif.
Benthos, Inc., N. Falmouth, Mass.
Blickman, S., Inc., Weehawken, N.J.
BTU Engrg. Corp., Waltham, Mass.
Cincinnati Sub-Zero Prods., Cincinnati, Ohio
Cooke Vacuum Prods., S. Norwalk, Conn.
Develco, Inc., Norwalk, Conn.
Kahl Scientific Instr. Corp., El Cajon, Calif.
Kahn & Co., Inc., Wethersfield, Conn.
Middlesex Gen'l. Inds., Somerville, Mass.
Red Point Corp., Burbank, Calif.
Reuter-Stokes, Cleveland, Ohio
Standard Cabinet Co., Inc., Totowa, N.J.
Tem-Pres Research Div., State College, Pa.
Tenney Engrg., Inc., Union, N.J.

Chambers, Radiation

Associated Testing Labs., Inc., Wayne, N.J.
General Elec. Co., Schenectady, N.Y.
Victoreen Instr., Cleveland, Ohio
Avco Elctrns., Tulsa, Okla.
Harshaw Chem. Co., Cleveland, Ohio
Landsverk Electrometer Co., Glendale, Cal.
Nuclear Corp. Amer., Denville, N.J.
Nuclear Equip. Chem. Corp., Farmingdale, N.Y.
Ray Proof Corp., Norwalk, Conn.
Reuter-Stokes, Cleveland, Ohio
Soltec Corp., No. Hollywood, Cal.
Torr Labs., Los Angeles, Cal.
Westinghouse Elec., Elmira, N.Y.

Chambers, Salt Spray

Associated Testing Labs., Inc., Wayne, N.J. p 388
Auto Control Labs., Los Angeles, Calif.
Develco, Inc., Norwalk, Conn.
Standard Cabinet Co., Inc., Totowa, N.J.
Tenney Engrg., Inc., Union, N.J.

Chambers, Sand & Dust

American Resch. Corp., Farmington, Conn.
Atlas Engrg. Corp., W. Hartford, Conn.
Auto Control Labs., Los Angeles, Calif.
Matthews Resch., Inc., Alexandria, Va.
Standard Cabinet Co., Inc., Totowa, N.J.
Tenney Engrg., Inc., Union, N.J.

Chambers, Space Simulation
—See Solar Simulators

Chambers, Sunshine

American Resch. Corp., Farmington, Conn.
Atlantic Ultraviolet Corp., Long Island City, N.Y.
Atlas Electric Devices, Chicago, Ill.
Atlas Engrg. Corp., W. Hartford, Conn.
Auto Control Labs., Los Angeles, Calif.
Hotpack Corp., Phila., Pa.
Standard Cabinet Co., Inc., Totowa, N.J.
Tenney Engrg., Inc., Union, N.J.
Thermotron Corp., Holland, Mich.
Webber Mfg. Co., Inc., Indianapolis, Ind.

Chambers, Temperature

Associated Testing Labs., Inc., Wayne, N.J. p 388
Blue M Engrg. Co., Blue Island, Ill. p 389
Cox & Co., Inc., New York, N.Y.
Electronic Research Co., Shawnee Mission, Kans. p 458
Aerotronic Assocs., Inc., Contoocook, N.H.
Alpha-Monarch Corp., Dallas, Tex.
American Instr. Co., Silver Spring, Md.
American Resch. Corp., Farmington, Conn.
Andonian Assocs., Inc., Waltham, Mass.
Atlas Engrg. Corp., W. Hartford, Conn.
Atmosphere Control Co., Inc., Philadelphia, Pa.
Auto Control Labs., Los Angeles, Calif.
Blickman, S., Inc., Weehawken, N.J.
BTU Engrg. Corp., Waltham, Mass.
Caig Labs., Inc., Westbury, N.Y.
Cambridge Thermionic, Cambridge, Mass
Cincinnati Sub-Zero Prods., Cincinnati, Ohio
Custom Sci. Instrs., Inc., Whippany, N.J.
Delta Design, La Mesa, Cal
Despatch Oven Co., Minneapolis, Minn.
Develco, Inc., Norwalk, Conn.
Elctrn. Control Co., Dresher, Pa.
Gruenberg Elec. Co., Inc., Williamsport, Pa.
Guildline Instrs., Inc., Larchmont, N.Y.
Hafstrom Tech. Prods., Inc., San Diego, Calif.
Harris Mfg. Co., Inc., Cambridge, Mass.
High Vacuum Equip. Corp., Hingham, Mass.
Honeywell, Apparatus Controls, Mpls., Minn.
Hotpack Corp., Phila., Pa.
Hull Corp., Hatboro, Pa.
Hydor Therme Corp., Pennsauken, N.J.
Instron Corp., Canton, Mass.
Integrated Dev. & Mfg. Co., Chagrin Falls, Ohio
Jersey Tech. Conslts., Morristown, N.J.
Kahl Scientific Instr. Corp., El Cajon, Calif.
Lab-Line Instrs., Inc., Melrose Park, Ill.
Lehigh Valley Elctrn., Inc., Fogelsville, Pa.
OAL Assocs., Inc., Westbury, N.Y.
Precision Sci. Co., Chicago, Ill.
Products for Research, Inc., Danvers, Mass.
Research, Inc., Minneapolis, Minn.
Research Instr. Co., Westbury, N.Y.
So-Low Environmental Equip., Cincinnati, Ohio
Standard Cabinet Co., Inc., Totowa, N.J.
Statham Instrs., Inc., Oxnard, Cal.
Teledyne Semiconductor, Hawthorne, Cal.
Tenney Engrg., Inc., Union, N.J.
Thermotron Corp., Holland, Mich.
Vestal Modern Design Corp., Vestal, N.Y.
Webber Mfg. Co., Inc., Indianapolis, Ind.

Chambers, Vacuum

Associated Testing Labs., Inc., Wayne, N.J. p 388
Blue M Engrg. Co., Blue Island, Ill. p 389
Aero Vac Corp., Troy, N.Y.
American Resch. Corp., Farmington, Conn.
Andonian Assocs., Inc., Waltham, Mass.
Astro Dynamics, Inc., Burlington, Mass.
Atlas Engrg. Corp., W. Hartford, Conn.
Auto Control Labs., Los Angeles, Calif.
Avco Elctrns., Tulsa, Okla.
Bendix, Rochester, N.Y.
Blickman, S., Inc., Weehawken, N.J.
Brew Richard D. & Co., Inc., Concord, N.H.
BTU Engrg. Corp., Waltham, Mass.
Cincinnati Sub-Zero Prods., Cincinnati, Ohio
Cooke Vacuum Prods., S. Norwalk, Conn.
Denton Vacuum, Inc., Cherry Hill, N.J.
Develco, Inc., Norwalk, Conn.
Edwards High Vacuum, Grand Island, N.Y.
Forma Scientific, Marietta, Ohio
Fredericks Co., Huntingdon Valley, Pa.
Granville-Phillips Co., Boulder, Colo.
High Vacuum Equip. Corp., Hingham, Mass.
High Voltage Engrg. Corp., Burlington, Mass.
Hotpack Corp., Phila., Pa.
Hughes Aircraft Co, Vacuum Tube Prods. Div/Vacuum Equip., Oceanside, Calif
Hull Corp., Hatboro, Pa.
Kahl Scientific Instr. Corp., El Cajon, Calif.
Kinney Vacuum Co., Boston, Mass.
Materials Resch. Corp., Orangeburg, N.Y.
Middlesex Gen'l. Inds., Somerville, Mass.
Norton Co., Newton, Mass.
Pennwalt Corp., Phila., Pa.
Precision Sci. Co., Chicago, Ill.
Red Point Corp., Burbank, Calif.
Research Instr. Co., Westbury, N.Y.
Sloan Technology Corp., Santa Barbara, Calif.
Standard Cabinet Co., Inc., Totowa, N.J.
T-M Vacuum Prods., Riverton, N.J.
Tenney Engrg., Inc., Union, N.J.
Thermotron Corp., Holland, Mich.
Torr Labs., Los Angeles, Cal.
Ultek Div., Palo Alto, Calif.
Vactronic Lab. Equip., Inc., E. Northport, N.Y.
Vacuum Equip. Div., Newton, Mass.
Vacuum Inds., Inc., Somerville, Mass.
Varian Assocs., Palo Alto, Cal.
Varian Assocs., Vacuum Div., Palo Alto, Cal.
Veeco Instrs., Inc., Plainview, N.Y.
Webber Mfg. Co., Inc., Indianapolis, Ind.

Chambers, Vibration

Associated Testing Labs., Inc., Wayne, N.J. p 388
Data-Control Systems, Danbury, Conn.
Standard Cabinet Co., Inc., Totowa, N.J.
Tenney Engrg., Inc., Union, N.J.
Thermotron Corp., Holland, Mich.

Chargers, Battery

ATR Elctrns., Inc., St. Paul, Minn.
Austron, Inc., Austin, Tex.
Betamite Electronic Devices, Culver City, Calif.
CEA, Monrovia, Cal.
Christie Elec., Los Angeles, Cal. p 674,675
CML-Macarr, Inc., Edison, N.J. p 667,668
Dynamic Instr. Corp., Plainview, N.Y. p 681
Gates Elctrn. Co., Bronx, N.Y.
General Elec. Co., Schenectady, N.Y.
International Rectifier, El Segundo, Cal.
Kepco, Inc., Flushing, N.Y.
La Marche Mfg. Co., Des Plaines, Ill. p 775
Marathon Battery Co., Cold Spring, N.Y.
Mauratron, Inc., Dallas, Tex. p 815
Mid-Eastern Inds., Scotch Plains, N.J.
North Elec. Co., Galion, Ohio
Opad Elec. Co., Inc., New York, N.Y.
Power Inc., Burnsville, Minn.
Powertec, Chatsworth, Cal.
Schauer Mfg. Corp., Cincinnati, Ohio
Servo-Tek Prods. Co., Hawthorne, N.J.
Todd Prods., Farmingdale, N.Y.
Unitron, Garland, Tex.
Western Reserve Elctrns., Twinsburg, Ohio p 581
A C Electronics Co., Santa Monica, Cal.
Allen, Alva Inds., Clinton, Mo.
American Rectifier Corp., College Point, N.Y.
Aristo-Craft Distinctive Miniatures, New York, N.Y.
Astro-Metrix, Burbank, Cal.
AUL Instrs., Inc., Flushng, N.Y.
Automatic Switch Co., Florham Park, N.J.
Barnes & Reinecke, Inc., Chicago, Ill.
BECO Solid State Systems, Salem, Va.
Bergen Labs., Inc., Paterson, N.J.
B.H. Inds., Los Angeles, Cal.
Bose Corp., Natick, Mass.
Bullock Magnetics Corp., Pomona, Calif.
C & D Batteries, Plymouth Meeting, Pa.
Cal-Power Corp., El Segundo, Calif.
Canadian Research Institute, Don Mills, Ont., Canada
Central Scientific Co., Chicago, Ill.
Coil Co. of Amer., Northvale, N.J.
Collins Electronics, Inc., Stevensville, Md.
Control Prods. Corp., Chicago, Ill.
Cyberex Inc., Willoughby, Ohio
Dual-Lite Co., Newtown, Conn.
Eagle-Picher Inds., Inc., Joplin, Mo.
Eastern Delta Corp., Fair Lawn, N.J.
Eastron Corp., Haverhill, Mass.
EDC (Electro Dev.), Lynnwood, Wash.
Edmund Scientific Co., Barrington, N.J.
Eico Electronic Instrument Co., Inc., Brooklyn, N.Y.
Electro Powerpacs Corp., Cambridge, Mass.
Electro Prods. Labs., Power Supply, Chicago, Ill.
Electro-Standards Labs., Inc., Miami, Fla.
Elctrn. Components Corp., Addison, Ill.
Electronic Meas. Corp., New York, N.Y.
Elgin Elctrns., Waterford, Pa.
Fedtro, Inc., Rockville Centre, N.Y.
Forney Inds., Inc., Fort Collins, Colo.
General Battery Corp., Reading, Pa.
General Radio Co., Concord, Mass.
Glentronics, Glendora, Cal.
Globe-Union Inc., Milwaukee, Wisc.
Gould Inc., Trenton, NJ
Green Elec. Corp., Fair Lawn, N.J.
Guardian California, Culver City, Cal.
Gulton Inds., Hawthorne, Calif.
Heath Co., Benton Harbor, Mich.
HGA Elctrns., Mt. Vernon, N.Y.
Hobart Bros. Co., Troy, Ohio
Hyperion Inds. Corp., Watertown, Mass.
Ionics, Inc., Watertown, Mass
Johnson Elec. Coil Co., Elmhurst, Ill.
Katolight Corp., Mankato, Minn.
Lakeshore Electric Corp., Bedford, Ohio
Leclanche S A, CH 1401-Yverdon, Switzerland
Lincoln Elec. Co., Cleveland, Ohio
Mag-Con Engrg. Co., St. Paul, Minn.
Model Rectifier Corp., Edison, N.J.
Motor Generator Div., Troy, Ohio
Oeco Corp., Portland, Ore.
Ogden Technology Labs., Fullerton, Cal.
ONAN Div., Mipls., Minn.
Optical Elctrns., Tucson, Ariz.
Permavolt Transformers, Inc., S. Bend, Ind.
Philmore Mfg. Co., Richmond Hill, N.Y.
Power Applications, Inc., Bayside, N.Y.
Power Control Corp., Pittsburgh, Pa.
Power Conversion Prods. Inc., Crystal Lake, Ill.
Ramm Rectifier Co., Inc., Bronx, N.Y.
Ramsay Engrg. Co., Anaheim, Calif.
Rapid Elec. Co., Bronx, N.Y.
Ratelco, Inc., Seattle, Wash.
Ray-O-Vac Co., Madison, Wisc.
Rectifier Engrg. & Supply, St. Louis, Mo.
RIL Elctrns., Inc., Southampton, Pa.
Sel-Rex Corp., Nutley, N.J.
Shigoto Inds., Ltd., New York, N.Y.
Singer-General Precision, Inc., Little Falls, N.J.
Solidstate Controls, Inc., Columbus, Ohio
Stored Energy Systems, Mountain View, Calif.
Sun Electric Corp., Chicago, Ill.
Teledyne Inet, Gardena, Cal.
Terado Corp., St. Paul, Minn.
Ther Elec. & Mach. Works, Chicago, Ill.
Transformer Mfrs., Inc., Chicago, Ill.
Transrex Div., Torrance, Cal.
Triple-A Specialty Co., Chicago, Ill.
Ward Leonard, Mt. Vernon, N.Y.
Warren Communications, Littleton, Mass.
Workman Elctrn. Prods., Inc., Sarasota, Fla.
Zenith Controls Inc., Chicago, Ill.

Chargers, Magnet—See Magnetizers

Chassis, Circuit Board Mounting—See Vol 3

Chassis Marking Kits—See Kits, Marking (Dial, Instrument, Equipment, etc.) —Vol 2

Chassis, Metal—See Vol 3

Chassis Slides—See Slides, Cabinet, Chassis & Drawer—Vol 3

Checkers—See Analyzers; Testers

Chemically Milled Parts—See Metal Parts, Chemically Milled —Vol 3

Chemicals, Anti-Static—See Coatings, Anti-Static—Vol 3

Chemicals, Degreasing—See Cleaners & Solvents—Vol 3

Chemicals, Dehumidifying—See Vol 3

Chemicals, Electroplating—See Vol 3

Chemicals, Epoxy Stripping—See Vol 3

Chemicals, Etching—See Vol 3

Chemicals, Fungicidal—See Coatings, Fungicidal—Vol 3

Chemicals, Luminescent—See Vol 3

Chemicals, Metal Stripping—See Vol 3

Chemicals, Photosensitive—See Vol 3

Chemicals, Semiconductor (Production)—See Vol 3

Chemicals, Wire Stripping—See Vol 3

Chestsets—See Handsets, Chestsets & Operator Sets

Chips, Capacitor—See Capacitors, Chip—Vol 3

Chips, IC—See Circuits, Integrated, Silicon Monolithic, Unpackaged Chips—Vol 2

Chips, Transistor—See Transistors, Chip Unpackaged —Vol 2

Chokes, A-F—See Coils, A-F—Vol 3

Chokes, Air Core, DC—See Vol 3

Chokes, Filter—See Vol 3

Chokes, R-F—See Vol 3

Chokes, Swinging—See Vol 3

Chokes, Waveguide—See Vol 2

Choppers—See Vol 2

Choppers, Photo—See Choppers—Vol 2

Chromatographs—See Analyzers, Gas

Chronographs—See Recorders, Timing

Chronometers

Austron, Inc., Austin, Tex.
Chrono-log Corp., Broomall, Pa. .. p 340
Aerospace Resch. Inc., Boston, Mass.
Neutronic Corp., Bridgeton, Mo.
Sprengnether, W.F. Instr. Co., Inc., St. Louis, Mo.
Tracor, Inc., Austin, Tex.
Wakmann Watch Co., Inc., New York, N.Y.

Circuit Analyzers—See Testers, Signal Tracing

Circuit Board Boxes—See Boxes, Component (Subassembly Handling)—Vol 3

Circuit Board Holders, Jig Type—See Holders, Circuit Board—Vol 3

Circuit Board Racks—See Racks, Circuit Board—Vol 3

Circuit Boards, Stamped (Without Components)—See Vol 2

Circuit Breakers—See Vol 2

Circuit Linearity Comparators—See Comparators, Circuit Linearity

Circuit Testers—See Testers, Signal Tracing

Circuits, Flexible—See Vol 2

Circuits, Hybrid, Thick Film—See Vol 2

Circuits, Hybrid, Thin-Film—See Vol 2

Circuits, Integrated, Metal Oxide Semiconductor (Mos)—See Vol 2

Circuits, Integrated, Digital—See Vol 2

Circuits, Integrated, Linear—See Vol 2

Circuits, Integrated, Silicon Monolithic, Unpackaged Chips—See Vol 2

Circuits, Large Scale Integration (LSI)—See Vol 2

Circuits, Logic Computer—See Cards, Logic; Circuits, Hybrid; Circuits, Integrated; Modules, Logic

Circuits, Medium Scale Integration (MSI)—See Vol 2

Circuits, Miniature (Cordwood etc.)—See Vol 2

Circuits, Multilayer—See Printed Circuits, Multilayer—Vol 2

Circuits, Printed (With Components)—See Cards, Linear Function—Vol 2

Circuits, Thick-Film—See Circuits, Hybrid, Thick-Film—Vol 2

Circuits, Thin-Film—See Circuits, Hybrid, Thin-Film—Vol 2

Circuits, Woven Wire—See Cloth, Woven Wire—Vol 2

Circulators, Ferrite—See Vol 2

Clamps & Clips, Cable-Also See Wire & Cable Ties—See Vol 3

Clamps, Component—See Vol 3

Clamps, Servo—See Vol 2

Clean Room Equipment & Supplies-Also See Work Stations, Clean, Dust-Free

Clauss Cutlery Co., Fremont, Ohio p 2934
Jonard Inds. Corp., Bronx, N.Y.
Agnew-Higgins, Inc., Garden Grove, Calif.
Air-Vac Engrg. Co., Milford, Conn.
Ajusto Equip. Co., Bowling Green, Ohio
American Air Filter, Louisville, Ky.
American Ultraviolet Co., Chatham, N.J.
Angelica Uniform Co., St. Louis, Mo.
Arnold Labs., N. Hollywood, Cal.
Atlas Coverall & Uniform Supply, L.A., Cal.
Baker Co., Inc., Biddeford, Me.
Balston Ind'l. Ltd., Lexington, Mass
Bendix Corp., Davenport, Iowa
Black Light Corp. Amer., San Gabriel, Cal.
Blickman, S., Inc., Weehawken, N.J.
Branson Instruments Co., Stamford, Conn.
Buffalo Forge Co., Buffalo, N.Y.
Cambridge Filter Corp., Syracuse, N.Y.
Clean Rooms Constr., Westminster, Cal.
Controlled Environment Equip. Corp., Newton Upper Falls, Mass.
Dri-Clave Corp., Westbury, N.Y.
Edcraft Inds., Inc., Linden, N.J.
Forney Inds., Inc., Fort Collins, Colo.
General Acoustics Corp., Los Angeles, Calif.
General Sci. Equip., Phila., Pa.
Haydu Prods., Inc., Opa Locka, Fla.
Industrial Formulations, Plainview, N.Y.
L & R Mfg. Co., Kearny, N.J.
Matrix Engineering Corp., Gardena, Calif.
Matthews Resch., Inc., Alexandria, Va.
Merix Chem. Co., Chicago, Ill.
Metropolitan Wire Goods, Wilkes-Barre, Pa.
Moore John B. Corp., So. Amboy, N.J.
Ray Prods., Inc., Alhambra, Calif.
Sara Scientific Co., San Francisco, Calif.
Standard Glove Co. of N.J., Newark, N.J.
Techni-Tool, Inc., Philadelphia, Pa.
3M Co., St. Paul, Minn.
Ultra Sonic Inds., Lindenhurst, N.Y.
Ultra-Violet Prods., Inc., San Gabriel, Cal.
Westinghouse Elec., Grand Rapids, Mich.
Wheelabrator Corp., Mishawaka, Ind.
Xcelite, Inc., Orchard Park, N.Y.

Clean Rooms—See Rooms, Clean, Dust-Free

Cleaners & Solvents—See Vol 3

Cleaners, Mechanical, Magnetic Tape

Almond Instrs. Co., Covina, Cal
GC Elctrns., Rockford, Ill.
Jonard Inds. Corp., Bronx, N.Y.
Virginia Panel Corp., Waynesboro, Va.
Data Prods. Corp., Woodland Hills, Calif.
Duotone Co., Inc., S. Miami, Fla.
Heeger, Inc., Los Angeles, Calif.
L & R Mfg. Co., Kearny, N.J.
Miller-Stephenson Chem. Co., Inc., Danbury, Conn.
Octagon Process, Inc., Edgewater, N.J.
Phillips Mfg. Co., Chicago, Ill.
Sprayon Prods., Inc., Bedford Hgts., Ohio
Ultra Sonic Inds., Lindenhurst, N.Y.
Workman Elctrn. Prods., Inc., Sarasota, Fla.

Cleaners, Ultrasonic

Allied Chemical Corp., Morristown, N.J.
Alpha Metals, Inc., Jersey City, N.J.
American Elec. Heater, Detroit, Mich.
Barco Chem. Prods. Co., Chicago, Ill.
Baron-Blakeslee, Inc., Chicago, Ill.
Bausch & Lomb, Rochester, N.Y.
Beckman Instrs., (AISSD), Fullerton, Cal.
Bendix Corp., Davenport, Iowa
Branson Instruments Co., Stamford, Conn.
Clarkson Labs., Inc., Camden, N.J.
Commander Labs., Inc., Escondido, Calif.
Delta Sonics, Hawthorne, Cal
DoAll Co., Des Plaines, Ill.
Dri-Clave Corp., Westbury, N.Y.
Dynasonics Corp., Pipestone, Minn.
Edmund Scientific Co., Barrington, N.J.
Elctrn. Space Prods., Los Angeles, Cal.
Electrovert, Inc., Mt. Vernon, N.Y.
Esterline Angus Div., Indianapolis, Ind.
Fidelity Chem. Prods. Corp., Newark, N.J.
Inspection Systems, Hawthorne, Calif
International Scanatron Sys., Wyandanch, N.Y.
Janel, Inc., Stirling, N.J.
Koh-I-Noor Rapidograph, Bloomsbury, N.J.
L & R Mfg. Co., Kearny, N.J.
LEA Mfg. Co., Waterbury, Conn
Lewis Corp., Woodbury, Conn.
Linden Labs., Inc., State College, Pa.
Marcal Electro-Sonics, Burkank, Calif.
Mettler Elctrns. Corp., Pasadena, Calif.
Miller, Harry Corp., Philadelphia, Pa.
Nuclear Equip. Chem. Corp., Farmingdale, N.Y.
Oakite Prods., Inc., Berkeley Hgts., N.J.
Octagon Process, Inc., Edgewater, N.J.
Phillips Mfg. Co., Chicago, Ill.
Phoenix Materials Corp., Kittanning, Pa.
Rawn Co., Inc., Spooner, Wisc.
Sara Scientific Co., San Francisco, Calif.
Soltec Corp., No. Hollywood, Cal.
Techni-Tool, Inc., Philadelphia, Pa.
Tronic Corp., Belmont, Calif.
Ultra Sonic Inds., Lindenhurst, N.Y.
Union Ultra-Sonics Corp., Lowell, Mass.
Vigor Tool Co., New York, N.Y.
VWR Scientific, San Francisco, Cal.
Westinghouse Elec., Sykesville, Md.
Westinghouse Elec. Corp., Pittsburgh, Pa.
Westinghouse Elec. Int'l., New York, N.Y.
Wheelabrator Corp., Mishawaka, Ind.

Cleaners & Filters, Air—See Air Cleaners & Filters—Vol 3

Cleaning & Filtering Equipment, Liquid

Balston Ind'l. Ltd., Lexington, Mass
Bendix Corp., Davenport, Iowa
Industrial Formulations, Plainview, N.Y.
London Chemical Co., Bensenville, Ill.
Metex Corp., Edison, N.J.
Pall Corp., Glen Cove, N.Y.
Richardson Co., Des Plaines, Ill.
Sel-Rex Corp., Nutley, N.J.

Clip Insulators—See Insulators, Test & Battery Clip —Vol 3

Clips, Alligator—See Vol 3

Clips, Battery—See Vol 3

Clips, Board, Harness—See Vol 3

Clips, Component—See Vol 3

Clips, Fahnestock, Spring Wire—See Vol 3

Clips, Test—See Vol 3

Clips, Transistor & Diode—See Retainers, Transistor & Diode—Vol 2

Clips & Caps, Grid & Plate—See Vol 3

Clips & Holders, Fuse-Also See Panels, Fuse—See Vol 3

Clocks (All Types)

A. D. Data Sys., Inc., Rochester, N.Y.
Atec, Inc., Houston, Tex. ..... p 410
Atomichron, Inc., New Hyde Park, N.Y. p 469
Austron, Inc., Austin, Tex.
Chrono-log Corp., Broomall, Pa. .. p 340
Clare, C.P. & Co., Chicago, Ill.
Durant Digital Instrs., Milwaukee, Wisc. p 1316
Dytro Corp., Hicksville, N.Y.
Electronic Research Co., Shawnee Mission, Kans. ..... p 458
Frequency Elctrns., New Hyde Pk., N.Y. p 469,1391
Geo Space Sys., Tampa, Fla. ..... p 350
Gibbs Mfg. & Resch., Janesville, Wisc.
Haydon, A. W. Co., Waterbury, Conn.
Hewlett-Packard, Palo Alto, Cal.
Monitor Labs, Inc., San Diego, Cal. p 364
(NES) Nationwide Elctrn. Sys., Itasca, Ill. ..... p 365
Parabam, Inc., Compton, Cal. ..... p 371
Pennwood Numechron, Pittsburgh, Pa. p 372
PPM, Inc., Bedford, Ohio ..... p 535
Precision Timer, Westbrook, Conn.
Sankyo Seiki Mfg. Co., Ltd., Tokyo, Japan ..... p 1630
Veeder-Root, Hartford, Conn..... p 1352
A.O.I.P., 75/Paris 12eme, France
Bio-Medical Elctrns., Inc., Rockville, Md.
Bulova Watch Co., Timer Lab., Flushing, N.Y.
Colorado Instrs., Inc., Broomfield, Colo.
Cooke Engrg. Co., Alexandria, Va.
Datatron, Inc., Santa Ana, Cal
Devco Engrg., W. Caldwell, N.J.
Du Kane Corp., St. Charles, Ill.
Edwards Co. Inc., Norwalk, Conn.
Gulton Inds., Albuquerque, N.M.
Instrumentation Tech. Corp., Northridge, Calif.
Int'l. Register, Chicago, Ill.
Kingmann-White, Inc., Placentia, Calif.
Lear Siegler, Inc., Santa Monica, Calif.
Montgomery Mfg. Co., Inc., Owensville, Ind.
National Time & Signal, Oak Pk., Mich.
Neutronic Corp., Bridgeton, Mo.
Non-Linear Sys., Inc., Del Mar, Cal.
Rohde & Schwarz Sls., Passaic, N.J.
Servo Dev. Corp., Hicksville, N.Y.
Sprengnether, W.F. Instr. Co., Inc., St. Louis, Mo.
Standard Elec. Time Corp., Springfield, Mass.
Time-O-Matic, Inc., Danville, Ill.
Timing Sys., Inc., Marblehead, Mass.
Tracor, Inc., Austin, Tex.
Tyco Instr. Div., Waltham, Mass.
Unitron Inds. Corp., Taipei, Taiwan, Republic of China
Universal Resch. Labs., Elk Grove Village, Ill
Vidar Corp., Mountain View, Cal.
Wakmann Watch Co., Inc., New York, N.Y.

Closed Circuit Tv Systems—See Television Systems, Closed Circuit

Cloth & Fabrics—See Insulation Materials, Fabric—Vol 3

Cloth, Speaker Grille

GC Elctrns., Rockford, Ill.
Acoustone Corp., Brooklyn, N.Y.
Chicopee Mfg. Co., Cornelia, Ga.
Flock Process Corp., S. Norwalk, Conn.
Mellotone, Inc., New York, N.Y.
Shigoto Inds., Ltd., New York, N.Y.
Wendell Fabrics Corp., New York, N.Y.

Cloth, Woven Wire—See Vol 2

Clutches, Friction—See Vol 2

Clutches, Magnetic—See Vol 2

Clutches, Positive—See Vol 2

Coatings, Anti-Laser Beam—See Vol 3

Coatings, Anti-Static—See Vol 3

Coatings, Conductive—See Vol 3

Coatings, See Materials—See Vol 3

Coatings, Films, Transfers, etc., Etchant-Resisting—See Vol 3

Coatings, Fluorescent—See Vol 3

Coatings, Fungicidal—See Vol 3

Coatings, Compounds, Lubricants, etc., Heat Conductive—See Vol 3

Coatings, High-Temperature, Ceramic, Plasma Spray—See Services, Coating—Vol 3

Coatings, Infrared—See Vol 3

Coatings, Insulating—See Vol 3

Coatings, Mold Releasing—See Vol 3

Coatings, Optical—See Vol 3

Coatings, Protective—See Vol 3

Coatings, Radioactive—See Vol 3

Coatings, Transducer Forming—See Vol 2

Coatings, Weatherproofing—See Vol 3

Code & Tab Markers—See Wire Markers (All Types)—Vol 3

Coded Discs, Optical

Magnetic Technology, Canoga Pk., Cal. p 386
Norden Div., Norwalk, Conn.
Renco Corp., Goleta, Cal. ..... p 378
Vernitron, Torrance, Cal. ..... p 386
Vernitron Corp., Deer Pk., N.Y. .... p 386
Baldwin Elctrns., Little Rock, Ark.
Buckbee-Mears Co., St. Paul, Minn.
Conrac Corp., New York, N.Y.
Data Technology Inc., Watertown, Mass.
Dell Optics Co., Inc., N. Bergen, N.J.
Encoder Division, Chatsworth, Cal.
H H Controls Co., Arlington, Mass.
Itek Corp., Lexington, Mass.
Loral Elctrn. Sys., Bronx, N.Y.
Metrological Data Corp., Garfield, N.J.
Micro-Line, Jamestown, N.Y.
Ragen Precision Inds., Inc., N. Arlington, N.J.
Robot Inds., Inc., Dearborn, Mich.
Rowe Engravers, Clifton, N.J.
Teledyne Gurley, Troy, N.Y.
United Aircraft Corp., Norwalk, Conn.

Coders, A-F

Bramco Controls, Piqua, Ohio .... p 1406
Dynamics Instr. Co., Monterey Pk., Cal.
Multitech Data Prods., Monterey Pk., Cal.
Computronics Engrg., Los Angeles, Calif.
Dorsett Elctrns., Tulsa, Okla.
HB Engrg. Corp., Silver Spring, Md.
ISC/Telephonics Div, Huntington, N.Y.
RFL Inds., Comms. Div., Boonton, N.J.
Rohde & Schwarz Sls., Passaic, N.J.
Trepac Corp. America, Englewood, N.J.

Coders, Beacon

C & K Components, Watertown, Mass.
Dynamics Instr. Co., Monterey Pk., Cal.
Multitech Data Prods., Monterey Pk., Cal.
Precision Timer, Westbrook, Conn.
Vega Precision Labs., Vienna, Va. p 614
Aerocom, Miami, Fla.
Aeronautical Comm. Equip. Inc., Miami, Fla.
CCA Elctrns. Corp., Gloucester, N.J.
Computronics Engrg., Los Angeles, Calif.
General Instr. Corp., Hicksville, N.Y.
GTE Sylvania Inc., Elctrn. Sys. Gp., Waltham, Mass.
Instru-Lec Corp., Mt. Vernon, N.Y.
Loral Elctrn. Sys., Bronx, N.Y.
Philips Elctrns. Inds., Ltd., Toronto 17, Can.
Sanders Assocs., Nashua, N.H.
Southern Avionics Co., Beaumont, Tex.

Coders, R-F

Dynamics Instr. Co., Monterey Pk., Cal.
Multitech Data Prods., Monterey Pk., Cal.
AMBAC Inds., Garden City, N.Y.
Computronics Engrg., Los Angeles, Calif.
General Instr. Corp., Hicksville, N.Y.
Loral Elctrn. Sys., Bronx, N.Y.
Secode Elctrns., Dallas, Texas

Coders, Transponder

Computer Devices, Commack, N.Y. p 2741
Dynamics Instr. Co., Monterey Pk., Cal.
Multitech Data Prods., Monterey Pk., Cal.
Vega Precision Labs., Vienna, Va. p 614
AMBAC Inds., Garden City, N.Y.
Edo Western Corp., Salt Lake City, Utah
General Instr. Corp., Hicksville, N.Y.
GTE Sylvania Inc., Elctrn. Sys. Gp., Waltham, Mass.
HB Engrg. Corp., Silver Spring, Md.
Hughes Aircraft Co, Fullerton, Cal.
Instru-Lec Corp., Mt. Vernon, N.Y.
Loral Elctrn. Sys., Bronx, N.Y.
RCA Govt. & Comm. Sys., Moorestown, N.J.
Sanders Assocs., Nashua, N.H.

Coil Assemblies & Forms-Also See Bobbins—See Vol 3

Coil Standards—See Standards, Inductance

Coil Testers—See Testers, Coil

Coil-Winding Equipment—See Machines, Coil-Winding

Coils, A F—See Vol 3

Coils, Antenna Loading—See Vol 3

Coils, Broadcast—See Vol 3

Coils, Choke—See Chokes (As Modified)—Vol 3

Coils, Color Purity—See Vol 3

Coils, Crossover, Audio—See Vol 3

Coils, Degausing—See Vol 3

Coils, Field—See Vol 3

Coils, Focusing—See Vol 3

Coils, Foil-Wound—See Vol 3

Coils, High-Q, Low-Frequency—See Vol 3

Coils, Hybrid & Repeat—See Vol 3

Coils, I-F—See Vol 3

Coils, Metallized Glass—See Vol 3

Coils, Molded—See Vol 3

Coils, Oscillator, Phono Test—See Vol 3

Coils, Relay—See Vol 3

Coils, R-F—See Vol 3

Coils, Saturable Reactor—See Vol 3

Coils, Shielded—See Vol 3

Coils, Solenoid—See Vol 3

Coils, Telephone—See Vol 3

Coils, Telephone Pickup (For Recording)—See Pickups, Telephone

Coils, Toroidal—See Vol 3

Coils, Transducer—See Vol 3

Coils, Transformer—See Vol 3

Coils, TV (All Types)—See Vol 3

Coils, Variable—See Vol 3

Coils, Vidicon Alignment—See Vol 3

Coils, Voice—See Vol 3

Coils, Water—See Water Coils, Tube Cooling—Vol 2

Coincidence Analyzers—See Analyzers, Coincidence

Cold-Cathode Readout—See Tubes, Readout—Vol 2

Cold Traps

Aero Vac Corp., Troy, N.Y.
Andonian Assocs., Inc., Waltham, Mass.
Atlas Engrg. Corp., W. Hartford, Conn.
Baron-Blakeslee, Inc., Chicago, Ill.
Bendix, Rochester, N.Y.
Cooke Vacuum Prods., S. Norwalk, Conn.
Denton Vacuum, Inc., Cherry Hill, N.J.
Edwards High Vacuum, Oakville, Ont., Can.
Granville-Phillips Co., Boulder, Colo.
Jersey Tech. Conslts., Morristown, N.J.
Kinney Vacuum Co., Boston, Mass.
Middlesex Gen'l. Inds., Somerville, Mass.
Nat'l. Coil Co., Douglas, Ariz.
Norton Co., Newton, Mass.
T-M Vacuum Prods., Riverton, N.J.
Vactronic Lab. Equip., Inc., E. Northport, N.Y.
Vacuum Equip. Div., Newton, Mass.
Varian Assocs., Vacuum Div., Palo Alto, Cal.
Veeco Instrs., Inc., Plainview, N.Y.

Collars—See Vol 3

Collimators, Infrared—See Vol 2

Collimators, Optical—See Vol 2

Colorimeters—See Vol 2

Color TV Equipment—See Cameras, TV (Color); Monitors, Video; Recorders, Video Tape

Combiners, Diversity, Post Detection

Interstate Elctrns. Corp., Anaheim, Cal.
Amphenol Canada Ltd., Scaroborough, (Tor.), Can.
Olektron Corp., Dudley, Mass.

Combustion Indicators—See Fire Detection & Fighting Equip.—Vol 2

Comm. Systems, Broadcast

American Elctrn. Labs., Inc., Lansdale, Pa.
Chrono-log Corp., Broomall, Pa.
Melcor Elctrns. Corp., Farmingdale, N.Y.
Nippon Electric/NEC America, N.Y., N.Y.
Quindar Elctrns., Inc., Springfield, N.J.
RHG Elctrns. Lab., Farmingdale, N.Y.
Aeg-Telefunken Corp., Englewood Cliffs, N.J.
Ampex Corp., Redwood City, Calif.
Andrew Corp., Orland Pk., Ill.
Audio Instr. Co., Union City, N.J.
CCA Elctrns. Corp., Gloucester, N.J.
Cohu Elctrns., Inc., San Diego, Calif.
Collins Radio Co., Dallas, Tex.
Elctrn. Comm., Inc., St. Petersburg, Fla.
General Devices, Inc., Princeton, N.J.
General Dynamics, San Diego, Cal.
GTE Lenkurt Inc., San Carlos, Calif.
ITT Mackay Marine, Clark, N.J.
Kalart Victor, Plainville, Conn.
Kemper Engrg. Co., Northridge, Cal.
Matsushita Comm. Ind'l. Co., Ltd., Yokohama, Japan
Microwave Assocs., Inc., Burlington, Mass.
Olektron Corp., Dudley, Mass.
Raytheon Data Systems Co., Norwood, Mass.
RCA Corp., Camden, N.J.
Regency Elctrns., Inc., Indianapolis, Ind.
RHA-Audio Communications, W. New York, N.J.
Rodelco, Deer Park, N.Y.
Sharpe Audio Div., Tonawanda, N.Y.
Systems Engineering, Ltd., Grouse Creek, Utah
Technical Mat'l., Mamaroneck, N.Y.
Tenatronics, Ltd., Cleveland, Ohio

Comm. Systems, Carrier Current

Data-Control Systems, Danbury, Conn.
Nippon Electric/NEC America, N.Y., N.Y.
Quindar Elctrns., Inc., Springfield, N.J.
AMBAC Inds., Garden City, N.Y.
Andrew Corp., Orland Pk., Ill.
Anritsu Electric Co., Ltd., Tokyo, Japan
Components Specialties, Inc., Freeport, N.Y.
Fasco Inds., Inc., Rochester, N.Y.
Femco Div., Irwin, Pa.
General Devices, Inc., Princeton, N.J.
General Dynamics, San Diego, Cal.
General Elec., Lynchburg, Va.
GTE Lenkurt Inc., San Carlos, Calif.
Hughes Aircraft Co, Culver City, Cal.
Hughes Aircraft Co, Fullerton, Cal.
Leeds & Northrup Corp., No. Wales, Pa.
Loral Elctrn. Sys., Bronx, N.Y.
Lynch Communication Systems, San Francisco, Calif.
Microwave Assocs., Inc., Burlington, Mass.
OKI Elctrns. America, Ft. Lauderdale, Fla.
Olektron Corp., Dudley, Mass.
RFL Inds., Comms. Div., Boonton, N.J.
Rust Corp., Everett, Mass.
Siemens Corp., Comm. Eq. Div., Iselin, N.J.
Stromberg Carlson Corp., Rochester, N.Y.
Superior Continental Corp., Hickory, N.C.
Talk-A-Phone Co., Chicago, Ill.
Whittaker Corp., Los Angeles, Cal.

Comm. Systems, Data

A. D. Data Sys., Inc., Rochester, N.Y.
Bendix Environmtl. Sci., Baltimore, Md.
Bramco Controls, Piqua, Ohio
Data-Control Systems, Danbury, Conn.
Datacom, Inc., Ft. Walton Bch., Fla. p 344
Dynamics Instr. Co., Monterey Pk., Cal.
Multitech Communications, Monterey Pk., Cal. ..... p 324

Multitech Data Prods., Monterey Pk., Cal. ..... p 363
(NES) Nationwide Elctrn. Sys., Itasca, Ill. ..... p 365
Nippon Electric/NEC America, N.Y., N.Y.
North Elec. Co., Galion, Ohio
Quindar Elctrns., Inc., Springfield, N.J. p 953
RHG Elctrns. Lab., Farmingdale, N.Y.
Sangamo Elec. Co., Pickens, S.C.
Sangamo Elec. Co., Springfield, Ill. p 379
Solid State Elctrns., Sepulveda, Cal.
Sonex, Inc., Bethayres, Pa. ..... p 955
Tempo/UTI Div., Chatsworth, Cal.
Action Systems Co., Meriden, Conn.
Adar Assocs., Cambridge, Mass.
Aerospace Resch. Inc., Boston, Mass.
Alden Elctrn. & Impulse Record. Equip., Westboro, Mass.
AMBAC Inds., Garden City, N.Y.
American Data Sys., Canoga Pk., Cal
A.O.I.P., 75/Paris 12eme, France
Applied Systems Corp., Detroit, Mich
Autocon Inds., Inc., St. Paul, Minn.
Bell & Howell Co., Pasadena, Calif.
Clary Corp., San Gabriel, Calif.
Codex Corp., Newton, Mass.
Collins Radio Co., Cedar Rapids, Iowa
Collins Radio Co., Dallas, Tex.
Collins Radio Co., Newport Beach, Calif.
Colorado Instrs., Inc., Broomfield, Colo.
Communitype Corp., New York, N.Y.
Computer Conversions Corp., East Northport, N.Y.
Computronics Engrg., Los Angeles, Calif.
Conductron Corp., St. Charles, Mo.
Continental Data Sys., Dayton, Ohio
Control Logic, Natick, Mass.
Cybermatics, Inc., Ft. Lee, N.J.
Data Access Sys., Inc., Dover, N.J.
Data Technology Corp., Palo Alto, Cal.
Demex, Inc., Kansas City, Mo.
Digi-Data Corp., Bladensburg, Md.
Digitech Data Inds., Inc., Ridgefield, Conn.
Digitronics Corp., Albertson, N.Y.
Dynalex, Inc., Burbank, Cal.
Electrac, Inc., Anaheim, Calif.
Elctrn. Comm., Inc., St. Petersburg, Fla.
Femco Div., Irwin, Pa.
Ferranti Ltd., Hollinwood, Lancs., England
Foxboro Co., Foxboro, Mass.
Frederick Electronics Corp., Frederick, Md.
Friden Div., San Leandro, Calif.
General Devices, Inc., Princeton, N.J.
General Dynamics, San Diego, Cal.
General Elec., Lynchburg, Va.
General Instr. Corp., Hicksville, N.Y.
General Instr. Corp., Hawthorne, Cal.
Gosh Instrs., Inc., Wethersfield, Conn.
Ground Data Corp., Fla., 33308
GTE Lenkurt Inc., San Carlos, Calif.
GTE Sylvania Inc., Elctrn. Sys. Gp., Waltham, Mass.
HB Engrg. Corp., Silver Spring, Md.
Hermes Elctrns., Dartmouth N.S., Can.
Honeywell Information Systems, Wellesley Hills, Mass
Hughes Aircraft Co, Culver City, Cal.
Hughes Aircraft Co, Fullerton, Cal.
Hughes Aircraft Co., Ind'l. Prods. Div., Oceanside, Cal.
Instrumentation Tech. Corp., Northridge, Calif.
Interlind Elctrns., Doraville, Ga.
Int'l. Comm., Miami, Fla.
Iso-Switch Corp., Costa Mesa, Cal.
Kemper Engrg. Co., Northridge, Cal.
Lear Siegler, Inc., Santa Monica, Calif.
Lear Siegler, Anaheim, Cal.
Leeds & Northrup Corp., No. Wales, Pa.
Leupold & Stevens, Inc., Beaverton, Ore.
Loral Elctrn. Sys., Bronx, N.Y.
LTV Electrosystems, Dallas, Tex.
Lynch Communication Systems, San Francisco, Calif.
Maxson Elctrns. Div., Great River, N.Y.
Memorex Corp., Santa Clara, Cal.
Meteorology Research, Inc., Altadena, Calif.
Microwave Assocs., Inc., Burlington, Mass.
Miles Reproducer Co., Inc., New York, N.Y.
Milgo Electrn. Corp., Miami, Fla.
Muirhead, Inc., Mountainside, N.J.
Nat'l. Midco Inds., Inc., Trenton, N.J.
Philco-Ford Corp., Washington, D.C.
Pioneer Elec. & Resch. Corp., Forest Park, Ill.
Potter Instr. Co., Melville, N.Y.
Prentice Elctrns. Corp., Palo Alto, Calif.
Raytheon Data Systems Co., Norwood, Mass.
RCA Govt. & Comm. Sys., Moorestown, N.J.
RCA Service Co., Camden, N.J.
RF Communications, Inc., Rochester, N.Y.
RFL Inds., Comms. Div., Boonton, N.J.
Sanders Data Sys., Nashua, N.H.
Singer - Tele-Signal, Woodbury, N.Y.
Spiras Sys., Inc., Waltham, Mass.
Systems Instrs. Resch., Inc., Atlanta, Ga.
Teledyne Adcom, Cambridge, Mass.
Teletype Corp., Skokie, Ill.
Texas Instruments, Inc., Houston, Tex.
Theta Instr. Corp., Fairfield, N.J.
Trepac Corp. America, Englewood, N.J.
Varian Data Machines, Irvine, Cal.
Viatron Computer Sys., Bedford, Mass.
Video Resch. Corp., Rockville, Md.
Weltronic Co., Southfield, Mich.
Western Microwave Labs., Los Gatos, Cal.
Western Telematic, Inc., Arcadia, Cal.

Comm. Systems, F-M

Data-Control Systems, Danbury, Conn. p 345
Dynamics Instr. Co., Monterey Pk., Cal.
Johnson E. F. Co., Waseca, Minn.
Multitech Data Prods., Monterey Pk., Cal.
Nippon Electric/NEC America, N.Y., N.Y.
Quindar Elctrns., Inc., Springfield, N.J.
RHG Elctrns. Lab., Farmingdale, N.Y.
Solid State Elctrns., Sepulveda, Cal.
Sonex, Inc., Bethayres, Pa.
Watkins Johnson Co., Palo Alto, Cal.
AMBAC Inds., Garden City, N.Y.
Anritsu Electric Co., Ltd., Tokyo, Japan
A.R.F. Products, Inc., Boulder, Colo.
A.R.F. Products, Inc., Raton, N.M.
Arvin Sys., Inc., Dayton, Ohio
Astro Comm. Lab., Gaithersburg, Md.
BF Elctrns., Solana Beach, Calif.
Cardion Communications, Woodbury, N.Y.
CCA Elctrns. Corp., Gloucester, N.J.
Communication Elctrns., Rockville, Md.
Communications Co., Inc., Coral Gables, Fla.
Defense Elctrns., Inc., Rockville, Md.
Dyna Magnetic Devices, Inc., Hicksville, N.Y.
Elctrn. Comm., Inc., St. Petersburg, Fla.
Farinon Electric, San Carlos, Calif.
General Devices, Inc., Princeton, N.J.
General Dynamics, San Diego, Cal.
General Elec., Lynchburg, Va.
Ground Data Corp., Fla., 33308
GTE Lenkurt Inc., San Carlos, Calif.
GTE Sylvania Inc., Elctrn. Sys. Gp., Waltham, Mass.
Hammarlund Mfg. Co., Red Bank, N.J.
Hughes Aircraft Co, Culver City, Cal.
Hughes Aircraft Co, Fullerton, Cal.
ITT Mackay Marine, Clark, N.J.
Lear Siegler, Inc., Santa Monica, Calif.
Loral Elctrn. Sys., Bronx, N.Y.
Microwave Assocs., Inc., Burlington, Mass.
Miles Reproducer Co., Inc., New York, N.Y.
Oklahoma Aerotronics, Hartshorne, Okla.
Pace Div., Harbor City, Calif.
Pearce-Simpson, Miami, Fla.
Philco-Ford Corp., Washington, D.C.
Plessey Elctrns. Corp., Farmingdale, N.Y.
Racal Communications, Rockville, Md.
Rank Precision Inds., W. Nyack, N.Y.
Raytheon Data Systems Co., Norwood, Mass.
RCA Govt. & Comm. Sys., Moorestown, N.J.
Reach Elctrns., Inc., Lexington, Neb.
Rodelco, Deer Park, N.Y.
Secode Elctrns., Dallas, Texas
Thomson-CSF Inc., New York, N.Y.
Unimetrics, Inc., Plainview, N.Y.
Video Resch. Corp., Rockville, Md.
Weitermann Elctrns., Milwaukee, Wisc.

Comm. Systems, Facsimile

Nippon Electric/NEC America, N.Y., N.Y.
Alden Elctrn. & Impulse Record. Equip., Westboro, Mass.
Cardion Elctrns., Woodbury, N.Y.
Cybermatics, Inc., Ft. Lee, N.J.
Defense Elctrns., Inc., Rockville, Md.
Elctrn. Comm., Inc., St. Petersburg, Fla.
Frederick Electronics Corp., Frederick, Md.
General Dynamics, San Diego, Cal.
GTE Lenkurt Inc., San Carlos, Calif.
Hughes Aircraft Co, Culver City, Cal.
International Scanatron Sys., Wyandanch, N.Y.
ITT Mackay Marine, Clark, N.J.
Muirhead, Inc., Mountainside, N.J.
Philco-Ford Corp., Washington, D.C.
Raytheon Data Systems Co., Norwood, Mass.
RF Communications, Inc., Rochester, N.Y.
Technical Mat'l., Mamaroneck, N.Y.
Telautograph Corp., Los Angeles, Cal.

Comm. Systems, Frequency Shift

Data-Control Systems, Danbury, Conn.
Dynamics Instr. Co., Monterey Pk., Cal.
Fluke, John Mfg. Co., Inc., Seattle, Wash. ..... p 478
Multitech Communications, Monterey Pk., Cal.
Multitech Data Prods., Monterey Pk., Cal. ..... p 363
Quindar Elctrns., Inc., Springfield, N.J.
Solid State Elctrns., Sepulveda, Cal.
Aerocom, Miami, Fla.
Aeronautical Comm. Equip. Inc., Miami, Fla.
AMBAC Inds., Garden City, N.Y.
American Data Sys., Canoga Pk., Cal
A.R.F. Products, Inc., Boulder, Colo.
Arvin Sys., Inc., Dayton, Ohio
Audio Instr. Co., Union City, N.J.
Autocon Inds., Inc., St. Paul, Minn.
Cardion Communications, Woodbury, N.Y.
Cardion Elctrns., Woodbury, N.Y.
Collins Radio Co., Dallas, Tex.
Data Access Sys., Inc., Dover, N.J.
Defense Elctrns., Inc., Rockville, Md.
Electrocom Inds., So. Bend, Indiana
Frederick Electronics Corp., Frederick, Md.
General Dynamics, San Diego, Cal.
Gosh Instrs., Inc., Wethersfield, Conn.
GTE Lenkurt Inc., San Carlos, Calif.
GTE Sylvania Inc., Elctrn. Sys. Gp., Waltham, Mass.
Hermes Elctrns., Dartmouth N.S., Can.
Hughes Aircraft Co, Culver City, Cal.
Hughes Aircraft Co, Fullerton, Cal.
Integrated Elctrns., Huntington Station, N.Y.
International Scanatron Sys., Wyandanch, N.Y.
Iso-Switch Corp., Costa Mesa, Cal.
ITT Mackay Marine, Clark, N.J.
Loral Elctrn. Sys., Bronx, N.Y.
Lynch Communication Systems, San Francisco, Calif.
Milgo Electrn. Corp., Miami, Fla.
Philco-Ford Corp., Washington, D.C.
Racal Communications, Rockville, Md.
RCA Govt. & Comm. Sys., Moorestown, N.J.
RF Communications, Inc., Rochester, N.Y.
RFL Inds., Comms. Div., Boonton, N.J.
Singer - Tele-Signal, Woodbury, N.Y.
Stromberg Carlson Corp., Rochester, N.Y.
Technical Mat'l., Mamaroneck, N.Y.
Trepac Corp. America, Englewood, N.J.
Video Resch. Corp., Rockville, Md.
Western Microwave Labs., Los Gatos, Cal.

Comm. Systems, Induction

Multitech Communications, Monterey Pk., Cal.
Hughes Aircraft Co, Culver City, Cal.
Hughes Aircraft Co, Fullerton, Cal.
Miles Reproducer Co., Inc., New York, N.Y.
Parcoe, Inc., Cleveland, Ohio
RHA-Audio Communications, W. New York, N.J.
Sharpe Audio Div., Tonawanda, N.Y.
Surface Conduction, Inc., New York, N.Y.

Comm. Systems, Infrared, Ultraviolet—See Vol 2

Comm. Systems, Intercom—See Intercommunication Systems

Comm. Systems, Laser

Electro/Data, Inc., Garland, Tex.
Nippon Electric/NEC America, N.Y., N.Y.
Electrophysics Corp., Nutley, N.J.
Flame Resch., Inc., Pittsburgh, Pa.
GTE Sylvania Inc., Elctrn. Sys. Gp., Waltham, Mass.
Hughes Aircraft Co, Culver City, Cal.
Infrared Inds., Inc., Santa Barbara, Cal.
Isomet Corp., Oakland, N.J.
ITT Aerospace, San Fernando, Cal.
Korad Mat'ls. Sys. Div., Santa Monica, Cal.
Philco-Ford Corp., Washington, D.C.
Raytheon Co., Lexington, Mass.
RCA Govt. & Comm. Sys., Moorestown, N.J.
Resalab Inc., Advanced Development Lab., Los Angeles, Cal.
Sanders Assocs., Nashua, N.H.

Comm. Systems, Microwave —See Vol 2

Comm. Systems, Multiplex

Applied Research Inc., Port Washington, N.Y.
Data-Control Systems, Danbury, Conn.
Nippon Electric/NEC America, N.Y., N.Y.
Quindar Elctrns., Inc., Springfield, N.J.
Solid State Elctrns., Sepulveda, Cal.
Sonex, Inc., Bethayres, Pa. ..... p 955
AMBAC Inds., Garden City, N.Y.
American Data Sys., Canoga Pk., Cal
Anritsu Electric Co., Ltd., Tokyo, Japan
A.R.F. Products, Inc., Raton, N.M.
Astrodata, Anaheim, Cal.
Autocon Inds., Inc., St. Paul, Minn.
Automatic Signal Div., E. Norwalk, Conn.
Bristol Div, Waterbury, Conn
Cardion Communications, Woodbury, N.Y.
Collins Radio Co., Cedar Rapids, Iowa
Collins Radio Co., Dallas, Tex.
Dynalex, Inc., Burbank, Cal.
Dynamic Sys. Elctrns. Corp., Tempe, Ariz.
Electrocom Inds., So. Bend, Indiana
Elctrn. Comm., Inc., St. Petersburg, Fla.
Farinon Electric, San Carlos, Calif.
Fifth Dimension, Princeton, N.J.
General Atronics, Military Elctrns., Phila., Pa.
General Devices, Inc., Princeton, N.J.
General Dynamics, San Diego, Cal.
General Elec., Lynchburg, Va.
GTE Lenkurt Inc., San Carlos, Calif.
Gulton Inds., Albuquerque, N.M.
Hughes Aircraft Co, Culver City, Cal.
Hughes Aircraft Co, Fullerton, Cal.
InterOcean Systems, San Diego, Cal.
ISC/Telephonics Div, Huntington, N.Y.
ITT Telecommunications, Raleigh, N.C.
Lear Siegler, Inc., Santa Monica, Calif.
Lynch Communication Systems, San Francisco, Calif.
Merchant, Robert C. Co., Carmel Valley, Calif.
Monitor Sys., Inc., Ft. Washington, Pa.
OKI Elctrns. America, Ft. Lauderdale, Fla.
Philco-Ford Corp., Washington, D.C.
Philips Elctrns. Inds., Ltd., Toronto 17, Can.
Raytheon Data Systems Co., Norwood, Mass.
RCA Corp., Camden, N.J.
RCA Govt. & Comm. Sys., Moorestown, N.J.
RCA Service Co., Camden, N.J.
RFL Inds., Comms. Div., Boonton, N.J.
Siemens Corp., Comm. Eq. Div., Iselin, N.J.
Superior Continental Corp., Hickory, N.C.
Surface Conduction, Inc., New York, N.Y.
Systems Engineering, Ltd., Grouse Creek, Utah
Taft Electrosystems, Inc., Metuchen, N. J.
Technical Mat'l., Mamaroneck, N.Y.
Varian Data Machines, Irvine, Cal.

Video Resch. Corp., Rockville, Md.

Comm. Systems, Portable (Industrial)

Data-Control Systems, Danbury, Conn.
Johnson E. F. Co., Waseca, Minn.
Multitech Communications, Monterey Pk., Cal.
Nippon Electric/NEC America, N.Y., N.Y.
North Elec. Co., Galion, Ohio
Quindar Elctrns., Inc., Springfield, N.J.
ACR Elctrns. Div., Carle Place, N.Y.
Alcor, Inc., Ithaca, N.Y.
Altron Elctrns. Co., Woodlyn, Pa.
American Geloso Elctrns., Inc., New York, N.Y.
Andrew Corp., Orland Pk., Ill.
Anritsu Electric Co., Ltd., Tokyo, Japan
Audio Equip. Co., Inc., Pt. Washington, N.Y.
Bennett Laboratories, Inc., Emeryville, Calif.
Clark, David Co., Worcester, Mass.
Collins Radio Co., Cedar Rapids, Iowa
Collins Radio Co., Dallas, Tex.
Concord Elctrns., Los Angeles, Cal.
Defense Elctrns., Inc., Rockville, Md.
Fanon Elctrns., Hillside, N.J.
Farinon Electric, San Carlos, Calif.
Fedtro, Inc., Rockville Centre, N.Y.
Fisher-Berkeley Corp., Emeryville, Calif.
General Elec., Lynchburg, Va.
General Radiotelephone Co., Burbank, Cal.
GTE Sylvania Inc., Elctrn. Sys. Gp., Waltham, Mass.
Hammarlund Mfg. Co., Red Bank, N.J.
Holmin, W.A. Corp., Rockford, Ill.
Lear Siegler, Inc., Santa Monica, Calif.
Linear Sys., Inc., Watsonville, Calif.
Microwave Assocs., Inc., Burlington, Mass.
Miles Reproducer Co., Inc., New York, N.Y.
OKI Elctrns. America, Ft. Lauderdale, Fla.
Pace Div., Harbor City, Calif.
Private Tele-Comms., Inc., Chicago, Ill.
Radio Specialty Mfg. Co., Portland, Ore.
Rank Precision Inds., W. Nyack, N.Y.
RCA Corp., Camden, N.J.
RCA Govt. & Comm. Sys., Moorestown, N.J.
Rodelco, Deer Park, N.Y.
Sharpe Audio Div., Tonawanda, N.Y.
Sunair Elctrn., Inc., Ft. Lauderdale, Fla.
Surface Conduction, Inc., New York, N.Y.
Talk-A-Phone Co., Chicago, Ill.
Technical Mat'l., Mamaroneck, N.Y.
TRI-COM, Inc., Rockville, Md.
Tri-Ex Tower Corp., Visalia, Calif.
Unimetrics, Inc., Plainview, N.Y.
University Sound, Anaheim, Cal.
Video Resch. Corp., Rockville, Md.
Whittaker Corp., Los Angeles, Cal.

Comm. Systems, Radiotelephone

Bowmar Instr. Corp., Ft. Wayne, Ind.
Electrospace Corp., Westbury
Anritsu Electric Co., Ltd., Tokyo, Japan
A.R.F. Products, Inc., Raton, N.M.
Avco Corp., Cincinnati, Ohio
Bludworth Marine Div., Linden, N.J.
Brelonix, Inc., Seattle, Wash
Collins Radio Co., Dallas, Tex.
Communications Co., Inc., Coral Gables, Fla.
Elctrn. Comm., Inc., St. Petersburg, Fla.
General Dynamics, San Diego, Cal.
General Radiotelephone Co., Burbank, Cal.
Ground Data Corp., Fla., 33308
Hammarlund Mfg. Co., Red Bank, N.J.
Hughes Aircraft Co, Culver City, Cal.
Hughes Aircraft Co, Fullerton, Cal.
Intech, Santa Clara, Cal.
ITT Mackay Marine, Clark, N.J.
Linear Sys., Inc., Watsonville, Calif.
Matsushita Comm. Ind'l. Co., Ltd., Yokohama, Japan
Miles Reproducer Co., Inc., New York, N.Y.
Mobil Elctrns., Inc., Anderson, Ind.
Pace Div., Harbor City, Calif.
Pearce-Simpson, Miami, Fla.
Pickard & Burns Inc., Lindenhurst, N.Y.
RCA Service Co., Camden, N.J.
RF Communications, Inc., Rochester, N.Y.
Secode Elctrns., Dallas, Texas
Sunair Elctrn., Inc., Ft. Lauderdale, Fla.
Systems Engineering, Ltd., Grouse Creek, Utah
Technical Mat'l., Mamaroneck, N.Y.
Unimetrics, Inc., Plainview, N.Y.
Virginia Elctrns. Co., Inc., Falls Church, Va.
Whittaker Corp., Los Angeles, Cal.

Comm. Systems, Selective Paging

Bramco Controls, Piqua, Ohio
Johnson E. F. Co., Waseca, Minn.
Multitech Communications, Monterey Pk., Cal. ..... **p 324**
Nippon Electric/NEC America, N.Y., N.Y.
North Elec. Co., Galion, Ohio
Action Systems Co., Meriden, Conn.
Alcor, Inc., Ithaca, N.Y.
Altec, Anaheim, Calif.
Autocall Co., The, Shelby, Ohio
Baumker Mfg. Co., Toledo, Ohio
Bennett Laboratories, Inc., Emeryville, Calif.
Bogen Div., Paramus, N.J.
Components Specialties, Inc., Freeport, N.Y.
Conrac Corp., New York, N.Y.
Du Kane Corp., St. Charles, Ill.
Edwards Co. Inc., Norwalk, Conn.
Executone, Inc., Long Island City, N.Y.
Fanon Elctrns., Hillside, N.J.
Femco Div., Irwin, Pa.
Fisher-Berkeley Corp., Emeryville, Calif.
Gai-Tronics Corp., Reading, Pa
General Elec., Lynchburg, Va.
HB Engrg. Corp., Silver Spring, Md.
Hughes Aircraft Co, Culver City, Cal.
Hughes Aircraft Co, Fullerton, Cal.
Lear Siegler, Inc., Santa Monica, Calif.
Merchant, Robert C. Co., Carmel Valley, Calif.
Miles Reproducer Co., Inc., New York, N.Y.
Mobil Elctrns., Inc., Anderson, Ind.
Nelson-Hershfield Elctrns., Phoenix, Ariz.
Parcoe, Inc., Cleveland, Ohio
Private Tele-Comms., Inc., Chicago, Ill.
Reach Elctrns., Inc., Lexington, Neb.
Regency Elctrns., Inc., Indianapolis, Ind.
RHA-Audio Communications, W. New York, N.J.
Secode Elctrns., Dallas, Texas
Sparks Communications, Inc., Brownsville, Tex.
Surface Conduction, Inc., New York, N.Y.
Talk-A-Phone Co., Chicago, Ill.
Unimetrics, Inc., Plainview, N.Y.
University Sound, Anaheim, Cal.
VIKOA, Hoboken, N.J.
Webster Elec. Co., Inc., Racine, Wisc.
Whittaker Corp., Los Angeles, Cal.

Comm. Systems, Single-Sideband

American Elctrn. Labs., Inc., Lansdale, Pa.
Johnson E. F. Co., Waseca, Minn.
Watkins Johnson Co., Palo Alto, Cal.
Aerocom, Miami, Fla.
Aeronautical Comm. Equip. Inc., Miami, Fla.
AMBAC Inds., Garden City, N.Y.
Andrew Corp., Orland Pk., Ill.
Anritsu Electric Co., Ltd., Tokyo, Japan
Arvin Sys., Inc., Dayton, Ohio
Barker & Williamson, Bristol, Pa.
Brelonix, Inc., Seattle, Wash
CCA Elctrns. Corp., Gloucester, N.J.
Collins Radio Co., Cedar Rapids, Iowa
Collins Radio Co., Dallas, Tex.
Electrac, Inc., Anaheim, Calif.
Elctrn. Comm., Inc., St. Petersburg, Fla.
General Dynamics, San Diego, Cal.
General Elec., Lynchburg, Va.
General Instr. Corp., Hicksville, N.Y.
General Radiotelephone Co., Burbank, Cal.
GTE Lenkurt Inc., San Carlos, Calif.
GTE Sylvania Inc., Elctrn. Sys. Gp., Waltham, Mass.
Hammarlund Mfg. Co., Red Bank, N.J.
Heath Co., Benton Harbor, Mich.
Hermes Elctrns., Dartmouth N.S., Can.
Hughes Aircraft Co, Culver City, Cal.
Hughes Aircraft Co, Fullerton, Cal.
ITT Mackay Marine, Clark, N.J.
Linear Sys., Inc., Watsonville, Calif.
Micro-Tel Corp., Baltimore, Md.
Olektron Corp., Dudley, Mass.
Pearce-Simpson, Miami, Fla.
Philips Elctrns. Inds., Ltd., Toronto 17, Can.
Pickard & Burns Inc., Lindenhurst, N.Y.
Plessey Elctrns. Corp., Farmingdale, N.Y.
Racal Communications, Rockville, Md.
Raytheon Data Systems Co., Norwood, Mass.
RCA Corp., Camden, N.J.
RCA Govt. & Comm. Sys., Moorestown, N.J.
RF Communications, Inc., Rochester, N.Y.
RFL Inds., Comms. Div., Boonton, N.J.
Struthers Elctrns. Corp., Mamaroneck, N.Y.
Sunair Elctrn., Inc., Ft. Lauderdale, Fla.
Technical Mat'l., Mamaroneck, N.Y.
RCA Govt. & Comm. Sys., Moorestown, N.J.

Comm. Systems, Telemetering

Airpax Elctrns., Inc., Cambridge, Md.
Airpax Elctrns., Ft. Lauderdale, Fla.
American Elctrn. Labs., Inc., Lansdale, Pa.
Applied Research Inc., Port Washington, N.Y.
Bramco Controls, Piqua, Ohio .... **p 1406**
Data-Control Systems, Danbury, Conn. **p 345**
Quindar Elctrns., Inc., Springfield, N.J. **p 953**
RHG Elctrns. Lab., Farmingdale, N.Y.
Solid State Elctrns., Sepulveda, Cal.
Sonex, Inc., Bethayres, Pa. ..... **p 955**
Vega Precision Labs., Vienna, Va. **p 614**
Watkins Johnson Co., Palo Alto, Cal.
AMBAC Inds., Garden City, N.Y.
Andrew Corp., Orland Pk., Ill.
Astro Comm. Lab., Gaithersburg, Md.
Astrodata, Anaheim, Cal.
Autocon Inds., Inc., St. Paul, Minn.
Automatic Signal Div., E. Norwalk, Conn.
Aydin Data Systems, Ft. Washington, Pa
Baganoff Assocs., Inc., St. Louis, Mo.
BF Elctrns., Solana Beach, Calif.
Biocom, Inc., Culver City, Cal.
Bionic Instrs., Inc., Bala Cynwyd, Pa.
Bristol Div, Waterbury, Conn
Collins Radio Co., Dallas, Tex.
Collins Radio Co., Newport Beach, Calif.
ComGeneral Corp., Dayton, Ohio
Conductron Corp., St. Charles, Mo.
Continental Data Sys., Dayton, Ohio
Data Access Sys., Inc., Dover, N.J.
Data Prods. Corp., Woodland Hills, Calif.
Defense Elctrns., Inc., Rockville, Md.
Destron Co., Rolling Hills Est, Cal
Dorsett Elctrns., Tulsa, Okla.
Electrac, Inc., Anaheim, Calif.
Elctrn. Comm., Inc., St. Petersburg, Fla.
Fairchild Space & Defense Sys., Syosset, N.Y.
Femco Div., Irwin, Pa.
Ferranti Ltd., Hollinwood, Lancs., England
Fifth Dimension, Princeton, N.J.
Fischer & Porter Co., Warminster, Pa.
General Devices, Inc., Princeton, N.J.
General Dynamics, San Diego, Cal.
General Instr. Corp., Hicksville, N.Y.
Gosh Instrs., Inc., Wethersfield, Conn.
Ground Data Corp., Fla., 33308
GTE Lenkurt Inc., San Carlos, Calif.
Gulton Inds., Albuquerque, N.M.
HB Engrg. Corp., Silver Spring, Md.
Honeywell, Aerospace & Def., Minneapolis, Minn.
Hughes Aircraft Co, Culver City, Cal.
Hughes Aircraft Co, Fullerton, Cal.
Interlind Elctrns., Doraville, Ga.
InterOcean Systems, San Diego, Cal.
Lear Siegler, Inc., Santa Monica, Calif.
Lear Siegler, Anaheim, Cal.
Leeds & Northrup Corp., No. Wales, Pa.
Leupold & Stevens, Inc., Beaverton, Ore.
Microcom Corp., Horsham, Pa.
Microwave Assocs., Inc., Burlington, Mass.
Monitor Sys., Inc., Ft. Washington, Pa.
Noble Elctrns., Inc., Carpinteria, Calif.
Oklahoma Aerotronics, Hartshorne, Okla.
Olektron Corp., Dudley, Mass.
Philco-Ford Corp., Washington, D.C.
Prodelin, Inc., Hightstown, N.J.
Radiation Sys., Inc., McLean, Va.
Ramsay Engrg. Co., Anaheim, Calif.
Rantec Div., Calabasas, Calif.
Raytheon Co., Lexington, Mass.
RCA Govt. & Comm. Sys., Moorestown, N.J.
RF Communications, Inc., Rochester, N.Y.
RFL Inds., Comms. Div., Boonton, N.J.
Rodale Elctrns., Inc., Garden City, N.Y.
Rodelco, Deer Park, N.Y.
Secode Elctrns., Dallas, Texas
Servo Corp. America, Hicksville, N.Y.
Singer - Tele-Signal, Woodbury, N.Y.
Special Microwave Devices Oper., Waltham, Mass.
Stromberg Carlson Corp., Rochester, N.Y.
Struthers Elctrns. Corp., Mamaroneck, N.Y.
Surface Conduction, Inc., New York, N.Y.
Taft Electrosystems, Inc., Metuchen, N. J.
3M Co., St. Paul, Minn.
Video Resch. Corp., Rockville, Md.
Western Microwave Labs., Los Gatos, Cal.

Comm. Systems, Telephone

ADC Prods., Minneapolis, Minn.
Data-Control Systems, Danbury, Conn.
Dynamics Instr. Co., Monterey Pk., Cal.
Electrospace Corp., Westbury ..... **p 323**
Multitech Communications, Monterey Pk., Cal. ..... **p 324**
Multitech Data Prods., Monterey Pk., Cal. ..... **p 363**
Nippon Electric/NEC America, N.Y., N.Y.
North Elec. Co., Galion, Ohio
Quindar Elctrns., Inc., Springfield, N.J.
RHG Elctrns. Lab., Farmingdale, N.Y.
Solid State Elctrns., Sepulveda, Cal.
Sonex, Inc., Bethayres, Pa.
Action Systems Co., Meriden, Conn.
Alcor, Inc., Ithaca, N.Y.
Altec, Anaheim, Calif.
Amplifier Corp. America, Westbury, N.Y.
Andrew Corp., Orland Pk., Ill.
Anritsu Electric Co., Ltd., Tokyo, Japan
Astrodata, Anaheim, Cal.
Auth Elec. Co., Inc., Deer Park, NY
Bliss Elctrn. Corp., Sussex, N.J.
Bogen Div., Paramus, N.J.
Continental Data Sys., Dayton, Ohio
Continental Elctrns., Brooklyn, N.Y.
Cybermatics, Inc., Ft. Lee, N.J.
Data Access Sys., Inc., Dover, N.J.
Data Prods. Corp., Woodland Hills, Calif.
Digi-Data Corp., Bladensburg, Md.
Digitronics Corp., Albertson, N.Y.
Du Kane Corp., St. Charles, Ill.
Encom Prods. Co., Inc., Oxford, Pa.
Engrg. Svcs., Madison, N.J.
Fanon Elctrns., Hillside, N.J.
Farinon Electric, San Carlos, Calif.
Femco Div., Irwin, Pa.
Ford Industries, Inc., Portland, Ore.
FRL, Marin Controls Co., Belmont, Cal.
Gai-Tronics Corp., Reading, Pa
GTE Automatic Elec., Northlake, Ill.
GTE Lenkurt Inc., San Carlos, Calif.
Hiett Elctrns. Corp., Wheeling, Ill.
Hughes Aircraft Co, Culver City, Cal.
Hughes Aircraft Co, Fullerton, Cal.
Interlind Elctrns., Doraville, Ga.
Int'l. Comm., Miami, Fla.
ITT Telecommunications, Raleigh, N.C.
Kemper Engrg. Co., Northridge, Cal.
Lear Siegler, Inc., Santa Monica, Calif.
Lear Siegler, Anaheim, Cal.
Lynch Communication Systems, San Francisco, Calif.
Merchant, Robert C. Co., Carmel Valley, Calif.
Microwave Assocs., Inc., Burlington, Mass.
Miles Reproducer Co., Inc., New York, N.Y.
Milgo Electrn. Corp., Miami, Fla.
Mobil Elctrns., Inc., Anderson, Ind.
Nat'l. Midco Inds., Inc., Trenton, N.J.
Nelson-Hershfield Elctrns., Phoenix, Ariz.
OKI Elctrns. America, Ft. Lauderdale, Fla.
Olektron Corp., Dudley, Mass.
Philco-Ford Corp., Washington, D.C.
Philips Elctrns. Inds., Ltd., Toronto 17, Can.
Private Tele-Comms., Inc., Chicago, Ill.
RCA Corp., Camden, N.J.

RCA Govt. & Comm. Sys., Moorestown, N.J.
RCA Service Co., Camden, N.J.
RFL Inds., Comms. Div., Boonton, N.J.
Roche, Paul C. Co., Inc., New York, N.Y.
Siemens Corp., Comm. Eq. Div., Iselin, N.J.
Singer - Tele-Signal, Woodbury, N.Y.
Stromberg Carlson Corp., Rochester, N.Y.
Superior Continental Corp., Hickory, N.C.
Surface Conduction, Inc., New York, N.Y.
Systems Engineering, Ltd., Grouse Creek, Utah
Telephone Dynamics Corp., N. Bellmore, N.Y.
Ultra Audio Prods., Beverly Hills, Calif.
VIKOA, Hoboken, N.J.
Webster Elec. Co., Inc., Racine, Wisc.

Comm. Systems, Teletype

Dynamics Instr. Co., Monterey Pk., Cal.
Multitech Communications, Monterey Pk., Cal. ..... p 324
Multitech Data Prods., Monterey Pk., Cal.
Quindar Elctrns., Inc., Springfield, N.J.
A C Electronics Co., Santa Monica, Cal.
Astrodata, Anaheim, Cal.
Barry Resch. Corp., Palo Alto, Cal.
Clary Corp., San Gabriel, Calif.
Collins Radio Co., Dallas, Tex.
Computronics Engrg., Los Angeles, Calif.
Continental Data Sys., Dayton, Ohio
Cybermatics, Inc., Ft. Lee, N.J.
Data Access Sys., Inc., Dover, N.J.
Defense Elctrns., Inc., Rockville, Md.
Demex, Inc., Kansas City, Mo.
Digitech Data Inds., Inc., Ridgefield, Conn.
Electrocom Inds., So. Bend, Indiana
Engrg. Svcs., Madison, N.J.
Frederick Electronics Corp., Frederick, Md.
General Atronics, Military Elctrns., Phila., Pa.
General Dynamics, San Diego, Cal.
GTE Lenkurt Inc., San Carlos, Calif.
Honeywell Information Systems, Wellesley Hills, Mass
Hughes Aircraft Co, Fullerton, Cal.
International Scanatron Sys., Wyandanch, N.Y.
Iso-Switch Corp., Costa Mesa, Cal.
ITT Mackay Marine, Clark, N.J.
Kemper Engrg. Co., Northridge, Cal.
Lear Siegler, Anaheim, Cal.
Lockheed Elctrns. Co., Watchung, N.J.
Lynch Communication Systems, San Francisco, Calif.
McElroy Elctrns. Corp., Shirley, Mass.
Philco-Ford Corp., Washington, D.C.
Philips Elctrns. Inds., Ltd., Toronto 17, Can.
Pioneer Elec. & Resch. Corp., Forest Park, Ill.
RCA Govt. & Comm. Sys., Moorestown, N.J.
RCA Service Co., Camden, N.J.
RF Communications, Inc., Rochester, N.Y.
RFL Inds., Comms. Div., Boonton, N.J.
Singer - Tele-Signal, Woodbury, N.Y.
Stromberg Carlson Corp., Rochester, N.Y.
Surface Conduction, Inc., New York, N.Y.
Technical Mat'l., Mamaroneck, N.Y.
Telemodem, Inc., Queens Village, N.Y.
Teletype Corp., Skokie, Ill.
Texas Instruments, Inc., Houston, Tex.
Trepac Corp. America, Englewood, N.J.
Universal Transistor Prods., Copiague, N.Y.
Western Telematic, Inc., Arcadia, Cal.

Comm. Systems, Vehicle Mounted

American Elctrn. Labs., Inc., Lansdale, Pa.
Data-Control Systems, Danbury, Conn.
Johnson E. F. Co., Waseca, Minn.
Multitech Communications, Monterey Pk., Cal.
Nippon Electric/NEC America, N.Y., N.Y.
North Elec. Co., Galion, Ohio
Ampex Corp., Redwood City, Calif.
Anritsu Electric Co., Ltd., Tokyo, Japan
Arvin Sys., Inc., Dayton, Ohio
Clary Corp., San Gabriel, Calif.
Collins Radio Co., Cedar Rapids, Iowa
Collins Radio Co., Dallas, Tex.
Communications Co., Inc., Coral Gables, Fla.
Craig Sys. Corp., Lawrence, Mass.
Defense Elctrns., Inc., Rockville, Md.
Dynascan Corp., Chicago, Ill.
Elctrn. Comm., Inc., St. Petersburg, Fla.
Femco Div., Irwin, Pa.
Ferranti Ltd., Hollinwood, Lancs., England
General Atronics, Military Elctrns., Phila., Pa.
General Dynamics, San Diego, Cal.
General Elec., Lynchburg, Va.
GTE Sylvania Inc., Elctrn. Sys. Gp., Waltham, Mass.
Hammarlund Mfg. Co., Red Bank, N.J.
Heath Co., Benton Harbor, Mich.
Hughes Aircraft Co, Fullerton, Cal.
Intech, Santa Clara, Cal.
Lear Siegler, Inc., Santa Monica, Calif.
Linear Sys., Inc., Watsonville, Calif.
LTV Electrosystems, Dallas, Tex.
Matsushita Comm. Ind'l. Co., Ltd., Yokohama, Japan
Microwave Assocs., Inc., Burlington, Mass.
Mobil Elctrns., Inc., Anderson, Ind.
Muirhead, Inc., Mountainside, N.J.
Olektron Corp., Dudley, Mass.
Pace Div., Harbor City, Calif.
Pearce-Simpson, Miami, Fla.
Philco-Ford Corp., Washington, D.C.
Ratelco, Inc., Seattle, Wash.
RCA Govt. & Comm. Sys., Moorestown, N.J.
Regency Elctrns., Inc., Indianapolis, Ind.
RF Communications, Inc., Rochester, N.Y.
Siemens Corp., Comm. Eq. Div., Iselin, N.J.
Struthers Elctrns. Corp., Mamaroneck, N.Y.
Sunair Elctrn., Inc., Ft. Lauderdale, Fla.
Technical Mat'l., Mamaroneck, N.Y.
Tri-Ex Tower Corp., Visalia, Calif.
Unimetrics, Inc., Plainview, N.Y.
Virginia Elctrns. Co., Inc., Falls Church, Va.
Whittaker Corp., Los Angeles, Cal.

Commutators, Rotary—
See Vol 2

Commutators, Switching—
See Vol 2

Comparators, Attenuation

Alford Mfg. Co., Winchester, Mass.
Hewlett-Packard, Palo Alto, Cal.
Weinschel Engrg. Co., Gaithersburg, Md. ..... p 1571
General Microwave Corp., Farmingdale, N.Y.
Maury Microwave Corp., Cucamonga, Calif.
Narda Microwave Corp., Plainview, N.Y.
Struthers-Dunn, Inc., Bettendorf, Iowa

Comparators, Capacitance—
See Bridges, Capacitance

Comparators, Circuit Linearity

General Magnetics, Bloomfield, N.J.
Hewlett-Packard, Palo Alto, Cal.
Solid State Elctrns., Sepulveda, Cal.
Teledyne Philbrick, Dedham, Mass.
Berkeley Nucleonics Corp., Berkeley, Calif.
Computer Central, Detroit, Mich.
Zeltex, Inc., Concord, Calif.

Comparators, Density—See Densitometers

Comparators, Digital

A. D. Data Sys., Inc., Rochester, N.Y.
API Instrs. Co., Waltham,, Mass. .. p 402
Automated Meas., Oakland, Calif. p 447
Automation Dev., Culver City, Cal.
Datacom, Inc., Ft. Walton Bch., Fla.
Datascan, Inc., Clifton, N.J. ..... p 428
Digital Equip. Corp., Maynard, Mass.
Digitron Corp., Norristown, Pa.
Dytro Corp., Hicksville, N.Y.
E-H Resch. Labs., Inc., Oakland, Cal. p 447
Electronic Research Co., Shawnee Mission, Kans. ..... p 458
Hewlett-Packard, Palo Alto, Cal.
Hickok Elect. Instr., Cleveland, Ohio
Hughes Aircraft Co., Mos Div., Newport Beach, Cal.
Monsanto Company, Electronic Instruments, W. Caldwell, N.J.
(NES) Nationwide Elctrn. Sys., Itasca, Ill.
Parabam, Inc., Compton, Cal.
PPM, Inc., Bedford, Ohio
Raytheon Computer, Santa Ana, Cal. p 374
Specific Products, Monrovia, Cal. p 325
SRC Div., Newport Bch., Cal. ..p 560,561
Systron-Donner Concord Instr. Div., Concord, Cal.
Tempo/UTI Div., Chatsworth, Cal.
AMBAC Inds., Garden City, N.Y.
Analogic, Wakefield, Mass.
Anocut Engrg. Co., Elk Grove Village, Ill.
Automation Dynamics, Northvale, N.J.
Computer Central, Detroit, Mich.
Control Logic, Natick, Mass.
Data Technology Corp., Palo Alto, Cal.
Dixson, Inc., Grand Junction, Colo.
Elctrn. Modules Corp., Timonium, Md.
Fairchild Semiconductor, Mountain View, Calif.
Fischer & Porter Co., Warminster, Pa.
Gap Instr. Corp., Hauppauge, N.Y.
General Microwave Corp., Farmingdale, N.Y.
General Radio Co., Concord, Mass.
Gralex Inds., Inc., Farmingdale, N.Y.
Gulton Inds., Albuquerque, N.M.
Hughes Aircraft Co, Culver City, Cal.
Hughes Aircraft Co, Fullerton, Cal.
Innovatek Enterprise, Millerton, N.Y.
Instrumentation Tech. Corp., Northridge, Calif.
Lancer Elctrns. Corp., Norristown, Pa.
Lear Siegler, Inc., Santa Monica, Calif.
Lear Siegler, Anaheim, Cal.
Micro Instr., Hawthorne, Cal.
Midland Standard Inc., Elgin, Ill.
Minnetech Labs., Inc., Minneapolis, Minn.
Monitor Sys., Inc., Ft. Washington, Pa.
Non-Linear Sys., Inc., Del Mar, Cal.
Northern Precision Labs., Inc., Fairfield, N.J.
Olympus Corp. America, New Hyde Park, N.Y.
Optimized Devices Inc., Pleasantville, N.Y.
Optomechanisms, Inc., Plainview, N.Y.
Reflectone, Inc., Stamford, Conn.
Rohde & Schwarz Sls., Passaic, N.J.
Singer - Tele-Signal, Woodbury, N.Y.
Struthers-Dunn, Inc., Pitman, N.J.
Struthers-Dunn, Inc., Bettendorf, Iowa
Tenor Co., Inc., New Berlin, Wisc.
Theta Instr. Corp., Fairfield, N.J.
United Sys. Corp., Dayton, Ohio
Zehntel, Inc., Berkeley, Calif.

Comparators, Frequency

Atec, Inc., Houston, Tex. ..... p 411
Austron, Inc., Austin, Tex.
Fluke, John Mfg. Co., Inc., Seattle, Wash. ..... p 478
Frequency Control, Inc., Austin, Tex.
Geo Space Sys., Tampa, Fla. ..... p 350
Hewlett-Packard, Palo Alto, Cal.
Hi-G, Windsor Locks, Conn.
Solid State Elctrns., Sepulveda, Cal.
Vectron Labs., Inc., Norwalk, Conn.
A & M Instrument, Inc., Great Neck, N.Y.
Aerospace Resch. Inc., Boston, Mass.
AMBAC Inds., Garden City, N.Y.
B.H. Inds., Los Angeles, Cal.
Collins Radio Co., Dallas, Tex.
Dynamic Precision Controls, Hagerstown, Ind.
Elctrn. Svc., Verona, N.J.
Engelmann Microwave, Montville, N.J.
Entron Inc., Morganville, N.J.
General Microwave Corp., Farmingdale, N.Y.
Heath Co., Benton Harbor, Mich.
Hyletronics Corp., Littleton, Mass.
Lear Siegler, Inc., Santa Monica, Calif.
Olektron Corp., Dudley, Mass.
Racal Communications, Rockville, Md.
Rohde & Schwarz Sls., Passaic, N.J.
Signal Analysis Inds. Corp., Hauppauge, N.Y.
Tracor, Inc., Austin, Tex.
Weston Instruments, Inc., Newark, N.J.
Zehntel, Inc., Berkeley, Calif.

Comparators, Impedance—
See Bridges, Impedance

Comparators, Inductance—
See Bridges, Inductance

Comparators, Optical—
See Vol 2

Comparators, Phase

Alford Mfg. Co., Winchester, Mass.
American Nucleonics Corp., Woodland Hills, Cal
Atomichron, Inc., New Hyde Park, N.Y. p 469
Austron, Inc., Austin, Tex.
Dranetz Engrg. Labs., Plainfield, N.J. p 438
Dytronics Co., Columbus, Ohio .... p 441
Frequency Elctrns., New Hyde Pk., N.Y. p 469,1391
Geo Space Sys., Tampa, Fla.
Hewlett-Packard, Palo Alto, Cal.
Hi-G, Windsor Locks, Conn.
Ind'l. Control Co., Farmingdale, N.Y.
Ind'l. Test Equip., Port Washington, N.Y. p 497
North Atlantic Inds., Plainview, N.Y. p 531
North Hills Elctrns., Inc., Glen Cove, N.Y.
Solid State Elctrns., Sepulveda, Cal.
Universal Ad-Yu Elctrns., Inc., Passaic, N.J. ..... p 579
Vari-L Co., Inc., Denver, Colo.
A & M Instrument, Inc., Great Neck, N.Y.
Aerospace Resch. Inc., Boston, Mass.
Collins Radio Co., Dallas, Tex.
Engelmann Microwave, Montville, N.J.
GRFF, Port Salerno, Fla.
Hyletronics Corp., Littleton, Mass.
Merrimac Resch. & Dev., Inc., West Caldwell, N.J.
Microwave Development Labs., Inc., Needham Hgts., Mass.
Olektron Corp., Dudley, Mass.
Radiation Sys., Inc., McLean, Va.
Rantec Div., Calabasas, Calif.
Relcom, Mt. View, Calif.
Struthers-Dunn, Inc., Bettendorf, Iowa
Theta Instr. Corp., Fairfield, N.J.
Tracor, Inc., Austin, Tex.
Varian Assocs., Palo Alto, Cal.

Comparators, Q

Dranetz Engrg. Labs., Plainfield, N.J.

Comparators, Reluctance

Dranetz Engrg. Labs., Plainfield, N.J.

Comparators, Resistance—
See Bridges, Resistance

Comparators, Surface—See Indicators, Surface Roughness

Comparators, Voltage

A. D. Data Sys., Inc., Rochester, N.Y.
Airpax Elctrns., Inc., Cambridge, Md.
Autronics Corp., Pasadena, Calif.
Beckman Instrs., Cedar Grove, N.J.
Boonton Electronics Corp., Parsippany, N.J.
Bulova Watch Co., Servo Prods. Elctrns. Div., Woodside, N.Y.
California Elctrn. Mfg. Co., Alamo, Calif. p 1315
Chronetics, Inc., Mt. Vernon, N.Y.
Control Technology Co., L.I.C., N.Y.
DDC, Hicksville, N.Y.
Diversified Elctrns., Evansville, Ind
Dytro Corp., Hicksville, N.Y.
Electro Sci. Inds., Portland, Ore.
General Magnetics, Bloomfield, N.J.
Hewlett-Packard, Palo Alto, Cal.
Hi-G, Windsor Locks, Conn.
Hybrid Sys. Corp., Burlington, Mass.
Julie Research Lab., New York, N.Y. p 502
Kepco, Inc., Flushing, N.Y.
North Hills Elctrns., Inc., Glen Cove, N.Y. ..... p 1339
PPM, Inc., Bedford, Ohio
Precision Monolithics, Santa Clara, Cal.
RO Assocs., Menlo Pk., Cal.
Slaughter Co., Ardmore, Okla. ..... p 558
Solid State Elctrns., Sepulveda, Cal.

Tektronix, Inc., Beaverton, Ore.
Teledyne Philbrick, Dedham, Mass.
Tempo/UTI Div., Chatsworth, Cal.
Trio Labs, Inc., Plainview, N.Y.
A & M Instrument, Inc., Great Neck, N.Y.
AMBAC Inds., Garden City, N.Y.
Analog Devices, Inc., Norwood, Mass.
B.H. Inds., Los Angeles, Cal.
Bowmar/Ali, Inc., Acton, Mass.
Brower Laboratories, Inc., Waltham, Mass.
Burr-Brown Resch. Corp., Tucson, Ariz.
Canadian Research Institute, Don Mills, Ont., Canada
Chemalloy Elctrns., Santee, Cal.
Computer Dynamics, Torrington, Conn.
Constant Voltage Co., Chicago, Ill.
Control Logic, Natick, Mass.
Controlotron Corp., Farmingdale, N.Y.
Delta-Tronics Corp., Tempe, Ariz.
Doric Sci. Corp., San Diego, Calif.
EDC Data Comps. Corp., Massapequa, N.Y.
Electrical Instr. Svc., Inc., Mt. Vernon, N.Y.
GPS Instr. Co., Framingham, Mass.
Guildline Instrs., Inc., Larchmont, N.Y.
Hallmark Standards, Inc., Mt. Vernon, N.Y.
Holt Instr. Labs., Oconto, Wisc.
Intech, Santa Clara, Cal.
Integrated Controls, San Diego, Cal.
Isotech Inc., Westford, Mass.
Jerrold/Watkins Div., Toronto, 395, Ont., Can.
Lancer Elctrns. Corp., Norristown, Pa.
Leeds & Northrup Corp., No. Wales, Pa.
Luft Instrs., Inc., Lincoln, Mass.
Maytronics, Inc., Colorado Springs, Colo.
Midland Standard Inc., Elgin, Ill.
Optimized Devices Inc., Pleasantville, N.Y.
Qualidyne Corp., Santa Clara, Cal.
Raytheon Co., Mt. View, Calif.
Reflectone, Inc., Stamford, Conn.
Signetics Corp., Sunnyvale, Calif.
Silicon Gen'l., Inc., Westminster, Cal.
Struthers-Dunn, Inc., Pitman, N.J.
Tempo Instr., Plainview, N.Y.
Transystems Elctrn. Co., Fort Lee, N.J.
Weston Instruments, Inc., Newark, N.J.
Zeltex, Inc., Concord, Calif.

Compasses, Electronic Gyro
—See Vol 2

Compensators, Angular Motion
—See Vol 2

Compensators, Lead Resistance
Electro Sci. Inds., Portland, Ore.
General Resistance, Mt. Vernon, N.Y.
Julie Research Lab., New York, N.Y.
Computer Central, Detroit, Mich.

Component Substitutors-See Test Equipment, Component Substituting
Solid State Elctrns., Sepulveda, Cal.
Hughes Aircraft Co, Culver City, Cal.
Morey Corp, Downers Grove, Ill.
Philmore Mfg. Co., Richmond Hill, N.Y.
Vytell Corp., Arlington Hgts., Ill.

Compounds, Antistatic
—See Coatings, Antistatic—Vol 3

Compounds, Encapsulating, Molding, Potting-Also See Plastic Raw Materials
—See Vol 3

Compounds, Weatherproofing
—See Coatings, Weatherproofing—Vol 3

Compressors, Data & Speech
Ithaco, Inc., Ithaca, N.Y.
AMBAC Inds., Garden City, N.Y.
Aydin Data Systems, Ft. Washington, Pa
Biomation Corp., Palo Alto, Cal
Ground Data Corp., Fla., 33308
Hughes Aircraft Co, Fullerton, Cal.
ISC/Telephonics Div, Huntington, N.Y.
Philco-Ford Corp., Washington, D.C.
RFL Inds., Comms. Div., Boonton, N.J.
Shure Bros., Inc., Evanston, Ill.
Signatron, Inc., Lexington, Mass.
Singer - Tele-Signal, Woodbury, N.Y.

Computer Logic Circuits
—See Cards, Logic; Circuits, Hybrid; Circuits, Integrated; Modules, Logic—Vol 2

Computer Memory Testers
—See Testers, Computer Memory

Computer Tape Recorders
—See Data Recorders

Computer Teaching Devices
—See Teaching Machines

Computer Type Indicators
—See Lights; Dials; Readouts—Vol 2

Computers, Analog
Bowmar Instr. Corp., Ft. Wayne, Ind.
Control Technology Co., L.I.C., N.Y.
DDC, Hicksville, N.Y.
General Magnetics, Bloomfield, N.J.
Hybrid Sys. Corp., Burlington, Mass.
Intronics, Inc., Newton, Mass.
Nippon Electric/NEC America, N.Y., N.Y.
Systron-Donner Concord Instr. Div., Concord, Cal.
Transmagnetics Inc., Farmingdale, N.Y.
AMBAC Inds., Garden City, N.Y.
Applied Dynamics Computer Sys., Ann Arbor, Mich.
Austin Elctrns., Roselle, N.J.
Automatic Control Elctrns. Co., San Antonio, Tex.
Automatic Signal Div., E. Norwalk, Conn.
Baganoff Assocs., Inc., St. Louis, Mo.
Bailey Meter Co., Wickliffe, Ohio
Bell & Howell Co., Pasadena, Calif.
Bristol Div, Waterbury, Conn
Components Specialties, Inc., Freeport, N.Y.
Cybermatics, Inc., Ft. Lee, N.J.
Ferranti Ltd., Hollinwood, Lancs., England
Foxboro Co., Foxboro, Mass.
Gap Instr. Corp., Hauppauge, N.Y.
General Computers, Inc., Los Angeles, Calif.
Hartman Sys. Div. A-T-O, Inc., Huntington Sta., N.Y.
Heath Co., Benton Harbor, Mich.
Honeywell, Aerospace & Def., Minneapolis, Minn.
Honeywell, Ft. Washington, Pa.
Hughes Aircraft Co, Culver City, Cal.
Hughes Aircraft Co, Fullerton, Cal.
Instru-Lec Corp., Mt. Vernon, N.Y.
Kollmorgen-Color Sys. Div., Attleboro, Mass.
Kollsman Instr. Corp., Syosset, N.Y.
Lear Siegler, Grand Rapids, Mich.
Leeds & Northrup Corp., No. Wales, Pa.
Link Div., Binghamton, N.Y.
Litton Sys., Inc., Woodland Hills, Calif.
Lockheed Aircraft Svce., Special Devices Div., Ontario, Calif.
Loral Elctrn. Sys., Bronx, N.Y.
Motorola Instr. & Control, Phoenix, Ariz.
Ogden Technology Labs., Fullerton, Cal.
Reflectone, Inc., Stamford, Conn.
Rodale Elctrns., Inc., Garden City, N.Y.
Singer-General Precision, Inc., Little Falls, N.J.
Standard Elec. Time Corp., Springfield, Mass.
Taylor Instr. Process Control Div., Rochester, N.Y.
Telectro Sys. Corp., Corona, N.Y.
Transystems Elctrn. Co., Fort Lee, N.J.
Westinghouse Elec. Corp., Pittsburgh, Pa.
Westinghouse Elec. Int'l., New York, N.Y.
Zonic Tech. Labs., Cincinnati, Ohio

Computers, Desk Top (Digital)
Digital Equip. Corp., Maynard, Mass. p 348
Eldorado Electrodata, Concord, Cal.
Hewlett-Packard, Palo Alto, Cal.
(NES) Nationwide Elctrn. Sys., Itasca, Ill.
Pennwood Numechron, Pittsburgh, Pa.
Applied Systems Corp., Detroit, Mich
Beckman Instrs., (AISSD), Fullerton, Cal.
Components Specialties, Inc., Freeport, N.Y.
Computer Automation, Inc., Newport Beach, Calif.
Cybermatics, Inc., Ft. Lee, N.J.
Dietzgen, Eugene Co., Chicago, Ill.
Digiac Corp., Plainview, N.Y.
Four-Phase Sys, Cupertino, Cal
Loral Elctrn. Sys., Bronx, N.Y.
Matsushita Comm. Ind'l. Co., Ltd., Yokohama, Japan
Monroe, Orange, N.J.
Motorola Instr. & Control, Phoenix, Ariz.
Spiras Sys., Inc., Waltham, Mass.
Texas Instruments, Inc., Houston, Tex.
Varian Assocs., Palo Alto, Cal.
Varian Data Machines, Irvine, Cal.
Wang Labs., Inc., Tewksbury, Mass.

Computers, Digital (General Purpose)
Burroughs Corp., Los Angeles, Cal.
Digital Equip. Corp., Maynard, Mass. p 348
Eldorado Electrodata, Concord, Cal.
Hewlett-Packard, Palo Alto, Cal.
(NES) Nationwide Elctrn. Sys., Itasca, Ill.
Nippon Electric/NEC America, N.Y., N.Y.
Pennwood Numechron, Pittsburgh, Pa.
Adage, Inc., Boston, Mass.
American Data Sys., Canoga Pk., Cal
Applied Systems Corp., Detroit, Mich
B-D Spear Medical Sys., Waltham, Mass.
Computer Automation, Inc., Newport Beach, Calif.
Cybermatics, Inc., Ft. Lee, N.J.
Datacraft Corp., Ft. Lauderdale, Fla.
Digiac Corp., Plainview, N.Y.
EMR Computer, Minneapolis, Minn.
Ferranti Ltd., Hollinwood, Lancs., England
Fischer & Porter Co., Warminster, Pa.
Four-Phase Sys, Cupertino, Cal
Friden Div., San Leandro, Calif.
Honeywell Information Systems, Wellesley Hills, Mass
Hughes Aircraft Co, Culver City, Cal.
Kollmorgen-Color Sys. Div., Attleboro, Mass.
Lear Siegler, Grand Rapids, Mich.
Litton Sys., Inc., Woodland Hills, Calif.
Lockheed Elctrns. Co., Watchung, N.J.
Lockheed Elctrns. Co., Los Angeles, Calif.
Loral Elctrn. Sys., Bronx, N.Y.
Microdata Corp., Santa Ana, Cal.
Motorola Instr. & Control, Phoenix, Ariz.
Potter Instr. Co., Melville, N.Y.
Raytheon Co., Lexington, Mass.
RCA Govt. & Comm. Sys., Moorestown, N.J.
REDCOR Corp., Woodland Hills, Cal.
Singer-General Precision, Inc., Little Falls, N.J.
Spiras Sys., Inc., Waltham, Mass.
Systems Engrg. Labs., Ft. Lauderdale, Fla.
Technical Consultants Corp., Ellington, Conn.
Texas Instruments, Inc., Houston, Tex.
Varian Assocs., Palo Alto, Cal.
Varian Data Machines, Irvine, Cal.
Viatron Computer Sys., Bedford, Mass.
Wang Labs., Inc., Tewksbury, Mass.
Westinghouse Elec. Corp., Pittsburgh, Pa.
Westinghouse Elec. Int'l., New York, N.Y.
Wyle Labs., El Segundo, Calif.
Xerox Data Sys., El Segundo, Cal

Computers, Digital (Special Purpose)
Bowmar Instr. Corp., Ft. Wayne, Ind.
Chronetics, Inc., Mt. Vernon, N.Y.
Datascan, Inc., Clifton, N.J.
Dytro Corp., Hicksville, N.Y.
Eldorado Electrodata, Concord, Cal.
Metric Sys., Ft. Walton Beach, Fla. p 358,360
(NES) Nationwide Elctrn. Sys., Itasca, Ill.
Pennwood Numechron, Pittsburgh, Pa. p 372
Rockland Sys. Corp., Blauvelt, N.Y.
Veeder-Root, Hartford, Conn.
Allis, Louis Co., Milwaukee, Wisc.
AMBAC Inds., Garden City, N.Y.
American Data Sys., Canoga Pk., Cal
Applied Control Co., Fairfield, N.J.
Applied Systems Corp., Detroit, Mich
Artronix, Inc., St. Louis, Mo.
Astronautics Corp. of Amer., Milwaukee, Wisc.
Austin Elctrns., Roselle, N.J.
Automatic Control Elctrns. Co., San Antonio, Tex.
Avco Corp., Cincinnati, Ohio
B-D Spear Medical Sys., Waltham, Mass.
Bailey Meter Co., Wickliffe, Ohio
Beckman Instrs., (AISSD), Fullerton, Cal.
Bell & Howell Co., Pasadena, Calif.
Bendix Aerospace-Elctrns., Teterboro, N.J.
Bio-Medical Elctrns., Inc., Rockville, Md.
Biomation Corp., Palo Alto, Cal
Blake Electronics, Inc., Muskego, Wisc.
Boston Digital Corp., Ashland, Mass.
Bunker-Ramo Corp., Westlake Village, Cal
California Computer Prods., Anaheim, Cal
C. E. Wire Co., Fort Wayne, Ind.
Collins Radio Co., Cedar Rapids, Iowa
Commander Labs., Inc., Escondido, Calif.
Components Specialties, Inc., Freeport, N.Y.
Computer Automation, Inc., Newport Beach, Calif.
Computronics Engrg., Los Angeles, Calif.
Concord Control, Boston, Mass.
Control Equip. Corp., New England, Lowell, Mass.
Cybermatics, Inc., Ft. Lee, N.J.
Data Dynamics Div., Englewood, N.J.
Data Products, Englewood, Col.
Data Technology Inc., Watertown, Mass.
Datacraft Corp., Ft. Lauderdale, Fla.
Davidson Elctrn. Dev. Co., Erie, Pa.
Defense Elctrns., Inc., Rockville, Md.
Delco Electrns. Div., Milwaukee, Wisc.
Design Automation, Inc., Lexington, Mass.
Desman Elctrns., Rochester, N.Y.
Di/An Controls, Inc., Boston, Mass.
Digiac Corp., Plainview, N.Y.
Digital Prods., San Pedro, Calif.
Dynalex, Inc., Burbank, Cal.
Dynapar Corp., Gurnee, Ill.
Elctrn. Modules Corp., Timonium, Md.
EMR Computer, Minneapolis, Minn.
Engrg. Svcs., Madison, N.J.
Fabri-Tek Instrs., Inc., Madison, Wisc.
Fairchild Space & Defense Sys., Syosset, N.Y.
Ferranti Ltd., Hollinwood, Lancs., England
Fischer & Porter Co., Warminster, Pa.
Foxboro Co., Foxboro, Mass.
General Instr. Corp., Hicksville, N.Y.
Goodyear Aerospace Corp., Akron, Ohio
GTE Sylvania Inc., Elctrn. Sys. Gp., Waltham, Mass.
Hartman Sys. Div. A-T-O, Inc., Huntington Sta., N.Y.
Harworth Mfg. Co., Redwood City, Calif.
Honeywell, Aerospace & Def., Minneapolis, Minn.
Honeywell Information Systems, Wellesley Hills, Mass
Hughes Aircraft Co, Culver City, Cal.
Hughes Aircraft Co, Fullerton, Cal.
Hyde Park Elctrns., Inc., Dayton, Ohio
Instrumentation Tech. Corp., Northridge, Calif.
Keuffel & Esser Co., Morristown, N.J.
Kollmorgen-Color Sys. Div., Attleboro, Mass.
Lear Siegler, Inc., Santa Monica, Calif.
Lear Siegler, Anaheim, Cal.
Lear Siegler, Grand Rapids, Mich.
Leeds & Northrup Corp., No. Wales, Pa.
Lehigh Valley Elctrn., Inc., Fogelsville, Pa.
Link Div., Binghamton, N.Y.
Litton Sys., Inc., Woodland Hills, Calif.
Lockheed Aircraft Svce., Special Devices Div., Ontario, Calif.
Loral Elctrn. Sys., Bronx, N.Y.
Massey Dickinson Co., Inc., Saxonville, Mass.
Matsushita Comm. Ind'l. Co., Ltd., Yokohama, Japan
Maxson Elctrns. Div., Great River, N.Y.
Microdata Corp., Santa Ana, Cal.
Midland Standard Inc., Elgin, Ill.
Monitor Sys., Inc., Ft. Washington, Pa.
Noble Elctrns., Inc., Carpinteria, Calif.
Nuclear-Chicago, Des Plaines, Ill.
Nuclear Data, Inc., Palatine, Ill.
NUS Corp., Paramus, N.J.
Perkin-Elmer Corp., Norwalk, Conn.
Philco-Ford Corp., Washington, D.C.
Raytheon Co., Lexington, Mass.

RCA Govt. & Comm. Sys., Moorestown, N.J.
REDCOR Corp., Woodland Hills, Cal.
Reflectone, Inc., Stamford, Conn.
Sanders Assocs., Ocean Sys., So. Nashua, N.H.
Signal Analysis Inds. Corp., Hauppauge, N.Y.
Singer-General Precision, Inc., Little Falls, N.J.
Spiras Sys., Inc., Waltham, Mass.
SSR Instrs. Co., Santa Monica, Cal.
Strandberg Engrg. Labs., Inc., Greensboro, N.C.
Taylor Instr. Process Control Div., Rochester, N.Y.
Technical Consultants Corp., Ellington, Conn.
Texas Instruments, Inc., Houston, Tex.
Theta Instr. Corp., Fairfield, N.J.
Transystems Elctrn. Co., Fort Lee, N.J.
Varian Assocs., Palo Alto, Cal.
Varian Data Machines, Irvine, Cal.
Wang Labs., Inc., Tewksbury, Mass.
Westinghouse Elec. Corp., Pittsburgh, Pa.
Westinghouse Elec. Int'l., New York, N.Y.
Wyle Labs., El Segundo, Calif.
Zehntel, Inc., Berkeley, Calif.

Computers, Hybrid, Analog-Digital
Bowmar Instr. Corp., Ft. Wayne, Ind.
Dytro Corp., Hicksville, N.Y.
Hybrid Sys. Corp., Burlington, Mass.
(NES) Nationwide Elctrn. Sys., Itasca, Ill.
Systron-Donner Concord Instr. Div., Concord, Cal.
Transmagnetics Inc., Farmingdale, N.Y.
Adage, Inc., Boston, Mass.
AMBAC Inds., Garden City, N.Y.
Applied Dynamics Computer Sys., Ann Arbor, Mich.
Austin Elctrns., Roselle, N.J.
Automatic Control Elctrns. Co., San Antonio, Tex.
Bailey Meter Co., Wickliffe, Ohio
Clifton Div., Clifton Hgts., Pa.
Cybermatics, Inc., Ft. Lee, N.J.
Davidson Elctrn. Dev. Co., Erie, Pa.
Defense Elctrns., Inc., Rockville, Md.
Design Automation, Inc., Lexington, Mass.
Desman Elctrns., Rochester, N.Y.
Dynamic Precision Controls, Hagerstown, Ind.
Ferranti Ltd., Hollinwood, Lancs., England
General Computers, Inc., Los Angeles, Calif.
GTE Sylvania Inc., Elctrn. Sys. Gp., Waltham, Mass.
Hartman Sys. Div. A-T-O, Inc., Huntington Sta., N.Y.
Hughes Aircraft Co, Culver City, Cal.
Lear Siegler, Grand Rapids, Mich.
Link Div., Binghamton, N.Y.
Litton Sys., Inc., Woodland Hills, Calif.
Loral Elctrn. Sys., Bronx, N.Y.
Motorola Instr. & Control, Phoenix, Ariz.
Nuclear Data, Inc., Palatine, Ill.
Singer-General Precision, Inc., Little Falls, N.J.
Technical Consultants Corp., Ellington, Conn.
Technical Instrs., Inc., No. Haven, Conn.
Toledo Scale, Toledo, Ohio
Transystems Elctrn. Co., Fort Lee, N.J.
Westinghouse Elec. Int'l., New York, N.Y.
Weston Instrs. Div., Hatboro, Pa
Xerox Data Sys., El Segundo, Cal
Zonic Tech. Labs., Cincinnati, Ohio

Computers, Radiac—See Analyzers, Radiation

Computing Equipment, Peripheral—See Converters; Counters; Printers; etc.

Condensers—See Capacitors —Vol 3

Conductive Fabrics, Films & Tapes—See Fabrics, Conductive—Vol 3

Conductive Plastic—See Materials, Conductive Plastic —Vol 3

Conduit, Electrical—See Vol 3

Cones, Speaker—See Speaker Cones

Connector Adapters—See Vol 3

Connector Boxes & Strips, Power Outlet—See Vol 3

Connectors & Terminals, Push-On, Quick Disconnect —See Vol 3

Connectors, Anode—See Tube Parts—Vol 2

Connectors, Antenna—See Connectors, R-F, Coaxial—Vol 3

Connectors, Audio—See Vol 3

Connectors, Battery—See Vol 3

Connectors, Chassis, Rack & Panel—See Vol 3

Connectors, Filtered—See Vol 3

Connectors, Flat Cable—See Vol 3

Connectors, Heavy Duty, Power—See Vol 3

Connectors, Hermetic, Pressurized & Waterproof—See Vol 3

Connectors, High Voltage—See Vol 3

Connectors, Integrated Circuit—See Sockets, Integrated Circuit—Vol 2

Connectors, Miniature, Subminiature & Microminiature—See Vol 3

Connectors, Missile (Umbilicals, Interstage, Post Boost)—See Vol 3

Connectors, Plug-In, Program Board—See Vol 3

Connectors, Printed Circuit—See Vol 3

Connectors, RF, Coaxial & Triaxial—See Vol 3

Connectors, Stripline—See Vol 3

Connectors, Test—See Vol 3

Connectors, Thermocouple—See Vol 3

Consoles, Cabinet—See Cabinets & Accessories, Metal—Vol 3

Contact Cleaners—See Cleaners & Solvents-Also See Burnishers, Contact—Vol 3

Contact Strips, Finger—See Vol 3

Contactors—See Relays, Power—Vol 2

Contacts, Electrical—See Vol 3

Containers, Shielded (All Types)—See Vol 3

Containers, Shipping, Metal & Fiberglass (Reusable)-Also See Transit Cases—See Vol 3

Containers, Storage—See Vol 3

Containers, Transit—See Transit Cases—Vol 3

Control Equipment, Classification—See Vol 2

Control Panels & Systems, Computer—See Boards, Programming

Controls, Capacitance Operated—See Vol 2

Controls, Carbon—See Potentiometers; Rheostats—Vol 3

Controls, Combustion—See Vol 2

Controls, Constant Impedance—See Attenuators

Controls, Counting & Sorting
Automation Dev., Culver City, Cal.
Beckman Instrs., Cedar Grove, N.J.
Betamite Electronic Devices, Culver City, Calif.
Chrono-log Corp., Broomall, Pa.
Control Technology Co., L.I.C., N.Y.
DDC, Hicksville, N.Y.
Digitron Corp., Norristown, Pa.
Durant Digital Instrs., Milwaukee, Wisc. **p 1316**
Eagle-Signal Div., Davenport, Iowa **p 1317**
General Elec. Co., Schenectady, N.Y.
Guardian Elec. Mfg. Co., Chicago, Ill.
Haydon, A. W. Co., Waterbury, Conn.
Hecon Corp., New Shrewsbury, N.J.
Hewlett-Packard, Palo Alto, Cal.
Icon Corp., Cambridge, Mass.
Int'l. Electro-Magnetics, Palatine, Ill.
Kessler-Ellis Prods., Atlantic Highlands, N.J.
Meloy Laboratories, Springfield, Va.
Parabam, Inc., Compton, Cal.
Precision Timer, Westbrook, Conn.
Presin Co., Inc., Shelton, Conn.
Sealectro Corp., Mamaroneck, N.Y.
Tapeswitch Corp. Amer., Farmingdale, N.Y.
Acromag, Inc., Wixom, Mich.
Ade Corp., Watertown, Mass.
Allis, Louis Co., Milwaukee, Wisc.
AMF Electical Prods., Alexandria, Va.
Anocut Engrg. Co., Elk Grove Village, Ill.
A.O.I.P., 75/Paris 12eme, France
Applied Control Co., Fairfield, N.J.
Automatic Timing & Controls, Inc., King of Prussia, Pa.
Autotron, Inc., Danville, Ill.
Avtron Mfg., Inc., Cleveland, Ohio
Canadian Research Institute, Don Mills, Ont., Canada
Coil Co. of Amer., Northvale, N.J.
Control Logic, Natick, Mass.
Controlcraft Corp., West Chicago, Ill.
Copar Corp., Oak Lawn, Ill.
Corning Glass Works, Fluidic Products Dept., Corning, N.Y.
Data Technology Inc., Watertown, Mass.
Davidson Elctrn. Dev. Co., Erie, Pa.
De-Tec-Tronic Corp., Chicago, Ill.
Delavan Mfg Co, West Des Moines, Iowa
Design Prods. Corp., Troy, Mich.
Dolan-Jenner Inds., Inc., Melrose, Mass.
Durant Mfg. Co., Milwaukee, Wisc.
Dynamic Data Corp., Columbus, Ohio
Dynamic Precision Controls, Hagerstown, Ind.
Dynapar Corp., Gurnee, Ill.
Eico Electronic Instrument Co., Inc., Brooklyn, N.Y.
Electro Prods. Labs., Power Supply, Chicago, Ill.
Electro Prods. Labs., Transducer Div., Chgo., Ill.
Electro-Sonic Control, Manteca, Calif.
Elctrn. Control Co., Dresher, Pa.
Electronic Control Corp., Detroit, Mich.
Elctrn. Modules Corp., Timonium, Md.
Elctrns., Ltd., Marion, Iowa
Engler Instr. Corp., Jersey City, N.J.
Femco Div., Irwin, Pa.
Ferranti Ltd., Hollinwood, Lancs., England
Frost Electronics Corp., Bellingham, Mass.
Accu-Sort Sys., Inc., Phila., Pa.
General Equip. & Mfg., Louisville, Ky.
Hird Brown America, Livingston, N.J.
Hyde Park Elctrns., Inc., Dayton, Ohio
Instrumentation Tech. Corp., Northridge, Calif.
Intercontinental Elctrns., E. Rochester, N.Y.
JMR Elctrns. Corp., Bronx, N.Y.
Lehigh Valley Elctrn., Inc., Fogelsville, Pa.
Luft Instrs., Inc., Lincoln, Mass.
Lundy Elctrns. & Sys., Inc., Glen Head, N.Y.
McClintock Matrixes, Inc., Woodbury, Conn.
MEKontrol Inc., Northboro, Mass.
Micro Instr., Hawthorne, Cal.
Micro Switch, Freeport, Ill.
Midland Standard Inc., Elgin, Ill.
Mullard, Inc., Farmingdale, N.Y.
National Sonics, Farmingdale, N.Y.
Noble Elctrns., Inc., Carpinteria, Calif.
PECO, Milpitas, Cal.
Photobell Co., Inc., New York, N.Y.
Photomation, Inc., Mountain View, Calif.
Post Elctrn. Prods., Beverly, Mass.
Power Instrs., Skokie, Ill.
Robot Inds., Inc., Dearborn, Mich.
Schoeffel Instr. Corp., Westwood, N.J.
Scientronics, Barrington, N.J.
Sensor Corp., Greenwich, Conn.
Sigma Instrs., Inc., Braintree, Mass.
Solid Controls, Inc., Minneapolis, Minn.
Square D Co., Park Ridge, Ill.
Stevenson Engrg. & Mfg., Portland, Ore.
Stow Labs., Inc., Hudson, Mass.
Sunshine Sci. Instrs., Inc., Philadelphia, Pa.
Theta Instr. Corp., Fairfield, N.J.
Tri-Tronics Co., Oak Brook, Ill.
Warner Elec. Brake & Clutch Co., Beloit, Wisc.
Worner Elctrn. Devices, Rankin, Ill.
Zehntel, Inc., Berkeley, Calif.

Controls, Density—See Vol 2

Controls, Dimension
Automation Dev., Culver City, Cal. **p 1310**
General Elec. Co., Schenectady, N.Y.
Int'l. Electro-Magnetics, Palatine, Ill.
Schaevitz Engrg., Pennsauken, N.J. **p 1346**
Veeder-Root, Hartford, Conn.
Addison Div., Mountainside, N.J.
Ade Corp., Watertown, Mass.
Allis, Louis Co., Milwaukee, Wisc.
Anocut Engrg. Co., Elk Grove Village, Ill.
Automatic Timing & Controls, Inc., King of Prussia, Pa.
Autotron, Inc., Danville, Ill.
Bendix, Dayton, Ohio
Columbia Resch. Labs., Woodlyn, Pa.
Data Technology Inc., Watertown, Mass.
Davidson Elctrn. Dev. Co., Erie, Pa.
Dynamic Data Corp., Columbus, Ohio
Dynamic Precision Controls, Hagerstown, Ind.
Dynapar Corp., Gurnee, Ill.
Electron-Machine Corp., Umatilla, Fla.
Electronic Control Corp., Detroit, Mich.
Elctrns., Ltd., Marion, Iowa
Honeywell, Apparatus Controls, Mpls., Minn.
Hughes Aircraft Co., Ind'l. Prods. Div., Oceanside, Cal.
Hughes Aircraft Co., Ind'l. Prods. Div./Ind'l. Auto, Oceanside, Cal.
Hyde Park Elctrns., Inc., Dayton, Ohio
Ind'l. Winding Mach., River Edge, N.J.
Luft Instrs., Inc., Lincoln, Mass.
Mechanical Technology, Inc., Latham, N.Y.
Microwave Instrs. Co., Corona del Mar, Calif.
Midland Standard Inc., Elgin, Ill.
Minnetech Labs., Inc., Minneapolis, Minn.
Mullard, Inc., Farmingdale, N.Y.
Solid Controls, Inc., Minneapolis, Minn.
Stevenson Engrg. & Mfg., Portland, Ore.
Sunshine Sci. Instrs., Inc., Philadelphia, Pa.
Theta Instr. Corp., Fairfield, N.J.
Westinghouse Elec. Int'l., New York, N.Y.
Worner Elctrn. Devices, Rankin, Ill.

Controls, Door Opening & Closing (Industrial)—
See Vol 2

Controls, Environmental Test Equipment

Bafco, Inc., Warminster, Pa.
Blue M Engrg. Co., Blue Island, Ill.
Harrel, Inc., E. Norwalk, Conn. .... p 1973
Precision Timer, Westbrook, Conn.
Sealectro Corp., Mamaroneck, N.Y.
Aeronautical Div, Bryan, Ohio
Alpha-Monarch Corp., Dallas, Tex.
AMBAC Inds., Garden City, N.Y.
American Instr. Co., Silver Spring, Md.
Applied Systems Corp., Detroit, Mich
Artisan Elctrns. Corp., Parsippany, N.J.
Beckman Instrs., Process Instrs., Fullerton, Cal.
Bell & Howell Co., Pasadena, Calif.
Cambridge Sys., EG&G Inc., Waltham, Mass.
Chadwick-Helmuth Co., Inc., Monrovia, Calif.
Delta Design, La Mesa, Cal
Develco, Inc., Norwalk, Conn.
Dynamic Precision Controls, Hagerstown, Ind.
Elctrn. Control Co., Dresher, Pa.
Elctrns., Ltd., Marion, Iowa
Foxboro Co., Foxboro, Mass.
FRL, Marin Controls Co., Belmont, Cal.
General Oceanology, Inc., Cambridge, Mass.
Gruenberg Elec. Co., Inc., Williamsport, Pa.
Hafstrom Tech. Prods., Inc., San Diego, Calif.
Halmar Elctrns., Inc., Columbus, Ohio
Hill, E. Vernon, Inc., San Francisco, Calif.
Honeywell, Apparatus Controls, Mpls., Minn.
Honeywell, Ft. Washington, Pa.
Honeywell, Residential Div., Mpls., Minn.
Hotpack Corp., Phila., Pa.
Hygrodynamics, Inc., Silver Spring, Md.
Jersey Tech. Conslts., Morristown, N.J.
Lab-Line Instrs., Inc., Melrose Park, Ill.
Leeds & Northrup Corp., No. Wales, Pa.
Lehigh Valley Elctrn., Inc., Fogelsville, Pa.
Luft Instrs., Inc., Lincoln, Mass.
Lutron Elctrns. Co., Inc., Coopersburg, Pa.
MB Elctrns/Textron Co., New Haven, Conn.
Micro-Technical Inds., Laguna Beach, Cal.
Mullard, Inc., Farmingdale, N.Y.
OAL Assocs., Inc., Westbury, N.Y.
Power Control Corp., Pittsburgh, Pa.
Research, Inc., Minneapolis, Minn.
Robicon Corp., Pittsburgh, Pa
Spectral Dynamics Corp. San Diego, San Diego, Cal.
T & T Controls Co., Media, Pa.
Taylor Instr. Process Control Div., Rochester, N.Y.
Torr Labs., Los Angeles, Cal.
Unholtz-Dickie Corp., Hamden, Conn.
United Elec. Controls Co., Watertown, Mass.
Varian Assocs., Vacuum Div., Palo Alto, Cal.
Westinghouse Elec. Int'l., New York, N.Y.
Weston Instrs. Div., Hatboro, Pa

Controls, Film Thickness—
See Controls, Material Thickness

Controls, Flame Failure

Precision Timer, Westbrook, Conn.
Tokyo Elec. Co., Ltd., Chiyoda-ku, Tokyo, Japan
Bailey Meter Co., Wickliffe, Ohio
Barber-Colman Co., Industrial Instrs. Div., Rockford, Ill.
Beckman Instrs., Process Instrs., Fullerton, Cal.
Conductron Corp., St. Charles, Mo.
Edison, Thomas A. Instr. Div., W. Orange, N.J.
Edison, T.A., Instr. Div., Ft. Lauderdale, Fla.
Honeywell, Apparatus Controls, Mpls., Minn.
Honeywell, Ft. Washington, Pa.
Honeywell, Residential Div., Mpls., Minn.
Photobell Co., Inc., New York, N.Y.
RBM Controls, Logansport, Ind.
Texas Instruments, Dallas, Tex.

Controls, Fluid Conductivity—
See Vol 2

Controls, Fluid Flow—
See Vol 2

Controls, Frequency—
See Vol 2

Controls, Gas—See Vol 2

Controls, Hardware, Shafts & Accessories—See Shafts; Dials;etc.—Vol 2

Controls, Humidity—See Vol 2

Controls, Ignitron Firing—
See Vol 2

Controls, Illumination—
See Vol 2

Controls, Level, Dry Material —See Vol 2

Controls, Level, Liquid—
See Vol 2

Controls, Machine Tool—
See Vol 2

Controls, Materials Thickness

Ind'l. Control Co., Farmingdale, N.Y.
Schaevitz Engrg., Pennsauken, N.J.
Veeder-Root, Hartford, Conn.
Addison Div., Mountainside, N.J.
Allis, Louis Co., Milwaukee, Wisc.
American Elctrn. Controls Co., Barrington, N.J.
Ametek/Instrs. & Controls, Feasterville, Pa.
Automatic Timing & Controls, Inc., King of Prussia, Pa.
Davidson Elctrn. Dev. Co., Erie, Pa.
Decker Corp., Bala-Cynwyd, Pa.
Dynamic Data Corp., Columbus, Ohio
Edwards High Vacuum, Grand Island, N.Y.
Electro-Sonic Control, Manteca, Calif.
Electron-Machine Corp., Umatilla, Fla.
Elctrns., Ltd., Marion, Iowa
Honeywell, Apparatus Controls, Mpls., Minn.
Hyde Park Elctrns., Inc., Dayton, Ohio
Ind'l. Gauging & Control, Norwalk, Conn.
Industrial Nucleonics, Columbus, Ohio
Ind'l. Winding Mach., River Edge, N.J.
Lion Precision Div., Newton, Mass.
Luft Instrs., Inc., Lincoln, Mass.
Magnaflux Corp., Chicago, Ill.
Materials Resch. Corp., Orangeburg, N.Y.
Mechanical Technology, Inc., Latham, N.Y.
Micro Switch, Freeport, Ill.
Microwave Instrs. Co., Corona del Mar, Calif.
Minnetech Labs., Inc., Minneapolis, Minn.
Nuclear Resch. Corp., Southampton, Pa.
PECO, Milpitas, Cal.
RIL Elctrns., Inc., Southampton, Pa.
Schoeffel Instr. Corp., Westwood, N.J.
Scientronics, Barrington, N.J.
Sloan Technology Corp., Santa Barbara, Calif.
Solid Controls, Inc., Minneapolis, Minn.
Stevenson Engrg. & Mfg., Portland, Ore.
Sunshine Sci. Instrs., Inc., Philadelphia, Pa.
Taylor Instr. Process Control Div., Rochester, N.Y.
Theta Instr. Corp., Fairfield, N.J.
Ultek Div., Palo Alto, Calif.
Unit Process Assemblies, Woodside, N.Y.
Vacuum Equip. Div., Newton, Mass.
Varian Assocs., Vacuum Div., Palo Alto, Cal.
Westinghouse Elec. Int'l., New York, N.Y.
Weston Instruments, Inc., Newark, N.J.

Controls, Moisture—See Controls, Humidity—Vol 2

Controls, Motor Speed—
See Vol 2

Controls, Oscillator—
See Vol 2

Controls, P-H

Veeder-Root, Hartford, Conn.
Analytical Meas., Inc., Chatham, N.J.
Bailey Meter Co., Wickliffe, Ohio
Beckman Instrs., Process Instrs., Fullerton, Cal.
Bristol Div, Waterbury, Conn
Canadian Research Institute, Don Mills, Ont., Canada
Chemalloy Elctrns., Santee, Cal.
Foxboro Co., Foxboro, Mass.
Honeywell, Apparatus Controls, Mpls., Minn.
Honeywell, Ft. Washington, Pa.
Leeds & Northrup Corp., No. Wales, Pa.
Luft Instrs., Inc., Lincoln, Mass.
Strandberg Engrg. Labs., Inc., Greensboro, N.C.
Taylor Instr. Process Control Div., Rochester, N.Y.
VWR Scientific, San Francisco, Cal.

Controls, Photoelectric—
See Vol 2

Controls, Positioning

Astrosystems, Lake Success, N.Y.
Automation Dev., Culver City, Cal. p 1310
Bowmar Instr. Corp., Ft. Wayne, Ind. p 1313
Bulova Watch Co., Servo Prods. Elctrns. Div., Woodside, N.Y. .... p 1867
Computer Instrs., Hempstead, N.Y.
Control Technology Co., L.I.C., N.Y. p 1869
Delco Elctrns. Div., Kokomo, Ind.
General Elec. Co., Schenectady, N.Y.
Geo Space Sys., Tampa, Fla. ..... p 608
Icon Corp., Cambridge, Mass. .... p 1333
Ind'l. Control Co., Farmingdale, N.Y. p 1872
Int'l. Electro-Magnetics, Palatine, Ill.
Ledex, Inc., Dayton, Ohio
LVC Ind's., Inc., Corona, N.Y.
Precision Mechanisms, Westbury, N.Y. p 1876
Schaevitz Engrg., Pennsauken, N.J. p 1346
Sealectro Corp., Mamaroneck, N.Y.
Servo-Tek Prods. Co., Hawthorne, N.J. p 1632
Square D Co., Milwaukee, Wisc. p 1347
Veeder-Root, Hartford, Conn.
Vernitron Corp., Deer Pk., N.Y.
Adams Rite Mfg. Co., Glendale, Calif.
Ade Corp., Watertown, Mass.
Aeroflex Labs., Plainview, N.Y.
Allen-Bradley, Cleveland, Ohio
Allis-Chalmers, Milwaukee, Wisc.
Allis, Louis Co., Milwaukee, Wisc.
Ametek/Instrs. & Controls, Feasterville, Pa.
Anocut Engrg. Co., Elk Grove Village, Ill.
Applied Control Co., Fairfield, N.J.
Automatic Control Elctrns. Co., San Antonio, Tex.
Automatic Switch Co., Florham Park, N.J.
Automatic Timing & Controls, Inc., King of Prussia, Pa.
Avtron Mfg., Inc., Cleveland, Ohio
Bailey Meter Co., Wickliffe, Ohio
Baldwin Elctrns., Little Rock, Ark.
Barber-Colman Co., Electro-Mechanical Prods. Div., Rockford, Ill.
Barber-Colman Co., Industrial Instrs. Div., Rockford, Ill.
Beckman Instrs., Process Instrs., Fullerton, Cal.
Bendix, S. Montrose, Pa.
Bendix, Detroit, Mich.
Betzelt GMBH, Trogerstr. 32, W. Germany
Boston Digital Corp., Ashland, Mass.
Bristol Div, Waterbury, Conn
Cal-Power Corp., El Segundo, Calif.
Celtic Inds., Inc., Van Nuys, Cal.
CGS/Lawrence, Southampton, Pa.
Columbia Resch. Labs., Woodlyn, Pa.
Computer Central, Detroit, Mich.
Computer Conversions Corp., East Northport, N.Y.
Controlotron Corp., Farmingdale, N.Y.
Corning Glass Works, Fluidic Products Dept., Corning, N.Y.
Data Technology Inc., Watertown, Mass.
Decker Corp., Bala-Cynwyd, Pa.
Design Prods. Corp., Troy, Mich.
Dynamic Data Corp., Columbus, Ohio
Dynamic Precision Controls, Hagerstown, Ind.
Dynapar Corp., Gurnee, Ill.
Edison, T.A., Instr. Div., Ft. Lauderdale, Fla.
Electro-Craft Corp, Hopkins, Minn
Electro Prods. Labs., Power Supply, Chicago, Ill.
Electro Prods. Labs., Transducer Div., Chgo., Ill.
Electrol Co., Inc., York, Pa.
Electronic Mach. Parts, College Point, N.Y.
Excellon Inds., Torrance, Calif.
Farrand Controls, Inc., Valhalla, N.Y.
Fiber Photics, Inc., Santa Cruz, Cal.
Fincor Div., York, Pa.
Foxboro Co., Foxboro, Mass.
Frost Electronics Corp., Bellingham, Mass.
Gap Instr. Corp., Hauppauge, N.Y.
Gems Div., Farmington, Conn.
General Equip. & Mfg., Louisville, Ky.
General Scanning, Watertown, Mass.
Gerber Sci. Instr. Co., Hartford, Conn.
Glar-Ban Corp., Buffalo, N.Y.
Glentek, Inc., Santa Monica, Calif.
Goodyear Aerospace Corp., Akron, Ohio
Hartman Sys. Div. A-T-O, Inc., Huntington Sta., N.Y.
HEI, Inc., Chaska, Minn.
Honeywell, Aerospace & Def., Minneapolis, Minn.
Honeywell, Apparatus Controls, Mpls., Minn.
Honeywell, Ft. Washington, Pa.
Houston Scientific Inds., Inc., Houston, Tex
Hughes Aircraft Co., Ind'l. Prods. Div., Oceanside, Cal.
Hughes Aircraft Co., Ind'l. Prods. Div./Ind'l. Auto, Oceanside, Cal.
Hydro-Aire Div., Burbank, Calif.
IKL, Inc., Newport Beach, Calif.
Instru-Lec Corp., Mt. Vernon, N.Y.
Intercontinental Elctrns., E. Rochester, N.Y.
Jordan Controls, Milwaukee, Wisc.
Keltron Corp., Waltham, Mass.
Lear Siegler, Inc., Santa Monica, Calif.
Luft Instrs., Inc., Lincoln, Mass.
Magnetics, Inc., Butler, Pa.
McClintock Matrixes, Inc., Woodbury, Conn.
Measurement Sys., Inc., Norwalk, Conn.
MEKontrol Inc., Northboro, Mass.
Merchant, Robert C. Co., Carmel Valley, Calif.
Micro Switch, Freeport, Ill.
Midland Standard Inc., Elgin, Ill.
Minnetech Labs., Inc., Minneapolis, Minn.
Mullard, Inc., Farmingdale, N.Y.
National Sonics, Farmingdale, N.Y.
Neill Engrg. Co., Akron, Ohio
Orbit Instr. Corp., Syosset, N.Y.
PECO, Milpitas, Cal.
Photomation, Inc., Mountain View, Calif.
Polyphase Instr. Co., Bridgeport, Pa.
Post Elctrn. Prods., Beverly, Mass.
Randtronics, Inc., Palo Alto, Cal.
Research Instr. Co., Westbury, N.Y.
Robicon Corp., Pittsburgh, Pa
Scientific-Atlanta, Inc., Atlanta, Ga.
Seco Elctrns. Corp., Hopkins, Minn.
Sensor Corp., Greenwich, Conn.
Servo Dev. Corp., Hicksville, N.Y.
Sigma Instrs., Inc., Braintree, Mass.
Singer Co., Somerville, N.J.
Solid Controls, Inc., Minneapolis, Minn.
Southwest Prods. Co., Monrovia, Calif.
Sprengnether, W.F. Instr. Co., Inc., St. Louis, Mo.
Square D Co., Park Ridge, Ill.
Stevenson Engrg. & Mfg., Portland, Ore.
Superior Elec., Bristol, Conn.
Taylor Instr. Process Control Div., Rochester, N.Y.
Taylor-Winfield Corp., Warren, Ohio
Teledyne Gurley, Troy, N.Y.
Tenor Co., Inc., New Berlin, Wisc.
Texas Instruments, Dallas, Tex.
Theta Instr. Corp., Fairfield, N.J.
3M Co., St. Paul, Minn.
Transducer Controls Corp., Covina, Calif.
Trish Energetics, Harvard, Mass.
Warner Elec. Brake & Clutch Co., Beloit, Wisc.
Westamp, Inc., Santa Monica, Cal.
Weston-Transicoil, Worcester, Pa.

Wintriss Controls, New York, N.Y.
Worner Elctrn. Devices, Rankin, Ill.
Yaskawa Elec. America, Inc., Oak Brook, Ill.
Zehntel, Inc., Berkeley, Calif.

Controls, Pressure—See Vol 2

Controls, Proportioning—See Vol 2

Controls, Proximity-Also See Controls, Capacitance Operated—See Vol 2

Controls, Remote—See Vol 2

Controls, SCR—See Vol 2

Controls, Servo System—See Vol 2

Controls, Smoke & Combustion—See Controls, Combustion—Vol 2

Controls, Specific Gravity—See Vol 2

Controls, Stepping Motor—See Vol 2

Controls, Temperature—See Vol 2

Controls, Thyratron Grid—See Vol 2

Controls, Timing—See Timers —Vol 2

Controls, Torque-Electronic—See Vol 2

Controls, Vacuum

Cook Elec. Co., Morton Grove, Ill.
Electro/Data, Inc., Garland, Tex.
Andonian Assocs., Inc., Waltham, Mass.
Automatic Switch Co., Florham Park, N.J.
Bailey Meter Co., Wickliffe, Ohio
Barber-Colman Co., Industrial Instrs. Div., Rockford, Ill.
Beckman Instrs., Process Instrs., Fullerton, Cal.
Bendix, Rochester, N.Y.
Bristol Div, Waterbury, Conn
CGS/Datametrics, Watertown, Mass.
Columbus Elec. Mfg. Co., Columbus, Ohio
Cooke Vacuum Prods., S. Norwalk, Conn.
Cutler-Hammer, Milwaukee, Wisc.
Decker Corp., Bala-Cynwyd, Pa.
Denton Vacuum, Inc., Cherry Hill, N.J.
Dietz, Henry G. Co., Inc., Long Island City, N.Y.
Edwards High Vacuum, Grand Island, N.Y.
Foxboro Co., Foxboro, Mass.
Fredericks Co., Huntingdon Valley, Pa.
Gagne Assocs., Inc., Binghamton, N.Y.
Granville-Phillips Co., Boulder, Colo.
Hastings-Raydist, Hampton, Va.
High Vacuum Equip. Corp., Hingham, Mass.
Honeywell, Aerospace & Def., Minneapolis, Minn.
Honeywell, Apparatus Controls, Mpls., Minn.
Honeywell, Ft. Washington, Pa.
Honeywell, Residential Div., Mpls., Minn.
Hughes Aircraft Co, Vacuum Tube Prods. Div/Vacuum Equip., Oceanside, Calif
Kentrox Inds., Inc., Portland, Ore.
Kinney Vacuum Co., Boston, Mass.
Lear Siegler, Inc., Elyria, Ohio
Luft Instrs., Inc., Lincoln, Mass.
Mercoid Corp., Chicago, Ill.
Middlesex Gen'l. Inds., Somerville, Mass.
MKS Instrs., Inc., Burlington, Mass.
Precision Sci. Co., Chicago, Ill.
Sloan Technology Corp., Santa Barbara, Calif.
Taylor Instr. Process Control Div., Rochester, N.Y.
Ultek Div., Palo Alto, Calif.
United Elec. Controls Co., Watertown, Mass.
U.O.P. Instrs. Div., Greenwich, Conn.
Vactronic Lab. Equip., Inc., E. Northport, N.Y.
Vacuum Equip. Div., Newton, Mass.
Vacuum Inds., Inc., Somerville, Mass.
Varian Assocs., Palo Alto, Cal.
Varian Assocs., Vacuum Div., Palo Alto, Cal.
Veeco Instrs., Inc., Plainview, N.Y.
VirTis Co., Inc., Gardiner, N.Y.

Controls, Ventilating—See Vol 2

Controls, Voltage Regulating—See Regulators & Stabilizers,Voltage

Controls, Volume & Tone—See Potentiometers—Vol 3

Controls, Welding

Bell, F.W., Inc., Columbus, Ohio
Eagle-Signal Div., Davenport, Iowa
General Elec. Co., Schenectady, N.Y.
Icon Corp., Cambridge, Mass.
Ohmite Mfg. Co., Skokie, Ill.
Precision Timer, Westbrook, Conn.
Triac Elctrn. Sys., N.Y., N.Y.
Cam-Lok Div., Cincinnati, Ohio
Electrol Co., Inc., York, Pa.
Eutectic Corp., Flushing, N.Y.
Ewald Instrs. Corp., Kent, Conn.
Flexion Corp., Santa Barbara, Cal.
Halmar Elctrns., Inc., Columbus, Ohio
Hamilton Standard, Windsor Locks, Conn.
Hughes Aircraft Co., Vacuum Tube Prods. Div/Welding Equip., Oceanside, Calif.
Lincoln Elec. Co., Cleveland, Ohio
Midland Standard Inc., Elgin, Ill.
Miller Elec. Mfg. Co., Appleton, Wisc.
Nelson Stud Welding Co., Lorain, Ohio
Polyphase Instr. Co., Bridgeport, Pa.
Robicon Corp., Pittsburgh, Pa
Robotron Corp., Detroit, Mich.
Sciaky Bros., Inc., Chicago, Ill.
Silver, G.H. & Assocs., Newtonville, Mass.
Square D Co., Park Ridge, Ill.
Taylor-Winfield Corp., Warren, Ohio
Unitek Corp., Monrovia, Calif.
Walters, W.A., Inc., Chicago, Ill.
Weltronic Co., Southfield, Mich.
Westinghouse Elec., Sykesville, Md.
Westinghouse Elec. Corp., Pittsburgh, Pa.
Westinghouse Elec. Int'l., New York, N.Y.

Controls, Wire Wound—See Potentiometers; Rheostats—Vol 3

Convection Cooling Packages, Semiconductor—See Transistor & Diode Heat Dissipators—Vol 2

Converters, A-C To D-C

Aaron-Davis Co., Los Angeles,, Cal. p 616
Abbott Transistor Labs., L.A., Cal. p 618
ADC Prods., Minneapolis, Minn.
Almond Instrs. Co., Covina, Cal.... p 329
American Time Products, Woodside, N.Y.
Arnold Magnetics, Culver City, Cal. p 644
Astrosystems, Lake Success, N.Y.
Austron, Inc., Austin, Tex.
Autronics Corp., Pasadena, Calif. p 1311
Avtel Corp., Covina, Cal. ..... p 659
Bulova Watch Elctrns. Div. Amer. Time Prods., Woodside, N.Y.
Bulova Watch Co., Servo Prods. Elctrns. Div., Woodside, N.Y.
CEA, Monrovia, Cal.
Christie Elec., Los Angeles, Cal.
CML-Macarr, Inc., Edison, N.J.
Control Technology Co., L.I.C., N.Y.
Data Technology, Palo Alto, Cal.
Del Elctrns. Corp., Mt. Vernon, N.Y.
Deltron, Inc., N. Wales, Pa.
Dranetz Engrg. Labs., Plainfield, N.J. p 1871
Dynamic Instr. Corp., Plainview, N.Y. p 681
Electronic Resch. Assocs., Cedar Grove, N.J.
Frequency Control, Inc., Austin, Tex.
Gould, Inc., Cleveland, Ohio
Hewlett-Packard, Palo Alto, Cal.
Interelectronics Corp., Congers, N.Y.
International Rectifier, El Segundo, Cal.
Julie Research Lab., New York, N.Y.
Kepco, Inc., Flushing, N.Y.
K.G.S. Elctrns., Pasadena, Cal.
Lambda Elctrns., Melville, N.Y...... p 777
Matrix Corp., Beech Grove, Ind.
Melcor Elctrns. Corp., Farmingdale, N.Y.
Natel Engrg. Co., Canoga Pk., Cal. p 366
North Elec. Co., Galion, Ohio
Nova Electric Mfg. Co., Nutley, N.J.
Powertec, Chatsworth, Cal.
RCA Elctrns. Comps., Harrison, N.J.
RO Assocs., Menlo Pk., Cal.
Solid State Elctrns., Sepulveda, Cal.
Technipower, Ridgefield, Conn...... p 905
Teledyne Philbrick, Dedham, Mass.
Thunder Int'l. Corp., Middletown, Conn.
Todd Prods., Farmingdale, N.Y.
Transmagnetics Inc., Farmingdale, N.Y.
Triac Elctrn. Sys., N.Y., N.Y.
Wagner Elec. Corp., Livingston, N.J.
Wanlass Div., Fort Washington, Pa.
Active Control Instrumentation, E. Northport, NY
Aerospace Avionics, Inc., Bohemia, N.Y.
Allis, Louis Co., Milwaukee, Wisc.
Allis Louis Co., Greendale, Wisc.
AMBAC Inds., Garden City, N.Y.
Anocut Engrg. Co., Elk Grove Village, Ill.
AUL Instrs., Inc., Flushng, N.Y.
B-W Mfrs., Inc., Kokomo, Ind.
Basler Elec. Co., Highland, Ill.
Behlman Engrg. Corp., Santa Barbara, Cal.
Bertan Assocs., Inc., Plainview, N.Y.
B.H. Inds., Los Angeles, Cal.
Bogue Elec. Mfg. Co., Paterson, N.J.
Borg-Warner Controls, Santa Ana, Cal.
Bose Corp., Natick, Mass.
Burr-Brown Resch. Corp., Tucson, Ariz.
Coil Co. of Amer., Northvale, N.J.
Components Specialties, Inc., Freeport, N.Y.
Computer Central, Detroit, Mich.
Computer Conversions Corp., East Northport, N.Y.
Constant Voltage Co., Chicago, Ill.
Data Technology Corp., Palo Alto, Cal.
Delta-Tronics Corp., Tempe, Ariz.
Diamond Repeater Co., Madison, N.J.
Dual-Lite Co., Newtown, Conn.
Dynalco Corp., Ft. Lauderdale, Fla.
Dynamic Sys. Elctrns. Corp., Tempe, Ariz.
Eastern Delta Corp., Fair Lawn, N.J.
EDC (Electro Dev.), Lynnwood, Wash.
Edison, T.A., Instr. Div., Ft. Lauderdale, Fla.
Elasco-Eastern, Inc., Bloomfield, Conn.
Electro-Pacific, Inc., Goleta, Calif.
Electro Windings & Comps., Kenilworth, N.J.
Elctrn. Components Corp., Addison, Ill.
Elctrn. Resources Div., Los Angeles, Cal.
Elctrn. Specialty, Thomaston, Conn.
EMP Elctrns., Inc., Phoenix, Ariz.
Exide Power Sys. Div., Philadelphia, Pa.
Fincor Div., York, Pa.
Foxboro Co., Foxboro, Mass.
General Instr. Corp., Hicksville, N.Y.
Green Rectifier Corp., Fair Lawn, N.J.
Guildline Instrs., Inc., Larchmont, N.Y.
Gulton Inds., Hawthorne, Calif.
Hallmark Standards, Inc., Mt. Vernon, N.Y.
Hope Elctrns., Clifton, N.J.
Hughes Aircraft Co, Culver City, Cal.
Integrated Controls, San Diego, Cal.
K West, Westminster, Calif.
Kato Engrg. Co., Mankato, Minn.
Kikusui Elctrns. Corp., Kawasaki City, Kanagawa-Pref., Japan
Lear Siegler, Grand Rapids, Mich.
Linear Sys., Inc., Watsonville, Calif.
Loral Elctrn. Sys., Bronx, N.Y.
Mag-Con Engrg. Co., St. Paul, Minn.
Medistor Instr. Co., Seattle, Wash.
Modular Power, Inc., Poway, Cal.
Neutronic Corp., Bridgeton, Mo.
Pacific Meas., Inc., Palo Alto, Calif.
Peerless Elec. Prods., Anaheim, Cal.
Peschel Instrs., Cape Coral, Fla.
Philco-Ford Corp., Washington, D.C.
Philmore Mfg. Co., Richmond Hill, N.Y.
Pioneer Magnetics, Santa Monica, Cal.
Polyphase Instr. Co., Bridgeport, Pa.
Power Applications, Inc., Bayside, N.Y.
Power Control Corp., Pittsburgh, Pa.
Power Conversion Prods. Inc., Crystal Lake, Ill.
Powercube Corp, Waltham, Mass.
Ratelco, Inc., Seattle, Wash.
Rho Engrg. Co., Los Angeles, Calif
Robicon Corp., Pittsburgh, Pa
Robotron Corp., Detroit, Mich.
Sel-Rex Corp., Nutley, N.J.
Semi/Dyne Elctrns. Corp., Freeport, N.Y.
Shane Inds., Sunny Vale, Cal.
Shigoto Inds., Ltd., New York, N.Y.
SKG Assocs., Inc., Boston, Mass.
Spectral Dynamics Corp. San Diego, San Diego, Cal.
Spectran Elctrns., Pompano Beach, Fla.
Teledyne Inet, Gardena, Cal.
Teledyne Kinetics, Solana Beach, Cal.
Telmar, Inc., Columbus, Ohio
Transrex Div., Torrance, Cal.
Unholtz-Dickie Corp., Hamden, Conn.
Unitron Inds. Corp., Taipei, Taiwan, Republic of China
Varo, Inc., Texas Div., Garland, Tex.
Velonex, Santa Clara, Calif.
Westinghouse Elec. Corp., Pittsburgh, Pa.
Westinghouse Elec. Corp., Pittsburgh, Pa.

Converters, Analog To Digital

A. D. Data Sys., Inc., Rochester, N.Y. p 328
Airflyte Elctrns. Co., Bayonne, N.J.
American Astrionics, Hollywood, Cal p 335
Anadex Instrs., Inc., Van Nuys, Calif.
Astrosystems, Lake Success, N.Y. p 332
Austron, Inc., Austin, Tex.
Automated Meas., Oakland, Calif. p 446,447
Automation Dev., Culver City, Cal.
Bendix Environmtl. Sci., Baltimore, Md. p 336
Bowmar Instr. Corp., Ft. Wayne, Ind.
Computer Labs, Greensboro, N.C. p 342,343
Computer Prods., Ft. Lauderdale, Fla. p 341
Control Technology Co., L.I.C., N.Y.
Datascan, Inc., Clifton, N.J.
DDC, Hicksville, N.Y...... p 347
Digital Equip. Corp., Maynard, Mass.
Digitron Corp., Norristown, Pa.
Dranetz Engrg. Labs., Plainfield, N.J.
Dynamics Instr. Co., Monterey Pk., Cal.
E-H Resch. Labs., Inc., Oakland, Cal. p 446,447
Electro-Numerics, Santa Clara, Cal.
Elctrn. Assocs., W. Long Branch, N.J.
Elctrn. Engrg. Co. Cal., Santa Ana, Cal.
Hewlett-Packard, Palo Alto, Cal.
Hickok Elect. Instr., Cleveland, Ohio
Hughes Aircraft Co., Mos Div., Newport Beach, Cal.
Hybrid Sys. Corp., Burlington, Mass. p 352
Ind'l. Control Co., Farmingdale, N.Y.
Inter-Computer Elctrns., Lansdale, Pa. p 354,356
Matrix Corp., Beech Grove, Ind.
Melcor Elctrns. Corp., Farmingdale, N.Y.
Monitor Labs, Inc., San Diego, Cal.
Multitech Automation Prods., Monterey Pk., Cal. ..... p 362
(NES) Nationwide Elctrn. Sys., Itasca, Ill.
Norden Div., Norwalk, Conn.
North Atlantic Inds., Plainview, N.Y. p 531
North Hills Elctrns., Inc., Glen Cove, N.Y.
Perkin-Elmer Corp., Wilton, Conn.
PPM, Inc., Bedford, Ohio
Precision Monolithics, Santa Clara, Cal.
Preston Scientific, Anaheim, Cal. p 373
Raytheon Computer, Santa Ana, Cal. p 374
Simpson Elec. Co., Chicago, Ill.
Solid State Elctrns., Sepulveda, Cal.
Sprague Elec. Co., No. Adams, Mass.
Summit Engrg. Corp., Bozeman, Mont.
Systron-Donner Concord Instr. Div., Concord, Cal.
Teledyne Philbrick, Dedham, Mass. p 1294
Tempo/UTI Div., Chatsworth, Cal. p 1349
Tohoku Metal Inds., Ltd., Tokyo, Japan
Transmagnetics Inc., Farmingdale, N.Y. p 1874
Varadyne Systems, Canton, Mass. p 385
Vernitron Corp., Deer Pk., N.Y.
Adage, Inc., Boston, Mass.
Allis, Louis Co., Milwaukee, Wisc.

AMBAC Inds., Garden City, N.Y.
Analog Devices, Inc., Norwood, Mass.
Analogic, Wakefield, Mass.
Applied Dynamics Computer Sys., Ann Arbor, Mich.
Arco Systems Inc., Palo Alto, Cal
Artronix, Inc., St. Louis, Mo.
Astronautics Corp. of Amer., Milwaukee, Wisc.
Austin Elctrns., Roselle, N.J.
Automatic Control Elctrns. Co., San Antonio, Tex.
Avco Corp., Cincinnati, Ohio
Aydin Data Systems, Ft. Washington, Pa
B & W Elctrn. Resch. Labs., Dallas, Tex.
Baganoff Assocs., Inc., St. Louis, Mo.
Baldwin Elctrns., Little Rock, Ark.
Beckman Instrs., Helipot Div., Fullerton, Cal.
Bell & Howell Co., Pasadena, Calif.
Bio-Medical Elctrns., Inc., Rockville, Md.
Biomation Corp., Palo Alto, Cal
Bowmar/Ali, Inc., Acton, Mass.
Bristol Div, Waterbury, Conn
Bunker-Ramo Corp., Westlake Village, Cal
Burr-Brown Resch. Corp., Tucson, Ariz.
California Instrs. Co., San Diego, Cal.
Canadian Research Institute, Don Mills, Ont., Canada
CGS/Datametrics, Watertown, Mass.
Clifton Div., Clifton Hgts., Pa.
Collectron Corp., New York, N.Y.
Computer Central, Detroit, Mich.
Computer Conversions Corp., East Northport, N.Y.
Computer Prods. Int'l., Inc., Santa Clara, Calif.
Conrac Corp., New York, N.Y.
Control Logic, Natick, Mass.
Corning Glass Works, Fluidic Products Dept., Corning, N.Y.
Data Technology Corp., Palo Alto, Cal.
Datatron, Inc., Santa Ana, Cal
Datum, Inc., Anaheim, Calif.
Defense Elctrns., Inc., Rockville, Md.
Digiac Corp., Plainview, N.Y.
Doric Sci. Corp., San Diego, Calif.
Dynalex, Inc., Burbank, Cal.
Dynamic Sys. Elctrns. Corp., Tempe, Ariz.
Elctrn. Modules Corp., Timonium, Md.
Elctrn. Resources Div., Los Angeles, Cal.
Encoder Division, Chatsworth, Cal.
Fabri-Tek Instrs., Inc., Madison, Wisc.
Fairchild Semiconductor, Mountain View, Calif.
Fairchild Space & Defense Sys., Syosset, N.Y.
Fifth Dimension, Princeton, N.J.
Foxboro Co., Foxboro, Mass.
Gap Instr. Corp., Hauppauge, N.Y.
General Devices, Inc., Princeton, N.J.
General Microwave Corp., Farmingdale, N.Y.
Gralex Inds., Inc., Farmingdale, N.Y.
GTE Sylvania Inc., Elctrn. Sys. Gp., Waltham, Mass.
Gulton Inds., Albuquerque, N.M.
Hi-Tek Corp., Santa Ana, Calif.
Honeywell, Aerospace & Def., Minneapolis, Minn.
Howell Instrs., Inc., Ft. Worth, Tex.
Hughes Aircraft Co, Culver City, Cal.
Innovatek Enterprise, Millerton, N.Y.
Instrumentation Tech. Corp., Northridge, Calif.
Integrated Controls, San Diego, Cal.
Itek Corp., Lexington, Mass.
Kelk, George Ltd., Don Mills, Ont., Canada
Keltron Corp., Waltham, Mass.
Kollsman Instr. Corp., Syosset, N.Y.
Lancer Elctrns. Corp., Norristown, Pa.
Lear Siegler, Inc., Santa Monica, Calif.
Lear Siegler, Anaheim, Cal.
Lear Siegler, Grand Rapids, Mich.
Lecroy Resch. Sys. Corp., West Nyack, N.Y.
Leeds & Northrup Corp., No. Wales, Pa.
Lem Instrument Corp., Farmingdale, N.Y.
Litton Sys., Inc., Woodland Hills, Calif.
Lockheed Aircraft Svc., Ont., Cal.
Loral Elctrn. Sys., Bronx, N.Y.
Measurement Sys., Inc., Norwalk, Conn.
Micro Instr., Hawthorne, Cal.
Milletron, Inc., Pittsburgh, Pa.
MMI Instruments, Danvers, Mass
Monitor Sys., Inc., Ft. Washington, Pa.
Moore Inds., Van Nuys, Cal.
MPC Prods. Corp., Chicago, Ill.
Nano Fast, Inc., Chicago, Ill.
Neutronic Corp., Bridgeton, Mo.
Newport Labs., Inc., Santa Ana, Cal.
Noble Elctrns., Inc., Carpinteria, Calif.
Northern Precision Labs., Inc., Fairfield, N.J.
Northern Sci., Inc., Middleton, Wisc.
Nuclear-Chicago, Des Plaines, Ill.
Nuclear Data, Inc., Palatine, Ill.
Nuclear Diodes, Prairie View, Ill.
Packard Instrument Co., Inc., Downers Grove, Ill.
Philco-Ford Corp., Washington, D.C.
Power Control Corp., Pittsburgh, Pa.
Princeton Applied Resch. Corp., Princeton, N.J.
Ragen Precision Inds., Inc., N. Arlington, N.J.
REDCOR Corp., Woodland Hills, Cal.
RFL Inds., Comms. Div., Boonton, N.J.
Rohde & Schwarz Sls., Passaic, N.J.
Scientific-Atlanta, Inc., Atlanta, Ga.
Servo Dev. Corp., Hicksville, N.Y.
Signal Analysis Inds. Corp., Hauppauge, N.Y.
Singer-General Precision, Inc., Little Falls, N.J.
SSR Instrs. Co., Santa Monica, Cal.
Struthers-Dunn, Inc., Bettendorf, Iowa
Systems Resch. Labs., Dayton, Ohio
Taft Electrosystems, Inc., Metuchen, N. J.
Techmetric Co., Redwood City, Calif.
Technical Instrs., Inc., No. Haven, Conn.
Teledyne Gurley, Troy, N.Y.
Theta Instr. Corp., Fairfield, N.J.
3M Co., St. Paul, Minn.
Transystems Elctrn. Co., Fort Lee, N.J.
Tyco Instr. Div., Waltham, Mass.
United Aircraft Corp., Norwalk, Conn.
United Sys. Corp., Dayton, Ohio
Varian Assocs., Palo Alto, Cal.
Varian Data Machines, Palo Alto, Cal.
Vidar Corp., Mountain View, Cal.
Westinghouse Elec. Int'l., New York, N.Y.
Wintriss Controls, New York, N.Y.
Wyle Labs., El Segundo, Calif.
Xerox Data Sys., El Segundo, Cal
Zeltex, Inc., Concord, Calif.

Converters, Analog to Digital, Monolithic—See Vol 2

Converters, Analog To Pulse

Anadex Instrs., Inc., Van Nuys, Calif.
Astrosystems, Lake Success, N.Y.
Automation Dev., Culver City, Cal.
Autronics Corp., Pasadena, Calif.
Bowmar Instr. Corp., Ft. Wayne, Ind.
Control Technology Co., L.I.C., N.Y.
Digital Equip. Corp., Maynard, Mass.
Dranetz Engrg. Labs., Plainfield, N.J.
Electro-Numerics, Santa Clara, Cal.
Hughes Aircraft Co., Mos Div., Newport Beach, Cal.
Hybrid Sys. Corp., Burlington, Mass.
ISC Magnetics Div., Huntington, N.Y.
Matrix Corp., Beech Grove, Ind.
(NES) Nationwide Elctrn. Sys., Itasca, Ill.
Norden Div., Norwalk, Conn.
North Atlantic Inds., Plainview, N.Y.
Solid State Elctrns., Sepulveda, Cal.
AMBAC Inds., Garden City, N.Y.
Bio-Medical Elctrns., Inc., Rockville, Md.
Clifton Div., Clifton Hgts., Pa.
Computer Conversions Corp., East Northport, N.Y.
Data Technology Corp., Palo Alto, Cal.
Elctrn. Resources Div., Los Angeles, Cal.
Foxboro Co., Foxboro, Mass.
General Microwave Corp., Farmingdale, N.Y.
Gralex Inds., Inc., Farmingdale, N.Y.
GTE Sylvania Inc., Elctrn. Sys. Gp., Waltham, Mass.
Hughes Aircraft Co, Culver City, Cal.
Integrated Controls, San Diego, Cal.
Lear Siegler, Inc., Santa Monica, Calif.
Lear Siegler, Grand Rapids, Mich.
Loral Elctrn. Sys., Bronx, N.Y.
Measurement Sys., Inc., Norwalk, Conn.
Neutronic Corp., Bridgeton, Mo.
Servo Dev. Corp., Hicksville, N.Y.
Singer-General Precision, Inc., Little Falls, N.J.
Struthers-Dunn, Inc., Bettendorf, Iowa
Technical Instrs., Inc., No. Haven, Conn.
United Aircraft Corp., Norwalk, Conn.

Converters, Binary To Decimal

A. D. Data Sys., Inc., Rochester, N.Y.
Airflyte Elctrns. Co., Bayonne, N.J.
Alco Elctrn. Prods., Lawrence, Mass.
Astrosystems, Lake Success, N.Y.
Autronics Corp., Pasadena, Calif.
Bowmar Instr. Corp., Ft. Wayne, Ind.
Data-Control Systems, Danbury, Conn.
Datascan, Inc., Clifton, N.J.
Digital Equip. Corp., Maynard, Mass.
Digitran Co., Pasadena, Cal.
Digitron Corp., Norristown, Pa.
Dytro Corp., Hicksville, N.Y.
Geo Space Sys., Tampa, Fla.
Hughes Aircraft Co., Mos Div., Newport Beach, Cal.
Ind'l Elctrn. Engrs., Van Nuys, Cal.
Metric Sys., Ft. Walton Beach, Fla. p 359
(NES) Nationwide Elctrn. Sys., Itasca, Ill. p 365
Norden Div., Norwalk, Conn.
Pinlites, Fairfield, N.J.
PPM, Inc., Bedford, Ohio
Raytheon Computer, Santa Ana, Cal. p 374
Sprague Elec. Co., No. Adams, Mass.
Tempo/UTI Div., Chatsworth, Cal.
Veeder-Root, Hartford, Conn.
Vernitron Corp., Deer Pk., N.Y.
Allis, Louis Co., Milwaukee, Wisc.
AMBAC Inds., Garden City, N.Y.
Analogic, Wakefield, Mass.
Automatic Control Elctrns. Co., San Antonio, Tex.
Aydin Data Systems, Ft. Washington, Pa
B & W Elctrn. Resch. Labs., Dallas, Tex.
B.H. Inds., Los Angeles, Cal.
Burroughs Corp., Plainfield, N.J.
CGS/Datametrics, Watertown, Mass.
CGS Units, Inc., Rochester, N.Y.
Clifton Div., Clifton Hgts., Pa.
Computer Conversions Corp., East Northport, N.Y.
Control Logic, Natick, Mass.
Corning Glass Works, Fluidic Products Dept., Corning, N.Y.
Data Technology Corp., Palo Alto, Cal.
Data Technology Inc., Watertown, Mass.
Defense Elctrns., Inc., Rockville, Md.
Digital Data Sys., Northridge, Cal.
Elctrn. Modules Corp., Timonium, Md.
Elctrn. Resources Div., Los Angeles, Cal.
Fairchild Semiconductor, Mountain View, Calif.
General Microwave Corp., Farmingdale, N.Y.
Gulton Inds., Albuquerque, N.M.
Hughes Aircraft Co, Culver City, Cal.
Instrumentation Tech. Corp., Northridge, Calif.
Keltron Corp., Waltham, Mass.
Lear Siegler, Grand Rapids, Mich.
Lecroy Resch. Sys. Corp., West Nyack, N.Y.
Lehigh Valley Elctrn., Inc., Fogelsville, Pa.
Lem Instrument Corp., Farmingdale, N.Y.
Loral Elctrn. Sys., Bronx, N.Y.
Microwave/Sys., Inc., E. Syracuse, N.Y.
Midland Standard Inc., Elgin, Ill.
Monitor Sys., Inc., Ft. Washington, Pa.
Philco-Ford Corp., Washington, D.C.
Rohde & Schwarz Sls., Passaic, N.J.
Singer-General Precision, Inc., Little Falls, N.J.
Struthers-Dunn, Inc., Pitman, N.J.
Struthers-Dunn, Inc., Bettendorf, Iowa
Systems Resch. Labs., Dayton, Ohio
Taft Electrosystems, Inc., Metuchen, N. J.
TEC, Inc., Eden Prairie, Minn.
Techmetric Co., Redwood City, Calif.
Tenor Co., Inc., New Berlin, Wisc.
Theta Instr. Corp., Fairfield, N.J.
3M Co., St. Paul, Minn.
Wyle Labs., El Segundo, Calif.
Xerox Data Sys., El Segundo, Cal
Zehntel, Inc., Berkeley, Calif.

Converters, Card To Tape

A. D. Data Sys., Inc., Rochester, N.Y.
Frequency Engrg. Labs., Farmingdale, N.J.
Metric Sys., Ft. Walton Beach, Fla. p 360
(NES) Nationwide Elctrn. Sys., Itasca, Ill. p 365
B & W Elctrn. Resch. Labs., Dallas, Tex.
Data Technology Corp., Palo Alto, Cal.
Demex, Inc., Kansas City, Mo.
Digi-Data Corp., Bladensburg, Md.
Elctrn. Resources Div., Los Angeles, Cal.
General Instr. Corp., Hawthorne, Cal.
GTE Sylvania Inc., Elctrn. Sys. Gp., Waltham, Mass.
Honeywell Information Systems, Wellesley Hills, Mass
Hughes Aircraft Co, Culver City, Cal.
Instrumentation Tech. Corp., Northridge, Calif.
Kemper Engrg. Co., Northridge, Cal.
Loral Elctrn. Sys., Bronx, N.Y.
Midland Standard Inc., Elgin, Ill.
Motorola Instr. & Control, Phoenix, Ariz.
Zehntel, Inc., Berkeley, Calif.

Converters, Counter, Vertical To Horizontal Readout

Bowmar Instr. Corp., Ft. Wayne, Ind.
Hughes Aircraft Co, Culver City, Cal.
Integrated Circuit Elctrns., Inc., Waltham, Mass.
Loral Elctrn. Sys., Bronx, N.Y.
Zehntel, Inc., Berkeley, Calif.

Converters, CRT Display

Astrosystems, Lake Success, N.Y.
Bowmar Instr. Corp., Ft. Wayne, Ind.
Digital Equip. Corp., Maynard, Mass.
Dranetz Engrg. Labs., Plainfield, N.J.
Hughes Aircraft Co., Mos Div., Newport Beach, Cal.
Ind'l Elctrn. Engrs., Van Nuys, Cal.
Intronics, Inc., Newton, Mass.
Melcor Elctrns. Corp., Farmingdale, N.Y.
Sierra Sys., Mountain View, Cal.
Tektronix, Inc., Beaverton, Ore.
Venus Scientific, Farmingdale, N.Y.
AMBAC Inds., Garden City, N.Y.
Analogic, Wakefield, Mass.
Aydin Data Systems, Ft. Washington, Pa
Bertan Assocs., Inc., Plainview, N.Y.
Data Disc, Video Div., Sunnyvale, Cal.
Data Technology Corp., Palo Alto, Cal.
Ferranti Ltd., Hollinwood, Lancs., England
Honeywell Information Systems, Wellesley Hills, Mass
Hughes Aircraft Co, Culver City, Cal.
Hughes Aircraft Co., Ind'l. Prods. Div., Oceanside, Cal.
Hughes Aircraft Co., Ind'l. Prods. Div. Display Sys., Oceanside, Calif.
Lear Siegler, Grand Rapids, Mich.
Lecroy Resch. Sys. Corp., West Nyack, N.Y.
Pacific Meas., Inc., Palo Alto, Calif.
Philco-Ford Corp., Washington, D.C.
Powercube Corp, Waltham, Mass.
Princeton Elctrn. Prods., New Brunswick, N.J.

Converters, D-C To D-C

Aaron-Davis Co., Los Angeles,, Cal. p 616
Abbott Transistor Labs., L.A., Cal. p 618
ACDC Elctrns., Oceanside, Cal.
ADC Prods., Minneapolis, Minn.
Advanced High Voltage Co., Inc., Northridge, Cal.
Almond Instrs. Co., Covina, Cal
American Time Products, Woodside, N.Y.
Amp Inc., Elizabethtown, Pa.
Amp Inc., Harrisburg, Pa.
Arnold Magnetics, Culver City, Cal. p 646-648
Austron, Inc., Austin, Tex. p 653
Autronics Corp., Pasadena, Calif. p 1311
Avtel Corp., Covina, Cal.
Bulova Watch Elctrns. Div. Amer. Time Prods., Woodside, N.Y.
Bulova Watch Co., Servo Prods. Elctrns. Div., Woodside, N.Y.
CEA, Monrovia, Cal. p 673
CML-Macarr, Inc., Edison, N.J.
Control Technology Co., L.I.C., N.Y.
Del Elctrns. Corp., Mt. Vernon, N.Y.
Electronic Resch. Assocs., Cedar Grove, N.J.
Flite-Tronics Co., Inc., Burbank, Cal. p 714
Freed Transformer Co., Bklyn., N.Y. p 2953
General Elec. Co., Schenectady, N.Y.
Gould, Inc., Cleveland, Ohio

Interelectronics Corp., Congers, N.Y. p 735
International Rectifier, El Segundo, Cal.
K.G.S. Elctrns., Pasadena, Cal.
Melcor Elctrns. Corp., Farmingdale, N.Y.
Microtran Co., Valley Stream, N.Y.
Mid-Eastern Inds., Scotch Plains, N.J.
Natel Engrg. Co., Canoga Pk., Cal.
North Elec. Co., Galion, Ohio
Nova Electric Mfg. Co., Nutley, N.J.
Powertec, Chatsworth, Cal.
Quindar Elctrns., Inc., Springfield, N.J.
RCA Elctrns. Comps., Harrison, N.J.
RO Assocs., Menlo Pk., Cal.
Sierra Sys., Mountain View, Cal. .. p 872
Sprague Elec. Co., No. Adams, Mass.
Technipower, Ridgefield, Conn. p 905,922,923
Tecnetics, Inc., Boulder, Colo..... p 882
Tempo/UTI Div., Chatsworth, Cal.
Thunder Int'l. Corp., Middletown, Conn. p 895
Todd Prods., Farmingdale, N.Y.
Tohoku Metal Inds., Ltd., Tokyo, Japan
Topaz Elctrns., San Diego, Cal. .... p 899
Torotel, Inc., Grandview, Mo.
Triac Elctrn. Sys., N.Y., N.Y.
Trio Labs, Inc., Plainview, N.Y.
Unitron, Garland, Tex..... p 935
Venus Scientific, Farmingdale, N.Y. p 944,945
Wagner Elec. Corp., Livingston, N.J.
Zaring Inds., Inc., Carmel, Ind.
Acromag, Inc., Wixom, Mich.
Active Control Instrumentation, E. Northport, NY
Aerospace Avionics, Inc., Bohemia, N.Y.
Allis-Chalmers, Milwaukee, Wisc.
Allis, Louis Co., Milwaukee, Wisc.
Allis Louis Co., Greendale, Wisc.
AMBAC Inds., Garden City, N.Y.
American Elctrns., Inc., Fullerton, Cal.
AMF Electical Prods., Alexandria, Va.
Analog Devices, Inc., Norwood, Mass.
Analogic, Wakefield, Mass.
AUL Instrs., Inc., Flushng, N.Y.
Barden Co., Div. Interdyne Co., Los Angeles, Cal.
Basler Elec. Co., Highland, Ill.
Behlman Engrg. Corp., Santa Barbara, Cal.
Bertan Assocs., Inc., Plainview, N.Y.
BF Elctrns., Solana Beach, Calif.
B.H. Inds., Los Angeles, Cal.
Bicron Elctrns. Co., Canaan, Conn.
Bogue Elec. Mfg. Co., Paterson, N.J.
Bose Corp., Natick, Mass.
Bourns Pacific Magnetic Corp., Romoland, Calif.
Bullock Magnetics Corp., Pomona, Calif.
Burr-Brown Resch. Corp., Tucson, Ariz.
Cal-Power Corp., El Segundo, Calif.
Central Scientific Co., Chicago, Ill.
Century Coil Corp., Chicago, Ill.
CGS Units, Inc., Rochester, N.Y.
Coil Co. of Amer., Northvale, N.J.
ComGeneral Corp., Dayton, Ohio
Components Corp., Denville, N.J.
Computer Conversions Corp., East Northport, N.Y.
Constant Voltage Co., Chicago, Ill.
Controlotron Corp., Farmingdale, N.Y.
Crestronics, Crestline, Cal.
Cyberex Inc., Willoughby, Ohio
Data Technology Corp., Palo Alto, Cal.
Delta Elctrn. Control, Costa Mesa, Cal.
Delta-Tronics Corp., Tempe, Ariz.
Dorsett Elctrns., Tulsa, Okla.
E-Tronics, Van Nuys, Cal.
EDC (Electro Dev.), Lynnwood, Wash.
Elasco-Eastern, Inc., Bloomfield, Conn.
Electro Windings & Comps., Kenilworth, N.J.
Electronic Modules, Inc., Pasadena, Cal.
Elctrn. Resources Div., Los Angeles, Cal.
Elctrn. Specialty, Thomaston, Conn.
Electrophysics Corp., Nutley, N.J.
EMP Elctrns., Inc., Phoenix, Ariz.
Exide Power Sys. Div., Philadelphia, Pa.
Fairchild Semiconductor, Mountain View, Calif.
Fairlane Electronics, Inc., Long Valley, N.J.
Forbes & Wagner, Inc., Silver Creek, N.Y.
Foxboro Co., Foxboro, Mass.
General Devices, Inc., Princeton, N.J.
Geo Space, Houston, Tex.
Glentek, Inc., Santa Monica, Calif.
Glentronics, Glendora, Cal.
Grafix, Inc., Albuquerque, N.M.
Grand Transformers, Grand Haven, Mich.
Gulton Inds., Albuquerque, N.M.
Gulton Inds., Hawthorne, Calif.
Hughes Aircraft Co, Culver City, Cal.
Hyperion Inds. Corp., Watertown, Mass.
Ideal Elec. & Mfg. Co., Mansfield, Ohio
Ind'l. Gauging & Control, Norwalk, Conn.
Integrated Controls, San Diego, Cal.
Isotech Inc., Westford, Mass.
ITI Electronics, Inc., Clifton, N.J.
ITT Aerospace, San Fernando, Cal.
K West, Westminster, Calif.
Kato Engrg. Co., Mankato, Minn.
Lansdale Microelectronics Div., Metuchen, N.J.
Lear Siegler, Inc., Santa Monica, Calif.
Lear Siegler, Grand Rapids, Mich.
Linear Sys., Inc., Watsonville, Calif.
Litton Inds., San Carlos, Calif.
Loral Elctrn. Sys., Bronx, N.Y.
Magnetico, Inc., E. Northport, N.Y.
Mil Elctrns. Inc., Hudson, N.H.
Modular Devices, Inc., Gardena, Calif.
Modular Power, Inc., Poway, Cal.
Mutron Corp., Brockton, Mass.
Novatronics, Inc., Pompano Beach, Fla.
Nuclear Corp. Amer., Denville, N.J.
Oeco Corp., Portland, Ore.
Peerless Elec. Prods., Anaheim, Cal.
Peschel Instrs., Cape Coral, Fla.
Philco-Ford Corp., Washington, D.C.
Pioneer Magnetics, Santa Monica, Cal.
Polyphase Instr. Co., Bridgeport, Pa.
Power Applications, Inc., Bayside, N.Y.
Power Control Corp., Pittsburgh, Pa.
Power Conversion Prods. Inc., Crystal Lake, Ill.
RFL Inds., Comms. Div., Boonton, N.J.
Rho Engrg. Co., Los Angeles, Calif
Rosemount Engrg. Co., Minneapolis, Minn.
SBD Systems, Inc., Amityville, N.Y.
Scott Electrns. Labs., Universal City, Calif.
Semi/Dyne Elctrns. Corp., Freeport, N.Y.
Shane Inds., Sunny Vale, Cal.
Shigoto Inds., Ltd., New York, N.Y.
SKG Assocs., Inc., Boston, Mass.
Spectran Elctrns., Pompano Beach, Fla.
Stanford Applied Engrg., Santa Clara, Cal.
Stored Energy Systems, Mountain View, Calif.
Struthers Elctrns. Corp., Mamaroneck, N.Y.
Teledyne Inet, Gardena, Cal.
Teledyne Kinetics, Solana Beach, Cal.
Telmar, Inc., Columbus, Ohio
Universal Transistor Prods., Copiague, N.Y.
Varo, Inc., Texas Div., Garland, Tex.
Velonex, Santa Clara, Calif.
Wabash Magnetics, Inc., Huntington, Ind.
Walden Elctrns. Corp., Waltham, Mass.
Ward Leonard, Mt. Vernon, N.Y.
Warren Communications, Littleton, Mass.
Westinghouse Elec. Corp., Pittsburgh, Pa.
Westinghouse Elec. Int'l., New York, N.Y.

Converters, D-C To Frequency

American Aerospace Controls, Farmingdale, N.Y.
American Time Products, Woodside, N.Y. ..... p 660
Amp Inc., Harrisburg, Pa.
Anadex Instrs., Inc., Van Nuys, Calif. p 399,400
Arnold Magnetics, Culver City, Cal. p 648,649
ATR Elctrns., Inc., St. Paul, Minn. p 652
Austron, Inc., Austin, Tex..... p 653
Autronics Corp., Pasadena, Calif.
Avtel Corp., Covina, Cal.
Bulova Watch Elctrns. Div. Amer. Time Prods., Woodside, N.Y. ..... p 660
Bulova Watch Co., Servo Prods. Elctrns. Div., Woodside, N.Y.
CML-Macarr, Inc., Edison, N.J. ..... p 664
Connor-Winfield Corp., Winfield, Ill.
Control Technology Co., L.I.C., N.Y.
Del Elctrns. Corp., Mt. Vernon, N.Y.
Digital Equip. Corp., Maynard, Mass.
Digitron Corp., Norristown, Pa.
Electronic Resch. Assocs., Cedar Grove, N.J. ..... p 709
Elgar Corp., San Diego, Cal.
Freed Transformer Co., Bklyn., N.Y.
Frequency Control, Inc., Austin, Tex.
General Elec. Co., Schenectady, N.Y.
Gould, Inc., Cleveland, Ohio
Hewlett-Packard, Palo Alto, Cal.
Hickok Elect. Instr., Cleveland, Ohio
Hybrid Sys. Corp., Burlington, Mass.
Interelectronics Corp., Congers, N.Y. p 735
International Rectifier, El Segundo, Cal.
K.G.S. Elctrns., Pasadena, Cal.
Kratos Instrument Div., Pasadena, Cal
Lorch Elctrns. Corp., Englewood, N.J.
Matrix Corp., Beech Grove, Ind.
Meloy Laboratories, Springfield, Va.
Microtran Co., Valley Stream, N.Y.
(NES) Nationwide Elctrn. Sys., Itasca, Ill.
North Elec. Co., Galion, Ohio
North Hills Elctrns., Inc., Glen Cove, N.Y. ..... p 1339
Nova Electric Mfg. Co., Nutley, N.J.
Powertec, Chatsworth, Cal.
Precision Timer, Westbrook, Conn.
Rotron, Inc., Woodstock, N.Y. .... p 2805
Solid State Elctrns., Sepulveda, Cal.
Sonex, Inc., Bethayres, Pa.
Thunder Int'l. Corp., Middletown, Conn.
Topaz Elctrns., San Diego, Cal. p 898,900-902
Torotel, Inc., Grandview, Mo.
Unitron, Garland, Tex..... p 937
Varadyne Power Sys., Northridge, Cal. p 934
Wanlass Div., Fort Washington, Pa.
Aerospace Avionics, Inc., Bohemia, N.Y.
Allis-Chalmers, Milwaukee, Wisc.
Allis, Louis Co., Milwaukee, Wisc.
Allis Louis Co., Greendale, Wisc.
AMBAC Inds., Garden City, N.Y.
American Elctrns., Inc., Fullerton, Cal.
Analogic, Wakefield, Mass.
B & W Elctrn. Resch. Labs., Dallas, Tex.
Behlman Engrg. Corp., Santa Barbara, Cal.
Bertan Assocs., Inc., Plainview, N.Y.
BF Elctrns., Solana Beach, Calif.
Bogue Elec. Mfg. Co., Paterson, N.J.
Cal-Power Corp., El Segundo, Calif.
Carter Motor Co., Chicago, Ill.
Century Coil Corp., Chicago, Ill.
Coil Co. of Amer., Northvale, N.J.
Computer Conversions Corp., East Northport, N.Y.
Constant Voltage Co., Chicago, Ill.
Data Technology Corp., Palo Alto, Cal.
EDC (Electro Dev.), Lynnwood, Wash.
Electric Indicator Co., Inc., Wilton, Conn.
Electronic Control Corp., Detroit, Mich.
Electronic Design Labs., Inc., Phila., Pa.
Elctrn. Modules Corp., Timonium, Md.
Elctrn. Specialty, Thomaston, Conn.
Exide Power Sys. Div., Philadelphia, Pa.
Glentek, Inc., Santa Monica, Calif.
Glentronics, Glendora, Cal.
Grafix, Inc., Albuquerque, N.M.
Gulton Inds., Hawthorne, Calif.
Honeywell, Ft. Washington, Pa.
Horlick, William I. Co., Inc., Boston, Mass.
Hughes Aircraft Co, Fullerton, Cal.
Hyperion Inds. Corp., Watertown, Mass.
Ideal Elec. & Mfg. Co., Mansfield, Ohio
Ind'l. Gauging & Control, Norwalk, Conn.
Integrated Controls, San Diego, Cal.
Kato Engrg. Co., Mankato, Minn.
Lansdale Microelectronics Div., Metuchen, N.J.
Lear Siegler, Inc., Santa Monica, Calif.
Lear Siegler, Grand Rapids, Mich.
Loral Elctrn. Sys., Bronx, N.Y.
Microwave Assocs., Inc., Burlington, Mass.
Milletron, Inc., Pittsburgh, Pa.
Moore Inds., Van Nuys, Cal.
Newport Labs., Inc., Santa Ana, Cal.
Nuclear Corp. Amer., Denville, N.J.
Oeco Corp., Portland, Ore.
Optical Elctrns., Tucson, Ariz.
Pacific Photometric Instrs., Berkeley, Cal.
Philco-Ford Corp., Washington, D.C.
Pioneer Magnetics, Santa Monica, Cal.
RFL Inds., Comms. Div., Boonton, N.J.
Rho Engrg. Co., Los Angeles, Calif
Riverbank Labs., Geneva, Ill.
Rohde & Schwarz Sls., Passaic, N.J.
SBD Systems, Inc., Amityville, N.Y.
Servo Dev. Corp., Hicksville, N.Y.
Singer-General Precision, Inc., Little Falls, N.J.
Singer - Tele-Signal, Woodbury, N.Y.
Spectral Dynamics Corp. San Diego, San Diego, Cal.
Sprengnether, W.F. Instr. Co., Inc., St. Louis, Mo.
Transystems Elctrn. Co., Fort Lee, N.J.
Varo, Inc., Texas Div., Garland, Tex.
Vetter, A.R., Co., Rebersburg, Pa
Ward Leonard, Mt. Vernon, N.Y.
Westinghouse Elec., Buffalo, N. Y.
Westinghouse Elec. Int'l., New York, N.Y.
Zenrad Controls Co., Santa Barbara, Cal.
Bowmar Instr. Corp., Ft. Wayne, Ind.

Converters, Digital To Analog

A. D. Data Sys., Inc., Rochester, N.Y.
American Astrionics, Hollywood, Cal
Anadex Instrs., Inc., Van Nuys, Calif.
Astrosystems, Lake Success, N.Y. p 333
Atec, Inc., Houston, Tex.
Austron, Inc., Austin, Tex.
Automation Dev., Culver City, Cal.
Behlman Div., San Diego, Cal
Bendix Environmtl. Sci., Baltimore, Md. p 336
Computer Labs, Greensboro, N.C. p 342,343
Computer Prods., Ft. Lauderdale, Fla. p 341
Control Technology Co., L.I.C., N.Y.
Data-Control Systems, Danbury, Conn.
DDC, Hicksville, N.Y..... p 347
Digital Equip. Corp., Maynard, Mass.
Digitron Corp., Norristown, Pa.
E-H Resch. Labs., Inc., Oakland, Cal.
Elctrn. Assocs., W. Long Branch, N.J.
Elctrn. Engrg. Co. Cal., Santa Ana, Cal.
Elgar Corp., San Diego, Cal.
General Resistance, Mt. Vernon, N.Y.
Geo Space Sys., Tampa, Fla.
Hewlett-Packard, Palo Alto, Cal.
Hughes Aircraft Co., Mos Div., Newport Beach, Cal.
Hybrid Sys. Corp., Burlington, Mass. p 353
Ind'l. Control Co., Farmingdale, N.Y.
Inter-Computer Elctrns., Lansdale, Pa. p 355
Kepco, Inc., Flushing, N.Y.
Matrix Corp., Beech Grove, Ind.
Melcor Elctrns. Corp., Farmingdale, N.Y. p 1290
Monitor Labs, Inc., San Diego, Cal.
Monsanto Company, Electronic Instruments, W. Caldwell, N.J.
(NES) Nationwide Elctrn. Sys., Itasca, Ill.
Norden Div., Norwalk, Conn.
North Atlantic Inds., Plainview, N.Y. p 368
North Hills Elctrns., Inc., Glen Cove, N.Y.
Perkin-Elmer Corp., Wilton, Conn.
Powertec, Chatsworth, Cal.
Precision Monolithics, Santa Clara, Cal. p 1547
Preston Scientific, Anaheim, Cal. p 373
Raytheon Computer, Santa Ana, Cal. p 375,376
Solid State Elctrns., Sepulveda, Cal.
Sprague Elec. Co., No. Adams, Mass.
Teledyne Philbrick, Dedham, Mass. p 1294
Tempo/UTI Div., Chatsworth, Cal.
Transmagnetics Inc., Farmingdale, N.Y. p 1874
Varadyne Systems, Canton, Mass. p 385
Veeder-Root, Hartford, Conn.
Vernitron Corp., Deer Pk., N.Y.
Adage, Inc., Boston, Mass.
AMBAC Inds., Garden City, N.Y.
Analog Devices, Inc., Norwood, Mass.
Analogic, Wakefield, Mass.
Applied Dynamics Computer Sys., Ann Arbor, Mich.
Astronautics Corp. of Amer., Milwaukee, Wisc.
Austin Elctrns., Roselle, N.J.
Avco Corp., Cincinnati, Ohio
B & W Elctrn. Resch. Labs., Dallas, Tex.
Beckman Instrs., Helipot Div., Fullerton, Cal.
B.H. Inds., Los Angeles, Cal.
Bio-Medical Elctrns., Inc., Rockville, Md.
Bowmar/Ali, Inc., Acton, Mass.
Burr-Brown Resch. Corp., Tucson, Ariz.
California Instrs. Co., San Diego, Cal.
CGS/Datametrics, Watertown, Mass.

Clifton Div., Clifton Hgts., Pa.
Components Corp., Denville, N.J.
Computer Central, Detroit, Mich.
Computer Conversions Corp., East Northport, N.Y.
Conrac Corp., New York, N.Y.
Control Logic, Natick, Mass.
Data Technology Corp., Palo Alto, Cal.
Datatron, Inc., Santa Ana, Cal
Datum, Inc., Anaheim, Calif.
Defense Elctrns., Inc., Rockville, Md.
Digiac Corp., Plainview, N.Y.
Dynalex, Inc., Burbank, Cal.
Dynamic Sys. Elctrns. Corp., Tempe, Ariz.
Elctrn. Resources Div., Los Angeles, Cal.
Fairchild Semiconductor, Mountain View, Calif.
Fairchild Space & Defense Sys., Syosset, N.Y.
Ferranti Ltd., Hollinwood, Lancs., England
Fifth Dimension, Princeton, N.J.
Foxboro Co., Foxboro, Mass.
Gap Instr. Corp., Hauppauge, N.Y.
General Devices, Inc., Princeton, N.J.
General Instr. Corp., Hicksville, N.Y.
General Microwave Corp., Farmingdale, N.Y.
GTE Sylvania Inc., Elctrn. Sys. Gp., Waltham, Mass.
Gulton Inds., Albuquerque, N.M.
Honeywell, Aerospace & Def., Minneapolis, Minn.
Hughes Aircraft Co, Culver City, Cal.
HyComp Inc., Maynard, Mass.
Information Displays, Inc., Mt. Kisco, N.Y.
Instrumentation Tech. Corp., Northridge, Calif.
Integrated Controls, San Diego, Cal.
Jordan Controls, Milwaukee, Wisc.
Keltron Corp., Waltham, Mass.
Kollsman Instr. Corp., Syosset, N.Y.
Lancer Elctrns. Corp., Norristown, Pa.
Lear Siegler, Inc., Santa Monica, Calif.
Lear Siegler, Anaheim, Cal.
Lear Siegler, Grand Rapids, Mich.
Leeds & Northrup Corp., No. Wales, Pa.
Litton Sys., Inc., Woodland Hills, Calif.
Loral Elctrn. Sys., Bronx, N.Y.
Massey Dickinson Co., Inc., Saxonville, Mass.
Micro Networks, Worcester, Mass.
Monitor Sys., Inc., Ft. Washington, Pa.
MPC Prods. Corp., Chicago, Ill.
Noble Elctrns., Inc., Carpinteria, Calif.
PECO, Milpitas, Cal.
Philco-Ford Corp., Washington, D.C.
Power Control Corp., Pittsburgh, Pa.
Power Instrs., Skokie, Ill.
Ragen Precision Inds., Inc., N. Arlington, N.J.
REDCOR Corp., Woodland Hills, Cal.
RFL Inds., Comms. Div., Boonton, N.J.
Rho Engrg. Co., Los Angeles, Calif
Rohde & Schwarz Sls., Passaic, N.J.
Servo Dev. Corp., Hicksville, N.Y.
Signal Analysis Inds. Corp., Hauppauge, N.Y.
Singer-General Precision, Inc., Little Falls, N.J.
SSR Instrs. Co., Santa Monica, Cal.
Struthers-Dunn, Inc., Pitman, N.J.
Struthers-Dunn, Inc., Bettendorf, Iowa
Superior Elec., Bristol, Conn.
Systems Resch. Labs., Dayton, Ohio
Taft Electrosystems, Inc., Metuchen, N. J.
3M Co., St. Paul, Minn.
Transystems Elctrn. Co., Fort Lee, N.J.
Ultronix, Inc., Grand Junction, Colo.
United Aircraft Corp., Norwalk, Conn.
Varian Data Machines, Irvine, Cal.
Varian Data Machines, Palo Alto, Cal.
Weston Instruments, Inc., Newark, N.J.
Wyle Labs., El Segundo, Calif.
Xerox Data Sys., El Segundo, Cal
Zehntel, Inc., Berkeley, Calif.
Zeltex, Inc., Concord, Calif.

Converters, Digital To Paper Tape

A. D. Data Sys., Inc., Rochester, N.Y. p 328
Atec, Inc., Houston, Tex.
Austron, Inc., Austin, Tex.
Data Graphics, San Antonio, Tex. p 346
Datacom, Inc., Ft. Walton Bch., Fla.
Digital Equip. Corp., Maynard, Mass.
Digitron Corp., Norristown, Pa.
Dytro Corp., Hicksville, N.Y.
Eldorado Electrodata, Concord, Cal.
Matrix Corp., Beech Grove, Ind.
Monitor Labs, Inc., San Diego, Cal.
(NES) Nationwide Elctrn. Sys., Itasca, Ill. p 365
CGS/Datametrics, Watertown, Mass.
Control Logic, Natick, Mass.
Data Technology Corp., Palo Alto, Cal.
Hughes Aircraft Co, Culver City, Cal.
Keltron Corp., Waltham, Mass.
Lecroy Resch. Sys. Corp., West Nyack, N.Y.
Microwave Magnetics Inc., Danvers, Mass.
MMI Instruments, Danvers, Mass
Struthers-Dunn, Inc., Bettendorf, Iowa
Theta Instr. Corp., Fairfield, N.J.
United Sys. Corp., Dayton, Ohio
Zehntel, Inc., Berkeley, Calif.

Converters, Digital To Resolver

Astrosystems, Lake Success, N.Y. p 333
Atec, Inc., Houston, Tex.
Bendix Environmtl. Sci., Baltimore, Md. p 336
Control Technology Co., L.I.C., N.Y.
DDC, Hicksville, N.Y. p 347
Hybrid Sys. Corp., Burlington, Mass.
Magnetic Technology, Canoga Pk., Cal. p 387
Natel Engrg. Co., Canoga Pk., Cal. p 367
North Atlantic Inds., Plainview, N.Y. p 368
Perkin-Elmer Corp., Wilton, Conn.
Transmagnetics Inc., Farmingdale, N.Y. p 1875
Vernitron, Torrance, Cal. p 387
Vernitron Corp., Deer Pk., N.Y. p 387
CGS/Datametrics, Watertown, Mass.
Clifton Div., Clifton Hgts., Pa.
Computer Conversions Corp., East Northport, N.Y.
Data Technology Corp., Palo Alto, Cal.
Dynalex, Inc., Burbank, Cal.
Fairchild Space & Defense Sys., Syosset, N.Y.
Gap Instr. Corp., Hauppauge, N.Y.
Hughes Aircraft Co, Culver City, Cal.
Lear Siegler, Grand Rapids, Mich.
Litton Sys., Inc., Woodland Hills, Calif.
Loral Elctrn. Sys., Bronx, N.Y.
Servo Dev. Corp., Hicksville, N.Y.
Singer-General Precision, Inc., Little Falls, N.J.
Struthers-Dunn, Inc., Bettendorf, Iowa
Ten Bosch, M., Inc., Pleasantville, N.Y.
Theta Instr. Corp., Fairfield, N.J.
Weston-Transicoil, Worcester, Pa.

Converters, Digital To Synchro

Astrosystems, Lake Success, N.Y. p 333,334
Bendix Environmtl. Sci., Baltimore, Md. p 336
Bowmar Instr. Corp., Ft. Wayne, Ind.
Control Technology Co., L.I.C., N.Y.
DDC, Hicksville, N.Y. p 347
Digital Equip. Corp., Maynard, Mass.
Hybrid Sys. Corp., Burlington, Mass.
Lorch-Adret Corp., Englewood, N.J.
Natel Engrg. Co., Canoga Pk., Cal. p 367
North Atlantic Inds., Plainview, N.Y. p 368
Perkin-Elmer Corp., Wilton, Conn.
Transmagnetics Inc., Farmingdale, N.Y. p 1875
Vernitron Corp., Deer Pk., N.Y.
AMBAC Inds., Garden City, N.Y.
Analogic, Wakefield, Mass.
Clifton Div., Clifton Hgts., Pa.
Computer Conversions Corp., East Northport, N.Y.
Dynalex, Inc., Burbank, Cal.
Gap Instr. Corp., Hauppauge, N.Y.
Hughes Aircraft Co, Culver City, Cal.
Lear Siegler, Grand Rapids, Mich.
Singer-General Precision, Inc., Little Falls, N.J.
Struthers-Dunn, Inc., Bettendorf, Iowa
Theta Instr. Corp., Fairfield, N.J.
Weston-Transicoil, Worcester, Pa.
Weston-Transicoil, Worcester, Pa.

Converters, Facsimile

Gibbs Mfg. & Resch., Janesville, Wisc.
Solid State Elctrns., Sepulveda, Cal.
Data Technology Corp., Palo Alto, Cal.
Frederick Electronics Corp., Frederick, Md.
International Scanatron Sys., Wyandanch, N.Y.
Muirhead, Inc., Mountainside, N.J.
Philco-Ford Corp., Washington, D.C.

Converters, Frequency, Logarithmic

Solid State Elctrns., Sepulveda, Cal.
AMBAC Inds., Garden City, N.Y.
Communication Elctrns., Rockville, Md.
Olektron Corp., Dudley, Mass.
Pacific Meas., Inc., Palo Alto, Calif.
Spectral Dynamics Corp. San Diego, San Diego, Cal.
Unholtz-Dickie Corp., Hamden, Conn.
Westinghouse Elec. Int'l., New York, N.Y.

Converters, Frequency Shift Keying

Data-Control Systems, Danbury, Conn.
Dynamics Instr. Co., Monterey Pk., Cal.
Multitech Communications, Monterey Pk., Cal.
Multitech Data Prods., Monterey Pk., Cal. p 363
Quindar Elctrns., Inc., Springfield, N.J.
Solid State Elctrns., Sepulveda, Cal.
Torotel, Inc., Grandview, Mo.
AMBAC Inds., Garden City, N.Y.
Electrocom Inds., So. Bend, Indiana
Frederick Electronics Corp., Frederick, Md.
Gosh Instrs., Inc., Wethersfield, Conn.
GTE Sylvania Inc., Elctrn. Sys. Gp., Waltham, Mass.
International Scanatron Sys., Wyandanch, N.Y.
Loral Elctrn. Sys., Bronx, N.Y.
Noble Elctrns., Inc., Carpinteria, Calif.
Olektron Corp., Dudley, Mass.
RF Communications, Inc., Rochester, N.Y.
RFL Inds., Comms. Div., Boonton, N.J.
Singer - Tele-Signal, Woodbury, N.Y.
Technical Mat'l., Mamaroneck, N.Y.
Trepac Corp. America, Englewood, N.J.

Converters, Frequency, Test

Astrosystems, Lake Success, N.Y. p 407,408
Behlman Div., San Diego, Cal
CML-Macarr, Inc., Edison, N.J. p 664
Data-Control Systems, Danbury, Conn.
Elgar Corp., San Diego, Cal.
Elin Div., San Diego, Cal.
Frequency Control, Inc., Austin, Tex.
Hewlett-Packard, Palo Alto, Cal.
Meloy Laboratories, Springfield, Va.
Nova Electric Mfg. Co., Nutley, N.J.
Solid State Elctrns., Sepulveda, Cal.
Universal Ad-Yu Elctrns., Inc., Passaic, N.J.
Aerospace Avionics, Inc., Bohemia, N.Y.
AMBAC Inds., Garden City, N.Y.
Basler Elec. Co., Highland, Ill.
Behlman Engrg. Corp., Santa Barbara, Cal.
California Instrs. Co., San Diego, Cal.
Delta Elctrn. Control, Costa Mesa, Cal.
Elcom Sys., Deer Pk., N.Y.
Hughes Aircraft Co, Fullerton, Cal.
Kato Engrg. Co., Mankato, Minn.
Olektron Corp., Dudley, Mass.
Shane Inds., Sunny Vale, Cal.

Converters, Frequency To D-C

Airpax Elctrns., Inc., Cambridge, Md.
Airpax Elctrns., Ft. Lauderdale, Fla.
Almond Instrs. Co., Covina, Cal. p 329
American Time Products, Woodside, N.Y.
Amp Inc., Elizabethtown, Pa.
Amp Inc., Harrisburg, Pa.
Anadex Instrs., Inc., Van Nuys, Calif. p 397,398
Astrosystems, Lake Success, N.Y.
ATR Elctrns., Inc., St. Paul, Minn. p 652
Autronics Corp., Pasadena, Calif.
Avtel Corp., Covina, Cal. p 659
Bulova Watch Elctrns. Div. Amer. Time Prods., Woodside, N.Y.
Christie Elec., Los Angeles, Cal.
Control Technology Co., L.I.C., N.Y.
Data-Control Systems, Danbury, Conn.
Del Elctrns. Corp., Mt. Vernon, N.Y.
Digital Equip. Corp., Maynard, Mass.
Freed Transformer Co., Bklyn., N.Y.
General Elec. Co., Schenectady, N.Y.
Georator Corp., Manassas, Va.
Gould, Inc., Cleveland, Ohio
Hewlett-Packard, Palo Alto, Cal.
Hybrid Sys. Corp., Burlington, Mass.
Interelectronics Corp., Congers, N.Y.
International Rectifier, El Segundo, Cal.
Kratos Instrument Div., Pasadena, Cal
Lorch Elctrns. Corp., Englewood, N.J.
Matrix Corp., Beech Grove, Ind.
Natel Engrg. Co., Canoga Pk., Cal.
(NES) Nationwide Elctrn. Sys., Itasca, Ill.
North Atlantic Inds., Plainview, N.Y.
North Hills Elctrns., Inc., Glen Cove, N.Y. p 1339
Nova Electric Mfg. Co., Nutley, N.J.
PPM, Inc., Bedford, Ohio
Quindar Elctrns., Inc., Springfield, N.J.
Scientific Columbus, Columbus, Ohio
Solid State Elctrns., Sepulveda, Cal. p 954
Sonex, Inc., Bethayres, Pa.
Transmagnetics Inc., Farmingdale, N.Y.
Unitron, Garland, Tex.
Wanlass Div., Fort Washington, Pa.
Acromag, Inc., Wixom, Mich.
Aerospace Avionics, Inc., Bohemia, N.Y.
Allis-Chalmers, Milwaukee, Wisc.
Allis, Louis Co., Milwaukee, Wisc.
Allis Louis Co., Greendale, Wisc.
AMBAC Inds., Garden City, N.Y.
American Elctrns., Inc., Fullerton, Cal.
AMF Electical Prods., Alexandria, Va.
Basler Elec. Co., Highland, Ill.
Behlman Engrg. Corp., Santa Barbara, Cal.
Bertan Assocs., Inc., Plainview, N.Y.
Bogue Elec. Mfg. Co., Paterson, N.J.
Bowmar/Ali, Inc., Acton, Mass.
Cal-Power Corp., El Segundo, Calif.
Century Coil Corp., Chicago, Ill.
Computer Conversions Corp., East Northport, N.Y.
Constant Voltage Co., Chicago, Ill.
Dynalco Corp., Ft. Lauderdale, Fla.
Dynamic Precision Controls, Hagerstown, Ind.
EDC (Electro Dev.), Lynnwood, Wash.
Electric Indicator Co., Inc., Wilton, Conn.
Electro Prods. Labs., Transducer Div., Chgo., Ill.
Electronic Design Labs., Inc., Phila., Pa.
Elctrn. Resources Div., Los Angeles, Cal.
Fairlane Electronics, Inc., Long Valley, N.J.
Fischer & Porter Co., Warminster, Pa.
Flow Technology, Inc., Tempe, Ariz.
Foxboro Co., Foxboro, Mass.
Gap Instr. Corp., Hauppauge, N.Y.
Glentronics, Glendora, Cal.
Grafix, Inc., Albuquerque, N.M.
Gulton Inds., Hawthorne, Calif.
Horlick, William I. Co., Inc., Boston, Mass.
Hughes Aircraft Co, Fullerton, Cal.
Kato Engrg. Co., Mankato, Minn.
Microwave Assocs., Inc., Burlington, Mass.
Moore Inds., Van Nuys, Cal.
Nuclear Corp. Amer., Denville, N.J.
Oeco Corp., Portland, Ore.
Olektron Corp., Dudley, Mass.
Optical Elctrns., Tucson, Ariz.
Pacific Meas., Inc., Palo Alto, Calif.
Peerless Elec. Prods., Anaheim, Cal.
Pioneer Magnetics, Santa Monica, Cal.
Powercube Corp, Waltham, Mass.
Precision Elctrns., Inc., Amityville, N.Y.
Price & Rutzebeck, Hayward, Calif.
Rafec Elctrns., Temple City, Calif.
Ratelco, Inc., Seattle, Wash.
RFL Inds., Comms. Div., Boonton, N.J.
Rho Engrg. Co., Los Angeles, Calif
Rohde & Schwarz Sls., Passaic, N.J.
SBD Systems, Inc., Amityville, N.Y.
Sel-Rex Corp., Nutley, N.J.
Sensor Corp., Greenwich, Conn.
Servo Dev. Corp., Hicksville, N.Y.
Singer - Tele-Signal, Woodbury, N.Y.
Sola Elec. Div., Elk Grove Village, Ill.
Spectral Dynamics Corp. San Diego, San Diego, Cal.
Telmar, Inc., Columbus, Ohio

Transystems Elctrn. Co., Fort Lee, N.J.
Varian Assocs., Palo Alto, Cal.
Vetter, A.R., Co., Rebersburg, Pa
Vidar Corp., Mountain View, Cal.

Converters, Graphic To Digital

Data Graphics, San Antonio, Tex.
Eldorado Electrodata, Concord, Cal.
(NES) Nationwide Elctrn. Sys., Itasca, Ill. p 365
AMBAC Inds., Garden City, N.Y.
Hughes Aircraft Co, Fullerton, Cal.
Litton Inds., San Carlos, Calif.
Measurement Sys., Inc., Norwalk, Conn.
Traid Corp., Glendale, Cal.

Converters, High-Frequency

American Elctrn. Labs., Inc., Lansdale, Pa.
American Time Products, Woodside, N.Y.
Applied Research Inc., Port Washington, N.Y.
Avtel Corp., Covina, Cal.
Bulova Watch Elctrns. Div. Amer. Time Prods., Woodside, N.Y.
CML-Macarr, Inc., Edison, N.J.
Georator Corp., Manassas, Va.
Hewlett-Packard, Palo Alto, Cal.
Interelectronics Corp., Congers, N.Y.
Lorch Elctrns. Corp., Englewood, N.J.
(NES) Nationwide Elctrn. Sys., Itasca, Ill.
Unitron, Garland, Tex.
Vari-L Co., Inc., Denver, Colo.
Wanlass Div., Fort Washington, Pa.
Aerospace Resch. Inc., Boston, Mass.
Allis-Chalmers, Milwaukee, Wisc.
Allis, Louis Co., Milwaukee, Wisc.
Allis Louis Co., Greendale, Wisc.
AMBAC Inds., Garden City, N.Y.
Anzac Elctrns., Waltham, Mass.
Astro-Metrix, Burbank, Cal.
Benco Television Assoc., Rexdale, Ont., Can.
Blonder-Tongue Labs., Inc., Old Bridge, N.J.
Borg-Warner Controls, Santa Ana, Cal.
Cal-Power Corp., El Segundo, Calif.
Data Technology Corp., Palo Alto, Cal.
EDC (Electro Dev.), Lynnwood, Wash.
Elcom Sys., Deer Pk., N.Y.
FKS Comms., Inc., New Hyde Park, N.Y.
Gulton Inds., Hawthorne, Calif.
Hammarlund Mfg. Co., Red Bank, N.J.
Heath Co., Benton Harbor, Mich.
Holt Instr. Labs., Oconto, Wisc.
Horlick, William I. Co., Inc., Boston, Mass.
Hughes Aircraft Co, Fullerton, Cal.
Hyletronics Corp., Littleton, Mass.
Industrial Microwave, Scotch Plains, N.J.
Kato Engrg. Co., Mankato, Minn.
Loral Elctrn. Sys., Bronx, N.Y.
MEM Controls, Inc., Wickliffe, Ohio
Microphase Corp., Cos Cob, Conn.
Microwave Assocs., Inc., Burlington, Mass.
Mobil Elctrns., Inc., Anderson, Ind.
Oleктron Corp., Dudley, Mass.
Philco-Ford Corp., Washington, D.C.
Powercube Corp, Waltham, Mass.
Relcom, Mt. View, Calif.
Robicon Corp., Pittsburgh, Pa
Rodelco, Deer Park, N.Y.
Signal Analysis Inds. Corp., Hauppauge, N.Y.
SKG Assocs., Inc., Boston, Mass.
Special Microwave Devices Oper., Waltham, Mass.
Teledyne Inet, Gardena, Cal.
Tocco Div., Cleveland, Ohio
Westinghouse Elec., Sykesville, Md.
Westinghouse Elec. Int'l., New York, N.Y.

Converters, Low-Frequency

American Elctrn. Labs., Inc., Lansdale, Pa.
American Time Products, Woodside, N.Y.
Applied Research Inc., Port Washington, N.Y.
Austron, Inc., Austin, Tex.
Avtel Corp., Covina, Cal. p 655
Behlman Div., San Diego, Cal
Bulova Watch Elctrns. Div. Amer. Time Prods., Woodside, N.Y.
CML-Macarr, Inc., Edison, N.J. p 664,665
Del Elctrns. Corp., Mt. Vernon, N.Y. p 680
Elgar Corp., San Diego, Cal.
Elin Div., San Diego, Cal.
Georator Corp., Manassas, Va. p 722,723
Gibbs Mfg. & Resch., Janesville, Wisc.
Ind'l. Test Equip., Port Washington, N.Y.
Interelectronics Corp., Congers, N.Y. p 735
Julie Research Lab., New York, N.Y.
Lorch Elctrns. Corp., Englewood, N.J.
Meloy Laboratories, Springfield, Va.
Natel Engrg. Co., Canoga Pk., Cal.
(NES) Nationwide Elctrn. Sys., Itasca, Ill.
Nova Electric Mfg. Co., Nutley, N.J.
Unitron, Garland, Tex. p 936
Varadyne Power Sys., Northridge, Cal. p 934
Vari-L Co., Inc., Denver, Colo.
Wanlass Div., Fort Washington, Pa.
Zaring Inds., Inc., Carmel, Ind.
Aerospace Resch. Inc., Boston, Mass.
Allis, Louis Co., Milwaukee, Wisc.
Allis Louis Co., Greendale, Wisc.
AMBAC Inds., Garden City, N.Y.
Anzac Elctrns., Waltham, Mass.
Astro-Metrix, Burbank, Cal.
Behlman Engrg. Corp., Santa Barbara, Cal.
Borg-Warner Controls, Santa Ana, Cal.
Cal-Power Corp., El Segundo, Calif.
Data Technology Corp., Palo Alto, Cal.
EDC (Electro Dev.), Lynnwood, Wash.
Elcom Sys., Deer Pk., N.Y.
Elctrn. Components Corp., Addison, Ill.
Guardian California, Culver City, Cal.
Gulton Inds., Hawthorne, Calif.
Hammarlund Mfg. Co., Red Bank, N.J.
Hughes Aircraft Co, Fullerton, Cal.
Industrial Microwave, Scotch Plains, N.J.
Jerrold Elctrns. Corp., Philadelphia, Pa.
Kato Engrg. Co., Mankato, Minn.
Loral Elctrn. Sys., Bronx, N.Y.
MEM Controls, Inc., Wickliffe, Ohio
Microphase Corp., Cos Cob, Conn.
Microwave Assocs., Inc., Burlington, Mass.
Mobil Elctrns., Inc., Anderson, Ind.
Oeco Corp., Portland, Ore.
Olektron Corp., Dudley, Mass.
Polyphase Instr. Co., Bridgeport, Pa.
Precision Elctrns., Inc., Amityville, N.Y.
Racal Communications, Rockville, Md.
RFL Inds., Comms. Div., Boonton, N.J.
Riverbank Labs., Geneva, Ill.
SKG Assocs., Inc., Boston, Mass.
Special Microwave Devices Oper., Waltham, Mass.
Sprengnether, W.F. Instr. Co., Inc., St. Louis, Mo.
Systems Elctrns., Cleveland, Ohio
Teledyne Inet, Gardena, Cal.
Tocco Div., Cleveland, Ohio
Universal Transistor Prods., Copiague, N.Y.

Converters, Microwave Frequency

American Elctrn. Labs., Inc., Lansdale, Pa.
American Nucleonics Corp., Woodland Hills, Cal
Applied Research Inc., Port Washington, N.Y. p 1554
Electro/Data, Inc., Garland, Tex.
Frequency Engrg. Labs., Farmingdale, N.J.
Greenray Inds., Inc., Mechanicsburg, Pa. p 607
Hewlett-Packard, Palo Alto, Cal.
Lorch Elctrns. Corp., Englewood, N.J.
RCA Elctrns. Comps., Harrison, N.J.
RHG Elctrns. Lab., Farmingdale, N.Y.
R L C Elctrns., Inc., Mt. Kisco, N.Y.
Vari-L Co., Inc., Denver, Colo.
Aertech Inds., Sunnyvale, Calif.
AIL, Div. Cutler-Hammer, Inc., Deer Park, N.Y.
Aircom, Inc., Union, N.H.
AMBAC Inds., Garden City, N.Y.
Collins Radio Co., Dallas, Tex.
Elcom Sys., Deer Pk., N.Y.
Electrac, Inc., Anaheim, Calif.
FKS Comms., Inc., New Hyde Park, N.Y.
General Microwave Corp., Farmingdale, N.Y.
Guide Inds., Inc., Sun Valley, Calif.
Hughes Aircraft Co, Fullerton, Cal.
Hyletronics Corp., Littleton, Mass.
Industrial Microwave, Scotch Plains, N.J.
Int'l. Microwave, Cos Cob, Conn.
Jerrold Elctrns. Corp., Philadelphia, Pa.
Jerrold/Watkins Div., Toronto, 395, Ont., Can.
Loral Elctrn. Sys., Bronx, N.Y.
Micro-Tel Corp., Baltimore, Md.
Microlab/FXR, Livingston, N.J.
Micromega, Los Angeles, Cal.
Microwave Assocs., Inc., Burlington, Mass.
Microwave Div, Nashua, N.H.
Narda Microwave Corp., Plainview, N.Y.
Olektron Corp., Dudley, Mass.
Philco-Ford Corp., Washington, D.C.
Premier Microwave, Port Chester, N.Y.
Radiation Sys., Inc., McLean, Va.
Rodelco, Deer Park, N.Y.
Scientific Communications, Garland, Tex.
Special Microwave Devices Oper., Waltham, Mass.
Varian Assocs., Palo Alto, Cal.
Varian Assoc., Beverly, Mass
Varian, Beverly, Mass.
Western Microwave Labs., Los Gatos, Cal.
Zeta Labs., Inc., Mountain View, Calif.

Converters, Paper Tape To Magnetic Tape

A. D. Data Sys., Inc., Rochester, N.Y. p 328
Data-Control Systems, Danbury, Conn.
Datacom, Inc., Ft. Walton Bch., Fla.
Datascan, Inc., Clifton, N.J. p 428
Dynamics Instr. Co., Monterey Pk., Cal.
Dytro Corp., Hicksville, N.Y.
Eldorado Electrodata, Concord, Cal.
Monitor Labs, Inc., San Diego, Cal. p 364
(NES) Nationwide Elctrn. Sys., Itasca, Ill. p 365
PPM, Inc., Bedford, Ohio
Control Logic, Natick, Mass.
Digi-Data Corp., Bladensburg, Md.
Digitronics Corp., Albertson, N.Y.
Friden Div., San Leandro, Calif.
Hughes Aircraft Co, Culver City, Cal.
Instrumentation Tech. Corp., Northridge, Calif.
Lance Inds., Sylmar, Calif.
Microphase Corp., Cos Cob, Conn.
Struthers-Dunn, Inc., Bettendorf, Iowa
Zehntel, Inc., Berkeley, Calif.

Converters, Paper Tape To Paper Tape

A. D. Data Sys., Inc., Rochester, N.Y. p 328
Data-Control Systems, Danbury, Conn.
Datacom, Inc., Ft. Walton Bch., Fla. p 344
Monitor Labs, Inc., San Diego, Cal.
(NES) Nationwide Elctrn. Sys., Itasca, Ill.
PPM, Inc., Bedford, Ohio
Remex Elctrns., Santa Ana, Cal.
Control Logic, Natick, Mass.
Digitronics Corp., Albertson, N.Y.
Hughes Aircraft Co, Culver City, Cal.
Microwave Magnetics Inc., Danvers, Mass.
Struthers-Dunn, Inc., Bettendorf, Iowa
Zehntel, Inc., Berkeley, Calif.

Converters, Phase

Astrosystems, Lake Success, N.Y.
Avtel Corp., Covina, Cal.
Dranetz Engrg. Labs., Plainfield, N.J. p 1871
General Magnetics, Bloomfield, N.J. p 1320
Ind'l. Control Co., Farmingdale, N.Y.
Intronics, Inc., Newton, Mass. .... p 1288
Lorch-Adret Corp., Englewood, N.J. p 517
North Atlantic Inds., Plainview, N.Y. p 369,531
North Hills Elctrns., Inc., Glen Cove, N.Y.
Solid State Elctrns., Sepulveda, Cal. p 954
Universal Ad-Yu Elctrns., Inc., Passaic, N.J. p 2752
Wanlass Div., Fort Washington, Pa.
Allis-Chalmers, Milwaukee, Wisc.
AMBAC Inds., Garden City, N.Y.
Bowmar/Ali, Inc., Acton, Mass.
Computer Conversions Corp., East Northport, N.Y.
Electrac, Inc., Anaheim, Calif.
Guardian California, Culver City, Cal.
Hughes Aircraft Co, Fullerton, Cal.
Kato Engrg. Co., Mankato, Minn.
Olektron Corp., Dudley, Mass.
Shane Inds., Sunny Vale, Cal.
Singer-General Precision, Inc., Little Falls, N.J.
Special Microwave Devices Oper., Waltham, Mass.
Theta Instr. Corp., Fairfield, N.J.

Converters, Polar To Rectangular Coordinates

Astrosystems, Lake Success, N.Y.
Bendix Environmtl. Sci., Baltimore, Md. p 336
Datacom, Inc., Ft. Walton Bch., Fla.
Dranetz Engrg. Labs., Plainfield, N.J. p 1870,1871
General Magnetics, Bloomfield, N.J.
Hybrid Sys. Corp., Burlington, Mass.
Ind'l. Control Co., Farmingdale, N.Y.
Intronics, Inc., Newton, Mass.
Metric Sys., Ft. Walton Beach, Fla. p 359
Transmagnetics Inc., Farmingdale, N.Y. p 383
Arco Systems Inc., Palo Alto, Cal
Computer Conversions Corp., East Northport, N.Y.
Dynalex, Inc., Burbank, Cal.
Jordan Controls, Milwaukee, Wisc.
Princeton Elctrn. Prods., New Brunswick, N.J.
Singer-General Precision, Inc., Little Falls, N.J.

Converters, Power Frequency, Electronic

American Time Products, Woodside, N.Y.
Amp Inc., Elizabethtown, Pa.
Amp Inc., Harrisburg, Pa.
Arnold Magnetics, Culver City, Cal.
ATR Elctrns., Inc., St. Paul, Minn. p 652
Austron, Inc., Austin, Tex.
Autronics Corp., Pasadena, Calif.
Avtel Corp., Covina, Cal. p 655
Behlman Div., San Diego, Cal
Bulova Watch Elctrns. Div. Amer. Time Prods., Woodside, N.Y.
CML-Macarr, Inc., Edison, N.J. p 664,665
Control Technology Co., L.I.C., N.Y.
Elgar Corp., San Diego, Cal.
Elin Div., San Diego, Cal.
Fork Standards, W. Chicago, Ill.
Frequency Control, Inc., Austin, Tex.
Gibbs Mfg. & Resch., Janesville, Wisc.
Ind'l. Test Equip., Port Washington, N.Y.
Interelectronics Corp., Congers, N.Y.
Meloy Laboratories, Springfield, Va.
Microtran Co., Valley Stream, N.Y.
Mid-Eastern Inds., Scotch Plains, N.J.
Nova Electric Mfg. Co., Nutley, N.J.
Topaz Elctrns., San Diego, Cal. p 901,902
Trio Labs, Inc., Plainview, N.Y.
Varadyne Power Sys., Northridge, Cal. p 934
Wanlass Div., Fort Washington, Pa.
Zaring Inds., Inc., Carmel, Ind.
Aerospace Avionics, Inc., Bohemia, N.Y.
Allis-Chalmers, Milwaukee, Wisc.
Allis, Louis Co., Milwaukee, Wisc.
Allis Louis Co., Greendale, Wisc.
AMBAC Inds., Garden City, N.Y.
Behlman Engrg. Corp., Santa Barbara, Cal.
B.H. Inds., Los Angeles, Cal.
Bogue Elec. Mfg. Co., Paterson, N.J.
Borg-Warner Controls, Santa Ana, Cal.
Bose Corp., Natick, Mass.
Cal-Power Corp., El Segundo, Calif.
California Instrs. Co., San Diego, Cal.
Carter Motor Co., Chicago, Ill.
Components Corp., Denville, N.J.
Constant Voltage Co., Chicago, Ill.
Cyberex Inc., Willoughby, Ohio
Cycle-Dyne, Inc., Jamaica, N.Y.
Delta Elctrn. Control, Costa Mesa, Cal.
EDC (Electro Dev.), Lynnwood, Wash.
Elasco-Eastern, Inc., Bloomfield, Conn.
Electro Windings & Comps., Kenilworth, N.J.
Elctrn. Resources Div., Los Angeles, Cal.

Elgin Elctrns., Waterford, Pa.
Energy Systems, Palo Alto, Cal.
Grafix, Inc., Albuquerque, N.M.
Gulton Inds., Hawthorne, Calif.
Harshaw Chem. Co., Cleveland, Ohio
Heath Co., Benton Harbor, Mich.
Horlick, William I. Co., Inc., Boston, Mass.
ITT Aerospace, San Fernando, Cal.
Lear Siegler, Inc., Santa Monica, Calif.
Linear Sys., Inc., Watsonville, Calif.
MEM Controls, Inc., Wickliffe, Ohio
NH Research, Inc., Santa Ana, Calif.
Oeco Corp., Portland, Ore.
Pacific Electro Dynamics, Bellevue, Wash
Power Control Corp., Pittsburgh, Pa.
Precision Elctrns., Inc., Amityville, N.Y.
RFL Inds., Comms. Div., Boonton, N.J.
Riverbank Labs., Geneva, Ill.
Robicon Corp., Pittsburgh, Pa
SBD Systems, Inc., Amityville, N.Y.
Shane Inds., Sunny Vale, Cal.
SKG Assocs., Inc., Boston, Mass.
Solidstate Controls, Inc., Columbus, Ohio
Sprengnether, W.F. Instr. Co., Inc., St. Louis, Mo.
Struthers Elctrns. Corp., Mamaroneck, N.Y.
Systems Elctrns., Cleveland, Ohio
Task Corp., Anaheim, Calif.
Tel-Instr. Elctrns. Corp., Carlstadt, N.J.
Teledyne Inet, Gardena, Cal.
Telmar, Inc., Columbus, Ohio
Tocco Div., Cleveland, Ohio
Universal Transistor Prods., Copiague, N.Y.
Varo, Inc., Texas Div., Garland, Tex.
Westinghouse Elec., Sykesville, Md.
Westinghouse Elec. Int'l., New York, N.Y.

Converters, Power Frequency, Rotary

CML-Macarr, Inc., Edison, N.J.
Georator Corp., Manassas, Va. p 722,723
Allis, Louis Co., Milwaukee, Wisc.
Allis Louis Co., Greendale, Wisc.
American Elctrns., Inc., Fullerton, Cal.
AMF Electrosystems Div., Vandalia, Ohio
Bogue Elec. Mfg. Co., Paterson, N.J.
Carter Motor Co., Chicago, Ill.
Continental Elec., Newark, N.J.
Electric Machinery Mfg. Co., Minneapolis, Minn.
Horlick, William I. Co., Inc., Boston, Mass.
Hughes Aircraft Co, Fullerton, Cal.
Ideal Elec. & Mfg. Co., Mansfield, Ohio
Kato Engrg. Co., Mankato, Minn.
Katolight Corp., Mankato, Minn.
Task Corp., Anaheim, Calif.
Techsonics, El Prado, N.M.
Teledyne Inet, Gardena, Cal.
Tocco Div., Cleveland, Ohio
Westinghouse Elec., Sykesville, Md.
Westinghouse Elec. Int'l., New York, N.Y.

Converters, Power Frequency, Vibrator

ATR Elctrns., Inc., St. Paul, Minn.
Triac Elctrn. Sys., N.Y., N.Y.
E-Tronics, Van Nuys, Cal.
Electro Windings & Comps., Kenilworth, N.J.
Hughes Aircraft Co, Fullerton, Cal.
Power Applications, Inc., Bayside, N.Y.

Converters, Pressure To D-C

—See Transducers, Pressure —Vol 2

Converters, Pressure To Frequency

—See Transducers, Pressure—Vol 2

Converters, Pulse To Analog

Anadex Instrs., Inc., Van Nuys, Calif.
Astrosystems, Lake Success, N.Y. p 333
Automation Dev., Culver City, Cal.
Control Technology Co., L.I.C., N.Y.
DDC, Hicksville, N.Y.
Dranetz Engrg. Labs., Plainfield, N.J. p 1871
E-H Resch. Labs., Inc., Oakland, Cal.
General Resistance, Mt. Vernon, N.Y.
Icon Corp., Cambridge, Mass.
Matrix Corp., Beech Grove, Ind.
Metric Sys., Ft. Walton Beach, Fla. p 359
Multitech Power Sys., Costa Mesa, Cal.
(NES) Nationwide Elctrn. Sys., Itasca, Ill.
North Hills Elctrns., Inc., Glen Cove, N.Y.
Solid State Elctrns., Sepulveda, Cal.
AMBAC Inds., Garden City, N.Y.
Automatic Control Elctrns. Co., San Antonio, Tex.
B & W Elctrn. Resch. Labs., Dallas, Tex.
Bristol Div, Waterbury, Conn
Clifton Div., Clifton Hgts., Pa.
Computer Conversions Corp., East Northport, N.Y.
Dynamic Precision Controls, Hagerstown, Ind.
Elctrn. Resources Div., Los Angeles, Cal.
Fischer & Porter Co., Warminster, Pa.
Flow Technology, Inc., Tempe, Ariz.
Foxboro Co., Foxboro, Mass.
General Devices, Inc., Princeton, N.J.
GTE Sylvania Inc., Elctrn. Sys. Gp., Waltham, Mass.
Hughes Aircraft Co, Culver City, Cal.
ISC/Telephonics Div, Huntington, N.Y.
Lear Siegler, Grand Rapids, Mich.
Lecroy Resch. Sys. Corp., West Nyack, N.Y.
Loral Elctrn. Sys., Bronx, N.Y.
Micro Instr., Hawthorne, Cal.
Motorola Instr. & Control, Phoenix, Ariz.
MPC Prods. Corp., Chicago, Ill.
Philco-Ford Corp., Washington, D.C.
Power Instrs., Skokie, Ill.
Servo Dev. Corp., Hicksville, N.Y.
Singer-General Precision, Inc., Little Falls, N.J.
Spectral Dynamics Corp. San Diego, San Diego, Cal.
Struthers-Dunn, Inc., Bettendorf, Iowa
Superior Elec., Bristol, Conn.
Taylor Instr. Process Control Div., Rochester, N.Y.
Transystems Elctrn. Co., Fort Lee, N.J.

Converters, Pulse To Digital

American Astrionics, Hollywood, Cal
Astrosystems, Lake Success, N.Y. p 332,334
Atec, Inc., Houston, Tex.
Austron, Inc., Austin, Tex.
Chrono-log Corp., Broomall, Pa.
Data Graphics, San Antonio, Tex. p 346
Digital Equip. Corp., Maynard, Mass.
Dranetz Engrg. Labs., Plainfield, N.J. p 1870,1871
Multitech Power Sys., Costa Mesa, Cal.
(NES) Nationwide Elctrn. Sys., Itasca, Ill. p 365
Veeder-Root, Hartford, Conn.
Allis, Louis Co., Milwaukee, Wisc.
AMBAC Inds., Garden City, N.Y.
Automatic Control Elctrns. Co., San Antonio, Tex.
Clifton Div., Clifton Hgts., Pa.
Computer Conversions Corp., East Northport, N.Y.
Dynalex, Inc., Burbank, Cal.
Elctrn. Resources Div., Los Angeles, Cal.
Foxboro Co., Foxboro, Mass.
GTE Sylvania Inc., Elctrn. Sys. Gp., Waltham, Mass.
Hughes Aircraft Co, Culver City, Cal.
ISC/Telephonics Div, Huntington, N.Y.
Lear Siegler, Grand Rapids, Mich.
Lecroy Resch. Sys. Corp., West Nyack, N.Y.
Loral Elctrn. Sys., Bronx, N.Y.
Measurement Sys., Inc., Norwalk, Conn.
Micro Instr., Hawthorne, Cal.
Microwave Magnetics Inc., Danvers, Mass.
Servo Dev. Corp., Hicksville, N.Y.
Singer-General Precision, Inc., Little Falls, N.J.
Struthers-Dunn, Inc., Bettendorf, Iowa
Theta Instr. Corp., Fairfield, N.J.

Converters, Resolver To Digital

Astrosystems, Lake Success, N.Y. p 332
Bendix Environmtl. Sci., Baltimore, Md. p 336
Control Technology Co., L.I.C., N.Y.
DDC, Hicksville, N.Y. p 347
Dranetz Engrg. Labs., Plainfield, N.J. p 1870
Hybrid Sys. Corp., Burlington, Mass.
Natel Engrg. Co., Canoga Pk., Cal. p 367
North Atlantic Inds., Plainview, N.Y. p 368
Perkin-Elmer Corp., Wilton, Conn.
Solid State Elctrns., Sepulveda, Cal.
Transmagnetics Inc., Farmingdale, N.Y. p 382
Vernitron Corp., Deer Pk., N.Y.
Analogic, Wakefield, Mass.
B.H. Inds., Los Angeles, Cal.
Clifton Div., Clifton Hgts., Pa.
Computer Conversions Corp., East Northport, N.Y.
Dynalex, Inc., Burbank, Cal.
Edison, T.A., Instr. Div., Ft. Lauderdale, Fla.
Gap Instr. Corp., Hauppauge, N.Y.
Hughes Aircraft Co, Culver City, Cal.
Innovatek Enterprise, Millerton, N.Y.
Lear Siegler, Grand Rapids, Mich.
Microwave Magnetics Inc., Danvers, Mass.
Singer-General Precision, Inc., Little Falls, N.J.
Struthers-Dunn, Inc., Bettendorf, Iowa
Theta Instr. Corp., Fairfield, N.J.
Zehntel, Inc., Berkeley, Calif.

Converters, Scan

A. D. Data Sys., Inc., Rochester, N.Y.
Beta Instr., Newton Upper Falls, Mass.
Natel Engrg. Co., Canoga Pk., Cal.
Raytheon Co., Quincy, Mass.
Tektronix, Inc., Beaverton, Ore.
Cardion Elctrns., Woodbury, N.Y.
Fairchild Space & Defense Sys., Syosset, N.Y.
General Devices, Inc., Princeton, N.J.
General Electrodynamics Corp., Garland, Tex.
Hughes Aircraft Co, Culver City, Cal.
Hughes Aircraft Co., Ind'l. Prods. Div., Oceanside, Cal.
Hughes Aircraft Co., Ind'l. Prods. Div. Display Sys., Oceanside, Calif.
Hughes Aircraft Co., Storage Tubes Ind'l. Prods. Div., Oceanside, Calif.
Loral Elctrn. Sys., Bronx, N.Y.
Philco-Ford Corp., Washington, D.C.
Princeton Elctrn. Prods., New Brunswick, N.J.
Rauland, Melrose Pk., Ill.
RCA Govt. & Comm. Sys., Moorestown, N.J.
Scientific-Atlanta, Inc., Atlanta, Ga.
Struthers-Dunn, Inc., Bettendorf, Iowa
Thomson-CSF Electron Tubes, N.Y., N.Y.
Westinghouse Elec., Elmira, N.Y.

Converters, Signal To Color

RCA Elctrns. Comps., Harrison, N.J.
Sprague Elec. Co., No. Adams, Mass.
Aydin Data Systems, Ft. Washington, Pa
GTE Sylvania Inc., Elctrn. Sys. Gp., Waltham, Mass.
Hughes Aircraft Co, Culver City, Cal.
Philco-Ford Corp., Washington, D.C.
RCA Govt. & Comm. Sys., Moorestown, N.J.

Converters, Single Sideband Receiver

Austron, Inc., Austin, Tex.
GTE Sylvania Inc., Elctrn. Sys. Gp., Waltham, Mass.
Hughes Aircraft Co, Culver City, Cal.
Hughes Aircraft Co, Fullerton, Cal.
Olektron Corp., Dudley, Mass.
Racal Communications, Rockville, Md.
RFL Inds., Comms. Div., Boonton, N.J.
Technical Mat'l., Mamaroneck, N.Y.

Converters, Synchro To Digital

Astrosystems, Lake Success, N.Y. p 332,334
Bendix Environmtl. Sci., Baltimore, Md. p 336
Control Technology Co., L.I.C., N.Y.
DDC, Hicksville, N.Y. p 347
Digital Equip. Corp., Maynard, Mass.
Dranetz Engrg. Labs., Plainfield, N.J. p 1870,1871
Hybrid Sys. Corp., Burlington, Mass.
Magnetic Technology, Canoga Pk., Cal. p 387
Natel Engrg. Co., Canoga Pk., Cal. p 367
Norden Div., Norwalk, Conn.
North Atlantic Inds., Plainview, N.Y. p 368,369
Perkin-Elmer Corp., Wilton, Conn.
Solid State Elctrns., Sepulveda, Cal.
Transmagnetics Inc., Farmingdale, N.Y. p 382,1874
Vernitron, Torrance, Cal. p 387
Vernitron Corp., Deer Pk., N.Y. p 387
AMBAC Inds., Garden City, N.Y.
Analogic, Wakefield, Mass.
B.H. Inds., Los Angeles, Cal.
Bunker-Ramo Corp., Westlake Village, Cal
Clifton Div., Clifton Hgts., Pa.
Computer Central, Detroit, Mich.
Computer Conversions Corp., East Northport, N.Y.
Conrac Corp., New York, N.Y.
Data Technology Inc., Watertown, Mass.
Dynalex, Inc., Burbank, Cal.
Edison, T.A., Instr. Div., Ft. Lauderdale, Fla.
Electrac, Inc., Anaheim, Calif.
Fairchild Space & Defense Sys., Syosset, N.Y.
Gap Instr. Corp., Hauppauge, N.Y.
Glentek, Inc., Santa Monica, Calif.
Hughes Aircraft Co, Culver City, Cal.
Innovatek Enterprise, Millerton, N.Y.
Lockheed Aircraft Svce., Special Devices Div., Ontario, Calif.
Loral Elctrn. Sys., Bronx, N.Y.
Northern Precision Labs., Inc., Fairfield, N.J.
Scientific-Atlanta, Inc., Atlanta, Ga.
Servo Dev. Corp., Hicksville, N.Y.
Singer-General Precision, Inc., Little Falls, N.J.
Struthers-Dunn, Inc., Bettendorf, Iowa
Ten Bosch, M., Inc., Pleasantville, N.Y.
Theta Instr. Corp., Fairfield, N.J.
United Aircraft Corp., Norwalk, Conn.
Weston-Transicoil, Worcester, Pa.

Converters, Synchro To Linear DC

Dranetz Engrg. Labs., Plainfield, N.J. p 1871
General Magnetics, Bloomfield, N.J. p 1319
Hybrid Sys. Corp., Burlington, Mass.
Natel Engrg. Co., Canoga Pk., Cal. p 366
Solid State Elctrns., Sepulveda, Cal.
Transmagnetics Inc., Farmingdale, N.Y. p 382
Vernitron Corp., Deer Pk., N.Y.
AMBAC Inds., Garden City, N.Y.
Computer Central, Detroit, Mich.
Computer Conversions Corp., East Northport, N.Y.
Dynalex, Inc., Burbank, Cal.
Gap Instr. Corp., Hauppauge, N.Y.
Singer-General Precision, Inc., Little Falls, N.J.
Struthers-Dunn, Inc., Bettendorf, Iowa
Theta Instr. Corp., Fairfield, N.J.

Converters, Synchro To Sine-Cosine

Astrosystems, Lake Success, N.Y.
Bendix Environmtl. Sci., Baltimore, Md. p 336
Dranetz Engrg. Labs., Plainfield, N.J.
General Magnetics, Bloomfield, N.J. p 1319,1320
Hybrid Sys. Corp., Burlington, Mass.
Natel Engrg. Co., Canoga Pk., Cal. p 366
Transmagnetics Inc., Farmingdale, N.Y. p 382,383,1875
Vernitron Corp., Deer Pk., N.Y.
Computer Conversions Corp., East Northport, N.Y.
Dynalex, Inc., Burbank, Cal.
Gap Instr. Corp., Hauppauge, N.Y.
Singer-General Precision, Inc., Little Falls, N.J.

Converters, Tape To Card

A. D. Data Sys., Inc., Rochester, N.Y.
Metric Sys., Ft. Walton Beach, Fla. p 359
(NES) Nationwide Elctrn. Sys., Itasca, Ill. p 365
Demex, Inc., Kansas City, Mo.
General Instr. Corp., Hawthorne, Cal.
Honeywell Information Systems, Wellesley Hills, Mass
Hughes Aircraft Co, Culver City, Cal.
Instrumentation Tech. Corp., Northridge, Calif.
Microwave Magnetics Inc., Danvers, Mass.
MMI Instruments, Danvers, Mass

Zehntel, Inc., Berkeley, Calif.

Converters, Telemetry

Applied Research Inc., Port Washington, N.Y. ..... p 1554
Astrosystems, Lake Success, N.Y. p 332
Data-Control Systems, Danbury, Conn.
Interelectronics Corp., Congers, N.Y.
Lorch Elctrns. Corp., Englewood, N.J.
RHG Elctrns. Lab., Farmingdale, N.Y.
Solid State Elctrns., Sepulveda, Cal.
Aertech Inds., Sunnyvale, Calif.
AMBAC Inds., Garden City, N.Y.
Aydin Data Systems, Ft. Washington, Pa
Beukers Labs., Inc., Hauppauge, N.Y.
Computer Conversions Corp., East Northport, N.Y.
Diamond Repeater Co., Madison, N.J.
Elcom Sys., Deer Pk., N.Y.
Foxboro Co., Foxboro, Mass.
Gulton Inds., Hawthorne, Calif.
Hughes Aircraft Co, Culver City, Cal.
Hughes Aircraft Co, Fullerton, Cal.
ISC/Telephonics Div, Huntington, N.Y.
Lansdale Microelectronics Div., Metuchen, N.J.
Lear Siegler, Inc., Santa Monica, Calif.
Microwave Assocs., Inc., Burlington, Mass.
Olektron Corp., Dudley, Mass.
Philco-Ford Corp., Washington, D.C.
RFL Inds., Comms. Div., Boonton, N.J.
Rodelco, Deer Park, N.Y.
Scientific Communications, Garland, Tex.
Taft Electrosystems, Inc., Metuchen, N. J.

Converters UHF To VHF

American Elctrn. Labs., Inc., Lansdale, Pa.
Applied Research Inc., Port Washington, N.Y.
C-COR Elctrns., State College, Pa.
Lorch Elctrns. Corp., Englewood, N.J.
Microwave Cavity Labs., La Grange, Ill.
RHG Elctrns. Lab., Farmingdale, N.Y.
Sierra Sys., Mountain View, Cal.
Advance Ross Elctrns. Corp., Chicago, Ill.
Aerospace Resch. Inc., Boston, Mass.
Aertech Inds., Sunnyvale, Calif.
AMBAC Inds., Garden City, N.Y.
Anritsu Electric Co., Ltd., Tokyo, Japan
Astro Comm. Lab., Gaithersburg, Md.
Benco Television Assoc., Rexdale, Ont., Can.
Beukers Labs., Inc., Hauppauge, N.Y.
Blonder-Tongue Labs., Inc., Old Bridge, N.J.
Communication Elctrns., Rockville, Md.
Entron, Inc., Silver Spring, Md.
Finney Co., Bedford, Ohio
FKS Comms., Inc., New Hyde Park, N.Y.
Gavin Instrs., Somerville, N.J.
Hughes Aircraft Co, Fullerton, Cal.
Int'l. Microwave, Cos Cob, Conn.
Jerrold Elctrns. Corp., Philadelphia, Pa.
Jerrold/Watkins Div., Toronto, 395, Ont., Can.
Microlab/FXR, Livingston, N.J.
Microwave Assocs., Inc., Burlington, Mass.
Olektron Corp., Dudley, Mass.
Philco-Ford Corp., Washington, D.C.
RCA Corp., Camden, N.J.
Rodelco, Deer Park, N.Y.
Rohde & Schwarz Sls., Passaic, N.J.
S & A Elctrns., Inc., Toledo, Ohio
Special Microwave Devices Oper., Waltham, Mass.
Varian Assoc., Beverly, Mass
VIKOA, Hoboken, N.J.

Converters, Vibrator Type—

See Converters, Power Frequency, Vibrator

Converters, Voltage To Frequency

Airpax Elctrns., Inc., Cambridge, Md.
Almond Instrs. Co., Covina, Cal
Anadex Instrs., Inc., Van Nuys, Calif. p 399
Austron, Inc., Austin, Tex.
Autronics Corp., Pasadena, Calif.
Datascan, Inc., Clifton, N.J.
Digital Equip. Corp., Maynard, Mass.
Digitron Corp., Norristown, Pa.
Electro-Numerics, Santa Clara, Cal.
Gould, Inc., Cleveland, Ohio
Hewlett-Packard, Palo Alto, Cal.
Hickok Elect. Instr., Cleveland, Ohio
Hybrid Sys. Corp., Burlington, Mass.
Lorch Elctrns. Corp., Englewood, N.J.
Matrix Corp., Beech Grove, Ind.
Meloy Laboratories, Springfield, Va.
(NES) Nationwide Elctrn. Sys., Itasca, Ill.
Neshaminy Transformer, Furlong, Pa.
North Hills Elctrns., Inc., Glen Cove, N.Y. ..... p 1339
Nova Electric Mfg. Co., Nutley, N.J. p 828
Solid State Elctrns., Sepulveda, Cal. p 954
Sonex, Inc., Bethayres, Pa.
Teledyne Philbrick, Dedham, Mass.
Unitron, Garland, Tex. ..... p 937
Aerospace Avionics, Inc., Bohemia, N.Y.
AMBAC Inds., Garden City, N.Y.
Analogic, Wakefield, Mass.
B & W Elctrn. Resch. Labs., Dallas, Tex.
Computer Conversions Corp., East Northport, N.Y.
Constant Voltage Co., Chicago, Ill.
Data Technology Corp., Palo Alto, Cal.
Dorsett Elctrns., Tulsa, Okla.
Dynamic Precision Controls, Hagerstown, Ind.
Electronic Design Labs., Inc., Phila., Pa.
Elctrn. Modules Corp., Timonium, Md.
Elctrn. Resources Div., Los Angeles, Cal.
Foxboro Co., Foxboro, Mass.
Gulton Inds., Hawthorne, Calif.
Horlick, William I. Co., Inc., Boston, Mass.
Newport Labs., Inc., Santa Ana, Cal.
Optical Elctrns., Tucson, Ariz.
Philco-Ford Corp., Washington, D.C.
Pioneer Magnetics, Santa Monica, Cal.
Power Control Corp., Pittsburgh, Pa.
RFL Inds., Comms. Div., Boonton, N.J.
Rohde & Schwarz Sls., Passaic, N.J.
Special Microwave Devices Oper., Waltham, Mass.
Transystems Elctrn. Co., Fort Lee, N.J.
Varian Assocs., Palo Alto, Cal.
Vidar Corp., Mountain View, Cal.
Wand Elctrns., Inc., Old Bethpage, N.Y.

Coolants, Circuit & Component—

See Vol 3

Coolers, Cryogenic

Blue M Engrg. Co., Blue Island, Ill.
Aeronautical Div, Bryan, Ohio
Air Prods. & Chems., Inc., Allentown, Pa.
Andonian Assocs., Inc., Waltham, Mass.
Auto Control Labs., Los Angeles, Calif.
Cambridge Thermionic, Cambridge, Mass
Cincinnati Sub-Zero Prods., Cincinnati, Ohio
Cole-Parmer Instr. Co., Chicago, Ill.
Cryotronics, Inc., High Bridge, N.J.
Essex Cryogenics Inds., St. Louis, Mo.
Hafstrom Tech. Prods., Inc., San Diego, Calif.
Hughes Aircraft Co, Culver City, Cal.
Jersey Tech. Consits., Morristown, N.J.
Malaker Corp., High Bridge, N.J.
Standard Cabinet Co., Inc., Totowa, N.J.
Thermalloy Co., Dallas, Tex.

Cooling Equipment—

See Air Conditioners; Blowers & Fans —Vol 3

Cooling/Heating Modules, Thermoelectric—

See Vol 2

Cooling Packages, Semiconductor—

See Transistor & Diode Heat Dissipators—Vol 2

Cooling Sprays—

See Coolants, Circuit & Component—Vol 3

Coordinate Measuring Machines—

See Machines, Measuring

Copper Clad Laminates —

See Laminates, Metal Clad—Vol 3

Cords & Cable, Dial Drive—

See Vol 2

Cords & Tapes, Lacing—

See Vol 3

Cords, Line & Set, Extension —

See Vol 3

Cords, Line (Lamp)—

See Cable, Multiconductor—Vol 3

Cords, Line, Resistance—

See Vol 3

Cords, Patch—

See Vol 3

Cords, Power—

See Cable, Power—Vol 3

Cords, Retractile—

See Vol 3

Cords, Speaker Extension—

See Cable, Audio—Vol 3

Cords, Twin Lead—

See Cable, Multiconductor—Vol 3

Core Arrays, Memory—

See Memory Arrays

Core Planes, Memory—

See Memory Planes

Core Stacks, Memory—

See Memory Stacks

Core Memory Systems—

See Memory Systems, Core

Cores, Ceramic—

See Vol 3

Cores, Magnetic, Ferrite, EL & E—

See Vol 3

Cores, Magnetic, Ferrite, Pot/Cup—

See Vol 3

Cores, Magnetic, Ferrite, Slug —

See Vol 3

Cores, Magnetic, Ferrite, Toroid—

See Vol 3

Cores, Magnetic, Ferrite, Yoke Section—

See Vol 3

Cores, Magnetic, Metal Alloy (Other Than Silicon & Nickel-Iron)—

See Vol 3

Cores, Magnetic, Nickel-Iron, EL, EE, F & Ring Laminations—

See Vol 3

Cores, Magnetic, Nickel-Iron, Toroid—

See Vol 3

Cores, Magnetic, Powdered Iron, Pot/Cup—

See Vol 3

Cores, Magnetic, Powdered Iron, Slug—

See Vol 3

Cores, Magnetic, Powdered Iron, Toroid—

See Vol 3

Cores, Magnetic, Powdered Permalloy, Toroid—

See Vol 3

Cores, Magnetic, Silicon, "C" —

See Vol 3

Cores, Magnetic, Silicon EI, EE & F, Laminations—

See Vol 3

Cores, Magnetic, Silicon, Toroid—

See Vol 3

Corners, Waveguide—

See Bends & Twists, Microwave

Corona Testers—

See Testers, Corona

Coulometers—

See Timers, Electrolytic Cell—Vol 2

Counters, Bi-Directional—

See Vol 2

Counters, Coil Winding—

See Vol 2

Counters, Directional—

See Vol 2

Counters, Electro-Magnetic—

See Vol 2

Counters, Frequency

American Elctrn. Labs., Inc., Lansdale, Pa.
Anadex Instrs., Inc., Van Nuys, Calif. p 391-395
Atec, Inc., Houston, Tex. ..... p 410,411
Beckman Instruments, Shiller Pk., Ill. p 413
Biddle, James G., Plymouth Meeting, Pa.
Bowmar Instr. Corp., Ft. Wayne, Ind. p 1312
Chronetics, Inc., Mt. Vernon, N.Y.
EIP, Inc., Santa Clara, Cal. ..... p 448
Eldorado Electrodata, Concord, Cal. p 449
Electro-Numerics, Santa Clara, Cal.
Electronic Research Co., Shawnee Mission, Kans. ..... p 458
Faratron Corp., Hackensack, N.J. p 467
Gibbs Mfg. & Resch., Janesville, Wisc.
Hewlett-Packard, Palo Alto, Cal.
Hickok Elect. Instr., Cleveland, Ohio p 488
Hughes Aircraft Co., Mos Div., Newport Beach, Cal.
Kay Elemetrics, Pine Brook, N.J. ... p 505
Landis & Gyr, Inc., Elmsford, N.Y.
Metric Sys., Ft. Walton Beach, Fla.
Monsanto Company, Electronic Instruments, W. Caldwell, N.J. p 528,529
Pinlites, Fairfield, N.J.
Simpson Elec. Co., Chicago, Ill. ..... p 557
Systron-Donner Corp., Concord, Cal. p 564
Systron-Donner Concord Instr. Div., Concord, Cal. ..... p 564
Systron-Donner Datapulse Div., Culver City, Cal. ..... p 564
Systron Donner Trygon Elctrns. Sub., Roosevelt, N.Y. ..... p 564
Tektronix, Inc., Beaverton, Ore.
Tokyo Elec. Co., Ltd., Chiyoda-ku, Tokyo, Japan
Veeder-Root, Hartford, Conn.
Advanced Energy Conversion, Menlo Pk., Cal.
Allis, Louis Co., Milwaukee, Wisc.
AMBAC Inds., Garden City, N.Y.
Anritsu Electric Co., Ltd., Tokyo, Japan
Astro Comm. Lab., Gaithersburg, Md.
Broadview Inds. Corp., Hempstead, N.Y.
California Instrs. Co., San Diego, Cal.
Communication Elctrns., Rockville, Md.
Controlcraft Corp., West Chicago, Ill.
Data Dynamics Div., Englewood, N.J.
Datum, Inc., Anaheim, Calif.
Digital Displays, Mendham, N.J.
Durant Mfg. Co., Milwaukee, Wisc.
Dynamic Precision Controls, Hagerstown, Ind.
Dynapar Corp., Gurnee, Ill.
Elctrns., Ltd., Marion, Iowa
Fairchild Semiconductor, Mountain View, Calif.
Fischer & Porter Co., Warminster, Pa.
General Radio Co., Concord, Mass.
General Radiotelephone Co., Burbank, Cal.
Harshaw Chem. Co., Cleveland, Ohio
Heath Co., Benton Harbor, Mich.
Instrumentation Tech. Corp., Northridge, Calif.
Integrated Circuit Elctrns., Inc., Waltham, Mass.
Intercontinental Elctrns., E. Rochester, N.Y.
ITT Mackay Marine, Clark, N.J.
JMR Elctrns. Corp., Bronx, N.Y.
Magtrol, Inc., Buffalo, N.Y.
Matsushita Comm. Ind'l. Co., Ltd., Yokohama, Japan
MEKontrol Inc., Northboro, Mass.
Micro-Tel Corp., Baltimore, Md.
Midland Standard Inc., Elgin, Ill.
Milletron, Inc., Pittsburgh, Pa.
Neutronic Corp., Bridgeton, Mo.
New London Instr. Co., Inc., New London, Conn.
Northeast Elctrns. Corp., Concord, N.H.
Philco-Ford Corp., Washington, D.C.
Philips Elctrn. Instrs., Mt. Vernon, N.Y.
Post Elctrn. Prods., Beverly, Mass.

Stark Elctrn. Instrs., Ltd., Ajax, Ont., Canada
Struthers-Dunn, Inc., Bettendorf, Iowa
Systems Resch. Labs., Dayton, Ohio
Techmetric Co., Redwood City, Calif.
Tyco Instr. Div., Waltham, Mass.
Unitron Inds. Corp., Taipei, Taiwan, Republic of China
Zehntel, Inc., Berkeley, Calif.

Counters, Gating—See Vol 2

Counters, Geiger

General Elec. Co., Schenectady, N.Y.
Landis & Gyr, Inc., Elmsford, N.Y.
Victoreen Instr., Cleveland, Ohio
Central Scientific Co., Chicago, Ill.
Eberline Instr. Corp., Santa Fe, N.M.
Harshaw Chem. Co., Cleveland, Ohio
Johnston Labs., Inc., Cockeysville, Md.
Kahl Scientific Instr. Corp., El Cajon, Calif.
Mullard, Inc., Farmingdale, N.Y.
Nuclear-Chicago, Des Plaines, Ill.
Nuclear Corp. Amer., Denville, N.J.
Nuclear Equip. Chem. Corp., Farmingdale, N.Y.
Nuclear Resch. Corp., Southampton, Pa.
Nuclear Supply Co., Washington, D.C.
Packard Instrument Co., Inc., Downers Grove, Ill.
Rank Precision Inds., W. Nyack, N.Y.
Reuter-Stokes, Cleveland, Ohio
Soltec Corp., No. Hollywood, Cal.
Stark Elctrn. Instrs., Ltd., Ajax, Ont., Canada
Universal Transistor Prods., Copiague, N.Y.
Wood, N. Counter Lab., Inc., Chicago, Ill.

Counters, Mechanical—See Vol 2

Counters, Particle

Durant Digital Instrs., Milwaukee, Wisc.
Electronic Research Co., Shawnee Mission, Kans.
General Elec. Co., Schenectady, N.Y.
Landis & Gyr, Inc., Elmsford, N.Y.
Veeder-Root, Hartford, Conn.
AIL, Div. Cutler-Hammer, Inc., Deer Park, N.Y.
Bailey Instrs., Inc., Saddle Brook, N.J.
Components Corp., Denville, N.J.
Controlled Environment Equip. Corp., Newton Upper Falls, Mass.
Eberline Instr. Corp., Santa Fe, N.M.
Harshaw Chem. Co., Cleveland, Ohio
High Accuracy Prods. Corp., Claremont, Cal.
Hird Brown America, Livingston, N.J.
Johnston Labs., Inc., Cockeysville, Md.
Milletron, Inc., Pittsburgh, Pa.
Mullard, Inc., Farmingdale, N.Y.
Nuclear Diodes, Prairie View, Ill.
Nuclear Equip. Chem. Corp., Farmingdale, N.Y.
Nuclear Resch. Corp., Southampton, Pa.
Philips Elctrn. Instrs., Mt. Vernon, N.Y.
Rank Precision Inds., W. Nyack, N.Y.
Royco Instrs., Inc., Menlo Pk., Cal.
Soltec Corp., No. Hollywood, Cal.
SSR Instrs. Co., Santa Monica, Cal.
Zeiss, Carl, Inc., New York, N.Y.

Counters, Photoelectric—See Vol 2

Counters, Preset—See Vol 2

Counters, Proportional—See Counters, Particle

Counters, Pulse—See Vol 2

Counters, Radiation—See Counters, Geiger-Also See Counters, Scintillation

Counters, Reversible—See Counters, Bi-Directional—Vol 2

Counters, Revolution—See Vol 2

Counters, Scintillation

General Elec. Co., Schenectady, N.Y.
Hewlett-Packard, Palo Alto, Cal.
Landis & Gyr, Inc., Elmsford, N.Y.
Victoreen Instr., Cleveland, Ohio
AMBAC Inds., Garden City, N.Y.
Beckman Instrs., (AISSD), Fullerton, Cal.
Components Corp., Denville, N.J.
Eberline Instr. Corp., Santa Fe, N.M.
EMR Div., Princeton, N.J.
Harshaw Chem. Co., Cleveland, Ohio
Isomet Corp., Oakland, N.J.
Johnston Labs., Inc., Cockeysville, Md.
Mullard, Inc., Farmingdale, N.Y.
Nanosecond Systems, Inc., Fairfield, Conn.
Nuclear-Chicago, Des Plaines, Ill.
Nuclear Corp. Amer., Denville, N.J.
Nuclear Data, Inc., Palatine, Ill.
Nuclear Diodes, Prairie View, Ill.
Nuclear Equip. Chem. Corp., Farmingdale, N.Y.
Nuclear Meas. Corp., Indianapolis, Ind.
Nuclear Resch. Corp., Southampton, Pa.
Nuclear Supply Co., Washington, D.C.
Packard Instrument Co., Inc., Downers Grove, Ill.
Philips Elctrn. Instrs., Mt. Vernon, N.Y.
Pilot Chemicals, Inc., Watertown, Mass.
Soltec Corp., No. Hollywood, Cal.

Counters, Variable Time Base

Anadex Instrs., Inc., Van Nuys, Calif. p 394
Beckman Instruments, Shiller Pk., Ill. p 413
LVC Ind's., Inc., Corona, N.Y.
Monitor Labs, Inc., San Diego, Cal.
Monsanto Company, Electronic Instruments, W. Caldwell, N.J. p 528,529
Systron-Donner Concord Instr. Div., Concord, Cal.
Digital Displays, Mendham, N.J.
Elctrns., Ltd., Marion, Iowa

Couplers & Keyers—See Keyers & Couplers

Couplers, Antenna

American Elctrn. Labs., Inc., Lansdale, Pa.
Applied Research Inc., Port Washington, N.Y. p 1554
Austron, Inc., Austin, Tex.
Centralab, Elctrns., Milwaukee, Wisc. p 2348
Daico Inds., Inc., Compton, Cal.. p 1556
Frequency Engrg. Labs., Farmingdale, N.J.
GC Elctrns., Rockford, Ill.
Geo Space Sys., Tampa, Fla. p 486
RF Communications, Rochester, N.Y.
Rye Inds., Inc., Mamaroneck, N.Y.
Saxton Prods., Congers, N.Y.
Transco Prods., Inc., Venice, Cal. p 613
Waveline, Inc., W. Caldwell, N.J. p 1567
Advance Ross Elctrns. Corp., Chicago, Ill.
Aerocom, Miami, Fla.
Aerolite Electronics Corp., Union City, N.J.
Aeronautical Comm. Equip. Inc., Miami, Fla.
Aerospace Resch. Inc., Boston, Mass.
Aircom, Inc., Union, N.H.
Anzac Elctrns., Waltham, Mass.
A.R.F. Products, Inc., Boulder, Colo.
A.R.F. Products, Inc., Raton, N.M.
Astro Comm. Lab., Gaithersburg, Md.
Ava Elctrns., Upper Darby, Pa.
Aviel Electronics Inc, Burbank, Calif.
Barker & Williamson, Bristol, Pa.
Benco Television Assoc., Rexdale, Ont., Can.
Brelonix, Inc., Seattle, Wash
Cardwell Condenser, Lindenhurst, N.Y.
CCA Elctrns. Corp., Gloucester, N.J.
C.B.C. Inds., Inc., Ft. Washington, Pa.
Collins Radio Co., Cedar Rapids, Iowa
Color/Craft Antenna Corp., N. Hollywood, Calif.
Continental Elctrns. Mfg., Dallas, Tex.
Delta Elctrns., Alexandria, Va.
Dittmore-Freimuth Corp., Milwaukee, Wisc.
Dorne & Margolin, Inc., Bohemia, N.Y.
Eby Sls. Co., Jamaica, N.Y.
Elctrn. Comm., Inc., St. Petersburg, Fla.
Elctrn. Navigation Inds., Inc., Rochester, N.Y.
Elctrn. Resources Div., Los Angeles, Cal.
Federal Screw Prods., Inc., Chicago, Ill.
Fedtro, Inc., Rockville Centre, N.Y.
Finney Co., Bedford, Ohio
Gavin Instrs., Somerville, N.J.
General Microwave Corp., Farmingdale, N.Y.
Granite State Machine Co., Inc., Manchester, N.H.
GTE Sylvania Inc., Elctrn. Sys. Gp., Waltham, Mass.
Guide Inds., Inc., Sun Valley, Calif.
Hartman Sys. Div. A-T-O, Inc., Huntington Sta., N.Y.
Herley Inds., Inc., Syosset, N.Y.
Hi-Lo Mfg. Corp., Chicago, Ill.
HRB-Singer, Inc., State College, Pa.
Hughes Aircraft Co, Culver City, Cal.
Hughes Aircraft Co, Fullerton, Cal.
Javex Elctrns., Cherry Valley, Calif.
Jerrold Elctrns. Corp., Philadelphia, Pa.
Jerrold/Watkins Div., Toronto, 395, Ont., Can.
Kevlin Mfg. Co., Woburn, Mass.
Lance Inds., Sylmar, Calif.
La Pointe Inds., Inc., Rockville, Conn.
Maspro Co., Inc., Nagoya-Shigai, Japan
Maury Microwave Corp., Cucamonga, Calif.
MCS Corp., Monrovia, Calif.
Merrimac Resch. & Dev., Inc., West Caldwell, N.J.
Microphase Corp., Cos Cob, Conn.
Microwave Assocs., Inc., Burlington, Mass.
Mobil Elctrns., Inc., Anderson, Ind.
National Beryllia Corp., Haskell, N.J.
Olektron Corp., Dudley, Mass.
Phelps Dodge Comm., North Haven, Conn.
Philips Elctrns. Inds., Ltd., Toronto 17, Can.
Philmore Mfg. Co., Richmond Hill, N.Y.
Premier Microwave, Port Chester, N.Y.
Radiation Sys., Inc., McLean, Va.
Rantec Div., Calabasas, Calif.
RCA Corp., Camden, N.J.
RF Communications, Inc., Rochester, N.Y.
Rohde & Schwarz Sls., Passaic, N.J.
Rowe Engravers, Clifton, N.J.
Sedco Sys., Inc., Farmingdale, N.Y.
Shigoto Inds., Ltd., New York, N.Y.
Struthers Elctrns. Corp., Mamaroneck, N.Y.
Sunair Elctrn., Inc., Ft. Lauderdale, Fla.
TACO Div., Sherburne, N.Y.
Technical Mat'l., Mamaroneck, N.Y.
Thomson-CSF Inc., New York, N.Y.
Tracor, Inc., Austin, Tex.
Tricraft Prods., Chicago, Ill.
Varian Assocs., Palo Alto, Cal.
Victor Microwave, Inc., Wakefield, Mass.
Vidaire Electronics Mfg. Corp., Freeport, N.Y.
Virginia Elctrns. Co., Inc., Falls Church, Va.
Waber Elctrns., Inc., Philadelphia, Pa.
Wavecom, Inc., Northridge, Cal.
Westinghouse Elec. Corp., Pittsburgh, Pa.
Winegard Co., Burlington, Iowa

Couplers, Directional—See Vol 2

Couplers, Microwave—See Vol 2

Couplers, Multi-Set—See Couplers, Antenna

Couplers, Rotary—See Vol 2

Couplings, Microwave—See Couplers, Microwave

Couplings, Quick-Disconnect, Liquid or Gas—See Vol 3

Couplings, Shaft, Rigid & Flexible—See Vol 2

Couplings, Vacuum

Bendix, Rochester, N.Y.
Ceramaseal, Inc., New Lebanon Center, N.Y.
Edwards High Vacuum, Oakville, Ont., Can.
Edwards High Vacuum, Grand Island, N.Y.
Granville-Phillips Co., Boulder, Colo.
High Voltage Engrg. Corp., Burlington, Mass.
Lear Siegler, Inc., Elyria, Ohio
Leybold-Heraeus, Monroeville, Pa.
Norton Co., Newton, Mass.
Sargent Welch Sci. Co., Skokie, Ill.
Ultek Div., Palo Alto, Calif.
Vacuum Equip. Div., Newton, Mass.
Varian Assocs., Palo Alto, Cal.

Covers, Chassis—See Vol 3

Covers, Jack—See Jack Covers—Vol 3

Covers, Protective—See Vol 3

Crayons, Coatings, Pellets, etc., Temperature Indicating-Also See Crystals, Liquid, Temperature Indicating—See Vol 2

Crimping Machines & Tools—See Tools, Crimping—Vol 3

Crossbars—See Scanners, Crossbar; Switches, Crossbar

Crucibles—See Boats—Vol 3

Cryogenic Equipment—See Dewars; Pumps; etc.

Cryogenic Liquid Converters

Aeronautical Div, Bryan, Ohio
Bendix Corp., Davenport, Iowa
Cryotronics, Inc., High Bridge, N.J.
Gardner Cryogenics Corp., Bethlehem, Pa.
Hughes Aircraft Co, Culver City, Cal.
Pennwalt Corp., Phila., Pa.
Santa Barbara Resch. Ctr., Goleta, Calif.

Crystal Analyzers—See Anlayzers, Crystal

Crystal Blanks

Bliley Electric, Erie, Pa. p 1369
Bulova Watch Co., Freq. Control Prods., Elctrns. Div., Woodside, N.Y. p 1362
Croven, Ltd., Whitby, Ont., Can... p 1378
CTS Corp, Elkhart, Ind. p 1373
Electronic Research Co., Shawnee Mission, Kans. p 1384
International Crystal Mfg., Oklahoma City, Okla. p 1404,1405
McCoy Elctrns. Co., Mt. Holly Springs, Pa. p 1408
Reeves-Hoffman Div., Carlisle, Pa. p 1426
Crystal Optics Resch., Inc., Ann Arbor, Mich.
Crystek Div., Ft. Myers, Fla.
Dell Optics Co., Inc., N. Bergen, N.J.
E.B.L. Co, East Hartford, Conn.
Elctrn. Space Prods., Los Angeles, Cal.
Exotic Materials, Inc., Costa Mesa, Cal.
Gould Labs., Cleveland, Ohio
Harshaw Chem. Co., Cleveland, Ohio
Hoffman, P.R. Co. Div., Carlisle, Pa.
Isomet Corp., Oakland, N.J.
Norelcom Inds., Inc., Farmingdale, N.Y.
Pan American Trade Dev., New York, N.Y.
Quartz & Silice, Paris 8e, France
Sawyer Resch. Prods., Inc., Eastlake, Ohio
Soltec Corp., No. Hollywood, Cal.

Crystal Filters—See Filters, Crystal—Vol 2

Crystal Mounts—See Mounts, Crystal

Crystal Oscillators—See Oscillators, Crystal-Controlled

Crystal Ovens—See Ovens, Crystal

Crystals, Barium Titanate

Erie Technological Prods. (EEM), Erie, Pa.
Bram Metallurgical-Chem., Phila., Pa.
Channel Inds., Santa Barbara, Cal.
Commander Labs., Inc., Escondido, Calif.
Edo Western Corp., Salt Lake City, Utah
Elctrn. Space Prods., Los Angeles, Cal.
Harshaw Chem. Co., Cleveland, Ohio
Honeywell, Aerospace & Def., Minneapolis, Minn.
Linden Labs., Inc., State College, Pa.
Mackay, A.D., Inc., New York, N.Y.

Materials Resch. Corp., Orangeburg, N.Y.
Valpey Corp., Holliston, Mass.
Var-Lac-Oid Chemical Co., Elizabeth, N.J.

Crystals, Filter

Bliley Electric, Erie, Pa. ..... p 1369
Bulova Watch Co., Freq. Control Prods., Elctrns. Div., Woodside, N.Y. p 1362
Croven, Ltd., Whitby, Ont., Can... p 1378
CTS Corp, Elkhart, Ind..... p 1373
Damon Corp., Needham Hgts., Mass.
Electronic Research Co., Shawnee Mission, Kans. ..... p 1384
Erie Frequency Control, Carlisle, Pa.
Erie Technological Prods. (EEM), Erie, Pa.
Hughes Aircraft Co., Frequency Control Devices, Newport Bch., Cal. .... p 1403
Hughes Aircraft Co., Hybrid Microelectronic Circuits, Newport Bch., Cal. ..... p 1403
McCoy Elctrns. Co., Mt. Holly Springs, Pa. ..... p 1408
Motorola Communications & Electrns., Chicago, Ill. ..... p 1417
Northern Engrg. Labs., Burlington, Wisc. ..... p 1419
Piezo Technology, Orlando, Fla.
Reeves-Hoffman Div., Carlisle, Pa. p 1426
Snelgrove, C. R. Ltd., Don Mills, Ont. Can. ..... p 1428
TMC Systems (Ariz.), Tempe, Ariz.
Torotel, Inc., Grandview, Mo. ..... p 1432
Clark Crystal, Marlborough, Mass.
Crystal Network Prods. Corp., Erie, Pa.
Crystek Div., Ft. Myers, Fla.
Exotic Materials, Inc., Costa Mesa, Cal.
Harshaw Chem. Co., Cleveland, Ohio
Monitor Sys., Inc., Ft. Washington, Pa.
Sherold Crystal Prods., Kansas City, Mo.
Standard Crystal Corp., Alhambra, Cal.
Technical Mat'l., Mamaroneck, N.Y.
Tedford Crystal Labs., Cincinnati, Ohio
TRW Semiconductor Div. TRW Inc., Lawndale, Cal.

Crystals, Frequency Control

Accutronics, Inc., Geneva, Ill.
Bliley Electric, Erie, Pa. ..... p 1369
Bulova Watch Co., Freq. Control Prods., Elctrns. Div., Woodside, N.Y. p 1362
Croven, Ltd., Whitby, Ont., Can... p 1378
CTS Corp, Elkhart, Ind..... p 1373
Electronic Research Co., Shawnee Mission, Kans. ..... p 1384
Erie Frequency Control, Carlisle, Pa. p 1382
Erie Technological Prods. (EEM), Erie, Pa. ..... p 1382
Gibbs Mfg. & Resch., Janesville, Wisc.
Hughes Aircraft Co., Frequency Control Devices, Newport Bch., Cal. .... p 1403
Hughes Aircraft Co., Hybrid Microelectronic Circuits, Newport Bch., Cal. ..... p 1403
International Crystal Mfg., Oklahoma City, Okla. .....p 1404,1405
McCoy Elctrns. Co., Mt. Holly Springs, Pa. ..... p 1408
Meloy Laboratories, Springfield, Va.
Monitor Prods., S. Pasadena, Cal. p 1416
Northern Engrg. Labs., Burlington, Wisc. ..... p 1419
Piezo Technology, Orlando, Fla.
Reeves-Hoffman Div., Carlisle, Pa. p 1426
TMC Systems (Ariz.), Tempe, Ariz.
Torotel, Inc., Grandview, Mo.
X-Tron Electronics, Hayward, Cal. p 1434
Clark Crystal, Marlborough, Mass.
Crystek Div., Ft. Myers, Fla.
Nebel, R.E. Lab., Garden City, N.Y.
Pan American Trade Dev., New York, N.Y.
Philips Elctrns. Inds., Ltd., Toronto 17, Can.
Racal Communications, Rockville, Md.
RCA Corp., Camden, N.J.
Sherold Crystal Prods., Kansas City, Mo.
Standard Crystal Corp., Alhambra, Cal.
Tedford Crystal Labs., Cincinnati, Ohio
TRW Semiconductor Div. TRW Inc., Lawndale, Cal.

Crystals, Laser-Maser

Nippon Electric/NEC America, N.Y., N.Y.
Aremco Prods., Inc., Briarcliff Manor, N.Y.
Atomergic Chemetals, Carle Place, N.Y.
Bell & Howell Co., Pasadena, Calif.
Crystal Optics Resch., Inc., Ann Arbor, Mich.
Crystal Technology, Mountain View, Cal
Dell Optics Co., Inc., N. Bergen, N.J.
E.B.L. Co, East Hartford, Conn.
Elctrn. Space Prods., Los Angeles, Cal.
Exotic Materials, Inc., Costa Mesa, Cal.
Gould Labs., Cleveland, Ohio
Hughes Aircraft Co, Malibu, Cal.
Isomet Corp., Oakland, N.J.
Korad Mat'ls. Sys. Div., Santa Monica, Cal.
Lasermetrics, Inc., Rochelle Park, N.J.
Quartz & Silice, Paris 8e, France
Raytheon Co., Waltham, Mass.
Union Carbide, San Diego, Cal.
Valpey Corp., Holliston, Mass.
Var-Lac-Oid Chemical Co., Elizabeth, N.J.

Crystals, Liquid, Temperature Indicating-Also See Crayons, Coatings, Pellets, Temperature Indicating—

See Vol 2

Crystals, Piezoelectric

Accutronics, Inc., Geneva, Ill.
Bliley Electric, Erie, Pa. ..... p 1369
Croven, Ltd., Whitby, Ont., Can... p 1378
CTS Corp, Elkhart, Ind.
Erie Frequency Control, Carlisle, Pa. p 1382
Erie Technological Prods. (EEM), Erie, Pa. ..... p 1382
Gibbs Mfg. & Resch., Janesville, Wisc.
McCoy Elctrns. Co., Mt. Holly Springs, Pa. ..... p 1408
Radio Materials Co., Chicago, Ill.
Reeves-Hoffman Div., Carlisle, Pa. p 1426
Seacor, Inc., Norwood, N.J.
Torotel, Inc., Grandview, Mo. ..... p 1432
X-Tron Electronics, Hayward, Cal. p 1434
Aremco Prods., Inc., Briarcliff Manor, N.Y.
Channel Inds., Santa Barbara, Cal.
Commander Labs., Inc., Escondido, Calif.
Crystal Network Prods. Corp., Erie, Pa.
Crystal Resch., Inc., Cambridge, Mass.
Crystal Technology, Mountain View, Cal
Crystek Div., Ft. Myers, Fla.
E.B.L. Co, East Hartford, Conn.
Edo Western Corp., Salt Lake City, Utah
Gould Labs., Cleveland, Ohio
Honeywell, Aerospace & Def., Minneapolis, Minn.
Isomet Corp., Oakland, N.J.
Lasermetrics, Inc., Rochelle Park, N.J.
Pan American Trade Dev., New York, N.Y.
Petersen Radio, Council Bluffs, Iowa
Quartz & Silice, Paris 8e, France
Sherold Crystal Prods., Kansas City, Mo.
Thermal Amer. Fused Quartz, Montville, N.J.
TRW Semiconductor Div. TRW Inc., Lawndale, Cal.
Vernitron Piezoelectric Div., Bedford, Ohio

Crystals, Quartz

Bliley Electric, Erie, Pa. ..... p 1369
Bulova Watch Co., Freq. Control Prods., Elctrns. Div., Woodside, N.Y. p 1362
Croven, Ltd., Whitby, Ont., Can... p 1378
CTS Corp, Elkhart, Ind..... p 1373
Electronic Research Co., Shawnee Mission, Kans. ..... p 1384
Engelhard Minerals & Chem., Murray Hill, N.J.
Erie Frequency Control, Carlisle, Pa. p 1382
Erie Technological Prods. (EEM), Erie, Pa. ..... p 1382
Gibbs Mfg. & Resch., Janesville, Wisc.
Hughes Aircraft Co., Frequency Control Devices, Newport Bch., Cal. .... p 1403
Hughes Aircraft Co., Hybrid Microelectronic Circuits, Newport Bch., Cal. ..... p 1403
McCoy Elctrns. Co., Mt. Holly Springs, Pa. ..... p 1408
Monitor Prods., S. Pasadena, Cal. p 1416
Motorola Communications & Electrns., Chicago, Ill. ..... p 1417
Northern Engrg. Labs., Burlington, Wisc. ..... p 1419
Piezo Technology, Orlando, Fla.
Reeves-Hoffman Div., Carlisle, Pa. p 1426
Snelgrove, C. R. Ltd., Don Mills, Ont. Can. ..... p 1428
TMC Systems (Ariz.), Tempe, Ariz.
Torotel, Inc., Grandview, Mo. ..... p 1432
X-Tron Electronics, Hayward, Cal. p 1434
Aremco Prods., Inc., Briarcliff Manor, N.Y.
Basic Ceramics Inc., Hawthorne, N.J.
Bram Metallurgical-Chem., Phila., Pa.
Clark Crystal, Marlborough, Mass.
Connolly & Co., Inc., Mt. View, Calif.
Crystek Div., Ft. Myers, Fla.
Dell Optics Co., Inc., N. Bergen, N.J.
E.B.L. Co, East Hartford, Conn.
Elctrn. Space Prods., Los Angeles, Cal.
Esco Products, Oak Ridge, NJ
Filtech Corp., Franklin Park, Ill.
Hoffman, P.R. Co. Div., Carlisle, Pa.
Isomet Corp., Oakland, N.J.
Lasermetrics, Inc., Rochelle Park, N.J.
Mackay, A.D., Inc., New York, N.Y.
Pan American Trade Dev., New York, N.Y.
Petersen Radio, Council Bluffs, Iowa
Philips Elctrns. Inds., Ltd., Toronto 17, Can.
Sawyer Resch. Prods., Inc., Eastlake, Ohio
Sherold Crystal Prods., Kansas City, Mo.
Sloan Technology Corp., Santa Barbara, Calif.
Tedford Crystal Labs., Cincinnati, Ohio
Thermal Amer. Fused Quartz, Montville, N.J.
TRW Semiconductor Div. TRW Inc., Lawndale, Cal.
Valpey Corp., Holliston, Mass.

Crystals, Rochelle Salts

Lasermetrics, Inc., Rochelle Park, N.J.
Quartz & Silice, Paris 8e, France

Crystals, Sapphire

Aremco Prods., Inc., Briarcliff Manor, N.Y.
Basic Ceramics Inc., Hawthorne, N.J.
Ceramic Magnetics, Inc., Fairfield, N.J.
Crystal Optics Resch., Inc., Ann Arbor, Mich.
Dell Optics Co., Inc., N. Bergen, N.J.
Elctrn. Space Prods., Los Angeles, Cal.
Esco Products, Oak Ridge, NJ
Insaco, Inc., Quakertown, Pa.
Keller, Hugo P., Inc., New York, N.Y.
Lasermetrics, Inc., Rochelle Park, N.J.
Union Carbide, San Diego, Cal.
Valpey Corp., Holliston, Mass.

Crystals, Scintillation Counter

Victoreen Instr., Cleveland, Ohio
Harshaw Chem. Co., Cleveland, Ohio
Isomet Corp., Oakland, N.J.
Nuclear Equip. Chem. Corp., Farmingdale, N.Y.
Nuclear Resch. Corp., Southampton, Pa.
Packard Instrument Co., Inc., Downers Grove, Ill.
Pilot Chemicals, Inc., Watertown, Mass.
Quartz & Silice, Paris 8e, France
Soltec Corp., No. Hollywood, Cal.
Var-Lac-Oid Chemical Co., Elizabeth, N.J.

Crystals, Semiconductor(Ingots & Wafers)

American Elctrn. Labs., Inc., Lansdale, Pa.
Ohio Semitronics, Columbus, Ohio p 1986
Atomergic Chemetals, Carle Place, N.Y.
Bell & Howell Co., Pasadena, Calif.
Computer Diode, Fair Lawn, N.J.
Dow Corning Corp., Midland, Mich.
Eagle-Picher Inds., Inc., Joplin, Mo.
Elctrn. Space Prods., Los Angeles, Cal.
Exotic Materials, Inc., Costa Mesa, Cal.
Gould Labs., Cleveland, Ohio
GTE Sylvania, Inc., Towanda, Pa.
Harmon Lichtenstein & Co., New York, N.Y.
Harshaw Chem. Co., Cleveland, Ohio
Leico Inds., Inc., New York, N.Y.
Mackay, A.D., Inc., New York, N.Y.
Materials Resch. Corp., Orangeburg, N.Y.
Monsanto Elctrn. Mat'ls., St. Peters, Mo.
Mullard, Inc., Farmingdale, N.Y.
Norton Co., Worcester, Mass.
Nucleonic Prods., Canoga Pk, Cal.
Pan American Trade Dev., New York, N.Y.
Semimetals, Inc., Westbury, N.Y.
Solitron Devices, Tappan, N.Y.
TRW Semiconductor Div. TRW Inc., Lawndale, Cal.
Var-Lac-Oid Chemical Co., Elizabeth, N.J.
Ventron Corp., Bradford, Pa.

Crystals, Yig

Electro/Data, Inc., Garland, Tex.
Tohoku Metal Inds., Ltd., Tokyo, Japan
Aremco Prods., Inc., Briarcliff Manor, N.Y.
Atomergic Chemetals, Carle Place, N.Y.
Elctrn. Space Prods., Los Angeles, Cal.
Harshaw Chem. Co., Cleveland, Ohio
Quartzite Processing, Inc., Malden, Mass.
Valpey Corp., Holliston, Mass.
Var-Lac-Oid Chemical Co., Elizabeth, N.J.

Cups, Encapsulation—

See Vol 3

Current Sensors-Also See Transducers, Volt, etc.—

See Vol 2

Current Sources

California Elctrn. Mfg. Co., Alamo, Calif.
CEA, Monrovia, Cal.
Christie Elec., Los Angeles, Cal.
E-H Resch. Labs., Inc., Oakland, Cal.
Electronic Dev. Corp., Boston, Mass. p 456
Fluke, John Mfg. Co., Inc., Seattle, Wash. ..... p 476
General Resistance, Mt. Vernon, N.Y.
Hewlett-Packard, Palo Alto, Cal.
Julie Research Lab., New York, N.Y. p 502
Kepco, Inc., Flushing, N.Y.
North Hills Elctrns., Inc., Glen Cove, N.Y.
Power Designs, Westbury, N.Y.
Raytheon Co., Quincy, Mass.
Systron-Donner Datapulse Div., Culver City, Cal.
Teledyne Philbrick, Dedham, Mass.
Trio Labs, Inc., Plainview, N.Y.
Zaring Inds., Inc., Carmel, Ind.
AMBAC Inds., Garden City, N.Y.
Bio-Medical Elctrns., Inc., Rockville, Md.
Eagle Elec. Mfg. Co., L. I. C., N.Y.
Foxboro Co., Foxboro, Mass.
Glentronics, Glendora, Cal.
Hallmark Standards, Inc., Mt. Vernon, N.Y.
Keithley Instrs., Inc., Cleveland, Ohio
LAD Electro-Sys., Inc., Hicksville, N.Y.
McKee-Pedersen Instrs., Danville, Calif.
Optical Elctrns., Tucson, Ariz.
Optimation, Inc., Sun Valley, Calif.
Sparton Southwest, Inc., Albuquerque, N.M.
Westinghouse Elec. Int'l., New York, N.Y.

Cutters, Hole, Hand Operated —See Vol 3

Cutters, Wire, Automatic—

See Wire Measuring & Cutting Machines

Cutters, Wire, Hand—

See Wire Cutters, Hand Operated —Vol 3

Dampers, Servo—

See Vol 2

Dampers, Structural, Chassis, Panel, etc.—

See Mounts, Shock & Vibration—Vol 3

Dashpots—

See Vol 3

Data Acquisition & Reduction Systems

A. D. Data Sys., Inc., Rochester, N.Y.p 328
American Astronics, Hollywood, Calp 335
Amp Inc., Harrisburg, Pa.....p 330,331
Astrosystems, Lake Success, N.Y. p 332,409

Austron, Inc., Austin, Tex.
Beckman Instruments, Shiller Pk., Ill.
Bendix Environmtl. Sci., Baltimore, Md.
Chronetics, Inc., Mt. Vernon, N.Y.
Computer Prods., Ft. Lauderdale, Fla.
Control Technology Co., L.I.C., N.Y.
Data-Control Systems, Danbury, Conn. p 345
Data Graphics, San Antonio, Tex. p 346
Datacom, Inc., Ft. Walton Bch., Fla. p 344
Delco Elctrns. Div., Kokomo, Ind.
Digital Equip. Corp., Maynard, Mass. p 348
Digitron Corp., Norristown, Pa.
Dranetz Engrg. Labs., Plainfield, N.J.
Dytro Corp., Hicksville, N.Y.
Ectron Corp., San Diego, Cal.
Eldorado Electrodata, Concord, Cal. p 449
Geo Space Sys., Tampa, Fla. ..... p 350
Gould, Inc., Cleveland, Ohio
Harrel, Inc., E. Norwalk, Conn.
Hewlett-Packard, Palo Alto, Cal.
Honeywell, Denver, Colo. ..... p 590
Hybrid Sys. Corp., Burlington, Mass.
Inter-Computer Elctrns., Lansdale, Pa.
Ithaco, Inc., Ithaca, N.Y. ..... p 1286
Matrix Corp., Beech Grove, Ind. .. p 361
Metric Sys., Ft. Walton Beach, Fla. p 358-360
Monitor Labs, Inc., San Diego, Cal. p 364
Multitech Automation Prods., Monterey Pk., Cal. ..... p 362
(NES) Nationwide Elctrn. Sys., Itasca, Ill. ..... p 365
Parabam, Inc., Compton, Cal. ..... p 371
PPM, Inc., Bedford, Ohio ..... p 535
Quindar Elctrns., Inc., Springfield, N.J. p 953
Raytheon Computer, Santa Ana, Cal. p 374,376
Remex Elctrns., Santa Ana, Cal.
Schaevitz Engrg., Pennsauken, N.J. p 1346
Sonex, Inc., Bethayres, Pa. ..... p 955
Systron-Donner Concord Instr. Div., Concord, Cal.
Teledyne Geotech, Dallas, Tex.
Tempo/UTI Div., Chatsworth, Cal. p 1349
Veeder-Root, Hartford, Conn.
Adage, Inc., Boston, Mass.
Allis, Louis Co., Milwaukee, Wisc.
AMBAC Inds., Garden City, N.Y.
Analogic, Wakefield, Mass.
A.O.I.P., 75/Paris 12eme, France
Applied Digital Data Systems, Inc., Hauppauge, N.Y.
Applied Electro Mechanics, Alexandria, Va.
Applied Systems Corp., Detroit, Mich
Arco Systems Inc., Palo Alto, Cal
Audio Instr. Co., Union City, N.J.
Austin Elctrns., Roselle, N.J.
Automation Dynamics, Northvale, N.J.
Avco Corp., Cincinnati, Ohio
Aydin Data Systems, Ft. Washington, Pa
B-D Spear Medical Sys., Waltham, Mass.
B & W Elctrn. Resch. Labs., Dallas, Tex.
BAC Elctrns., Pennsauken, N.J.
Baganoff Assocs., Inc., St. Louis, Mo.
Bailey Meter Co., Wickliffe, Ohio
Beckman Instrs., (AISSD), Fullerton, Cal.
Beckman Instrs., Process Instrs., Fullerton, Cal.
Bell & Howell Co., Pasadena, Calif.
Bio-Medical Elctrns., Inc., Rockville, Md.
Biocom, Inc., Culver City, Cal.
Biomation Corp., Palo Alto, Cal
Bionic Instrs., Inc., Bala Cynwyd, Pa.
Bowmar/Ali, Inc., Acton, Mass.
Borg-Warner Controls, Santa Ana, Cal.
Bristol Div, Waterbury, Conn
California Avionics Labs., Inc., Palo Alto, Calif.
Cardion Elctrns., Woodbury, N.Y.
Climatronics Corp., Hauppauge, N.Y.
Colorado Instrs., Inc., Broomfield, Colo.
Communitype Corp., New York, N.Y.
Compu-Systems Co., Wakefield, Mass.
Computer Automation, Inc., Newport Beach, Calif.
Computer Prods. Int'l., Inc., Santa Clara, Calif.
Computer Terminal Sys., Plainview, N.Y.
Concord Control, Boston, Mass.
Conrac Corp., New York, N.Y.
Continental Data Sys., Dayton, Ohio
Control Equip. Corp., New England, Lowell, Mass.
Copar Corp., Oak Lawn, Ill.
D.A.T.A., Inc., Orange, N.J.
Data Technology Corp., Palo Alto, Cal.
Datatron, Inc., Santa Ana, Cal
Davidson Elctrn. Dev. Co., Erie, Pa.
Defense Elctrns., Inc., Rockville, Md.
Design Automation, Inc., Lexington, Mass.
Desman Elctrns., Rochester, N.Y.
Digi-Data Corp., Bladensburg, Md.
Digital Data Sys., Northridge, Cal.
Digital Prods., San Pedro, Calif.
Doric Sci. Corp., San Diego, Calif.
Dynamic Precision Controls, Hagerstown, Ind.
Dynamic Sys. Elctrns. Corp., Tempe, Ariz.
Dynapar Corp., Gurnee, Ill.
Echo Science Corp., Pasadena, Cal.
Elctrn. Modules Corp., Timonium, Md.
Elctrns., Ltd., Marion, Iowa
Engdahl Enterprises, Costa Mesa, Cal.
Esterline Angus Div., Indianapolis, Ind.
Evans Assocs., Berkeley, Calif.
Fabri-Tek Instrs., Inc., Madison, Wisc.
Fairchild Space & Defense Sys., Syosset, N.Y.
Ferranti Ltd., Hollinwood, Lancs., England
Fifth Dimension, Princeton, N.J.
Fischer & Porter Co., Warminster, Pa.
Foxboro Co., Foxboro, Mass.
GCA Technology Div., Bedford, Mass.
General Devices, Inc., Princeton, N.J.
General Dynamics, San Diego, Cal.
General Oceanology, Inc., Cambridge, Mass.
Geo Space, Houston, Tex.
GeoMetrics, Palo Alto, Cal.
Gerber Sci. Instr. Co., Hartford, Conn.
Goodyear Aerospace Corp., Akron, Ohio
GTE Sylvania Inc., Elctrn. Sys. Gp., Waltham, Mass.
Harshaw Chem. Co., Cleveland, Ohio
Hartman Sys. Div. A-T-O, Inc., Huntington Sta., N.Y.
Honeywell, Aerospace & Def., Minneapolis, Minn.
Honeywell, Ft. Washington, Pa.
Howell Instrs., Inc., Ft. Worth, Tex.
Hughes Aircraft Co, Culver City, Cal.
Hughes Aircraft Co, Fullerton, Cal.
Incor Instr., Plainview, N.Y.
Incre-Data Corporation, Albuquerque, N.M.
Instrumentation Tech. Corp., Northridge, Calif.
Integrated Controls, San Diego, Cal.
Interlind Elctrns., Doraville, Ga.
Int'l. Computer Prods., Dallas, Tex.
Ircon Inc., Niles, Ill.
Iso-Switch Corp., Costa Mesa, Cal.
Itek Corp., Lexington, Mass.
ITI Electronics, Inc., Clifton, N.J.
Kaye Instrs., Inc., Cambridge, Mass.
KDI Adtrol, Inc., Broomall, Pa.
Lancer Elctrns. Corp., Norristown, Pa.
Lear Siegler, Inc., Santa Monica, Calif.
Lear Siegler, Anaheim, Cal.
Lecroy Resch. Sys. Corp., West Nyack, N.Y.
Leeds & Northrup Corp., No. Wales, Pa.
Link Div., Binghamton, N.Y.
Lockheed Aircraft Svc., Ont., Cal.
Lockheed Aircraft Svce., Special Devices Div., Ontario, Calif.
Lockheed Elctrns. Co., Watchung, N.J.
Loral Elctrn. Sys., Bronx, N.Y.
LTV Electrosystems, Dallas, Tex.
Mann, David W. Co., Burlington, Mass.
Marathon Instrs. Div., Pico Rivera, Calif.
Massey Dickinson Co., Inc., Saxonville, Mass.
Maxson Elctrns. Div., Great River, N.Y.
MB Elctrns/Textron Co., New Haven, Conn.
Meteorology Research, Inc., Altadena, Calif.
Microwave Magnetics Inc., Danvers, Mass.
Midland Standard Inc., Elgin, Ill.
MMI Instruments, Danvers, Mass
Monitor Sys., Inc., Ft. Washington, Pa.
Motorola Instr. & Control, Phoenix, Ariz.
Non-Linear Sys., Inc., Del Mar, Cal.
Northern Sci., Inc., Middleton, Wisc.
Nuclear Data, Inc., Palatine, Ill.
NUS Corp., Paramus, N.J.
Odetics, Inc., Anaheim, Cal.
Optomechanisms, Inc., Plainview, N.Y.
Petty Geophysical Engrg., San Antonio, Tex.
Philco-Ford Corp., Washington, D.C.
Philips Elctrns. Inds., Ltd., Toronto 17, Can.
Pioneer Magnetics, Santa Monica, Cal.
Potter Instr. Co., Melville, N.Y.
Princeton Applied Resch. Corp., Princeton, N.J.
Prodelin, Inc., Hightstown, N.J.
Ramsay Engrg. Co., Anaheim, Calif.
Raytheon Co., Lexington, Mass.
RCA Govt. & Comm. Sys., Moorestown, N.J.
REDCOR Corp., Woodland Hills, Cal.
RFL Inds., Comms. Div., Boonton, N.J.
Rohde & Schwarz Sls., Passaic, N.J.
Sanders Assocs., Nashua, N.H.
Schneider Instr. Co., Cincinnati, Ohio
Scientific-Atlanta, Inc., Atlanta, Ga.
Signal Analysis Inds. Corp., Hauppauge, N.Y.
Singer-General Precision, Inc., Little Falls, N.J.
Singer - Tele-Signal, Woodbury, N.Y.
Spiras Sys., Inc., Waltham, Mass.
Systems Instrs. Resch., Inc., Atlanta, Ga.
Systems Resch. Labs., Dayton, Ohio
Taft Electrosystems, Inc., Metuchen, N. J.
Technical Consultants Corp., Ellington, Conn.
Teledyne Adcom, Cambridge, Mass.
Telmar, Inc., Columbus, Ohio
Theta Instr. Corp., Fairfield, N.J.
3M Co., St. Paul, Minn.
Traid Corp., Glendale, Cal.
Unholtz-Dickie Corp., Hamden, Conn.
United Sys. Corp., Dayton, Ohio
Varian Aerograph, Walnut Creek, Calif.
Varian Data Machines, Irvine, Cal.
Varian Data Machines, Palo Alto, Cal.
Vetter, A.R., Co., Rebersburg, Pa
Vidar Corp., Mountain View, Cal.
Video Resch. Corp., Rockville, Md.
Westinghouse Elec. Corp., Pittsburgh, Pa.
Westronics, Inc., Ft. Worth, Tex.
Wyle Labs., El Segundo, Calif.
Xerox Data Sys., El Segundo, Cal
Zehntel, Inc., Berkeley, Calif.
Zeltex, Inc., Concord, Calif.

Data Blockers

(NES) Nationwide Elctrn. Sys., Itasca, Ill.
AMBAC Inds., Garden City, N.Y.
American Data Sys., Canoga Pk., Cal
Systems Instrs. Resch., Inc., Atlanta, Ga.

Data Compressors, Digital

Austron, Inc., Austin, Tex.
Datacom, Inc., Ft. Walton Bch., Fla.
Digital Equip. Corp., Maynard, Mass.
Eldorado Electrodata, Concord, Cal. p 449
(NES) Nationwide Elctrn. Sys., Itasca, Ill.
AMBAC Inds., Garden City, N.Y.
Arco Systems Inc., Palo Alto, Cal
Aydin Data Systems, Ft. Washington, Pa
Biomation Corp., Palo Alto, Cal
Conductron Corp., St. Charles, Mo.
Electro-Optical Systems, Pasadena, Cal.
Hughes Aircraft Co, Fullerton, Cal.
ISC/Telephonics Div, Huntington, N.Y.
Philco-Ford Corp., Washington, D.C.
Signal Analysis Inds. Corp., Hauppauge, N.Y.
Signatron, Inc., Lexington, Mass.

Data Display Indicators—See Lights; Dials; Readouts—Vol 2

Data Display Systems—See Displays—Vol 2

Data Processing Equipment—See Specific Types

Data Recorders, Computer

A. D. Data Sys., Inc., Rochester, N.Y. p 328
Austron, Inc., Austin, Tex.
Burroughs Corp., Los Angeles, Cal.
Cook Electric Co., Morton Grove, Ill.
Crown Int'l., Elkhart, Ind. ..... p 951
Datacom, Inc., Ft. Walton Bch., Fla. p 344
Digital Equip. Corp., Maynard, Mass.
Digitron Corp., Norristown, Pa.
Dytro Corp., Hicksville, N.Y. ..... p 440
Eldorado Electrodata, Concord, Cal.
Hewlett-Packard, Palo Alto, Cal.
Houston Instr., Bellaire, Tex.
(NES) Nationwide Elctrn. Sys., Itasca, Ill.
North Elec. Co., Galion, Ohio
PPM, Inc., Bedford, Ohio ..... p 535
Presin Co., Inc., Shelton, Conn.
Sangamo Elec. Co., Pickens, S.C.
Sangamo Elec. Co., Springfield, Ill. p 379
AMBAC Inds., Garden City, N.Y.
American Data Sys., Canoga Pk., Cal
Ampex Corp., Redwood City, Calif.
Applied Systems Corp., Detroit, Mich
Astro-Science, S. El Monte, Cal.
Auricord, Long Island City, N.Y.
Austin Elctrns., Roselle, N.J.
Bell & Howell Co., Pasadena, Calif.
Biomation Corp., Palo Alto, Cal
Bionic Instrs., Inc., Bala Cynwyd, Pa.
Borg-Warner Controls, Santa Ana, Cal.
Cintra Inc., Sunnyvale, Cal.
Clary Corp., San Gabriel, Calif.
Colorado Instrs., Inc., Broomfield, Colo.
Communitype Corp., New York, N.Y.
Computer Mate, Inc., San Clemento, Cal
Concord Control, Boston, Mass.
Conductron Corp., St. Charles, Mo.
Control Equip. Corp., New England, Lowell, Mass.
Data Disc Inc., Computer Prods., Sunnyvale, Cal.
Data Prods. Corp., Woodland Hills, Calif.
Data Recording Sys., Sunnyvale, Cal.
Data Technology Corp., Palo Alto, Cal.
Digi-Data Corp., Bladensburg, Md.
Digital Prods., San Pedro, Calif.
Dynalex, Inc., Burbank, Cal.
Dynamic Sys. Elctrns. Corp., Tempe, Ariz.
Echo Science Corp., Pasadena, Cal.
Esterline Angus Div., Indianapolis, Ind.
Facit-Odhner, Inc., Secaucus, N.J.
Farrand Controls, Inc., Valhalla, N.Y.
Ferranti Ltd., Hollinwood, Lancs., England
Fischer & Porter Co., Warminster, Pa.
Friden Div., San Leandro, Calif.
Geo Space, Houston, Tex.
Goldak Co., Inc., Glendale, Calif.
GTE Sylvania Inc., Elctrn. Sys. Gp., Waltham, Mass.
Heitz, Karl, Inc., New York, N.Y.
Honeywell, Aerospace & Def., Minneapolis, Minn.
Honeywell Information Systems, Wellesley Hills, Mass
Honeywell, Ft. Washington, Pa.
Houston Scientific Inds., Inc., Houston, Tex
Hughes Aircraft Co, Fullerton, Cal.
Incre-Data Corporation, Albuquerque, N.M.
Int'l. Computer Prods., Dallas, Tex.
KDI Adtrol, Inc., Broomall, Pa.
Kennedy Co., Altadena, Calif.
Leach Corp., Azusa,, Cal.
Leupold & Stevens, Inc., Beaverton, Ore.
Lockheed Aircraft Svc., Ont., Cal.
Lockheed Aircraft Svce., Special Devices Div., Ontario, Calif.
Lockheed Elctrns. Co., Watchung, N.J.
Marathon Instrs. Div., Pico Rivera, Calif.
MMI Instruments, Danvers, Mass
Mohawk Data Sciences Corp., Herkimer, N.Y.
Non-Linear Sys., Inc., Del Mar, Cal.
Orion Prods. Co., Sunnyvale, Cal.
Peripheral Equip. Corp., Chatsworth, Cal.
Photomechanisms Div., Inc., Huntington Sta., N.Y.
Potter Instr. Co., Melville, N.Y.
Practical Automation, Inc., Shelton, Conn.
Precision Instr. Co., Palo Alto, Calif.
Princeton Applied Resch. Corp., Princeton, N.J.
Raymond Engrg., Inc., Middletown, Conn.
RCA Govt. & Comm. Sys., Moorestown, N.J.
Sanders Assocs., Inc., Data Sys. Div., Nashua, N.H.
Stromberg DatagraphiX, San Diego, Cal.
Systems Instrs. Resch., Inc., Atlanta, Ga.
Taylor Instr. Process Control Div., Rochester, N.Y.

TEAC Corp. of Amer., Santa Monica, Cal
Telmar, Inc., Columbus, Ohio
Texas Instruments, Inc., Houston, Tex.
3M Co., St. Paul, Minn.
Varian Aerograph, Walnut Creek, Calif.
Varian Assocs., Palo Alto, Cal.
Varian Data Machines, Irvine, Cal.
Varian Data Machines, Palo Alto, Cal.
Viatron Computer Sys., Bedford, Mass.
Vidar Corp., Mountain View, Cal.
Video Resch. Corp., Rockville, Md.
Xynetics, Inc., Canoga Pk., Cal.
Zehntel, Inc., Berkeley, Calif.

Data Transmission Systems—
See Transmission Systems, Data

Decade Boxes, Capacitance

AVX Aerovox Corp., New Bedford, Mass.
Beckman Instrs., Cedar Grove, N.J.
Boonton Elctrns., Parsippany, N.J.
Digitran Co., Pasadena, Cal.
Dranetz Engrg. Labs., Plainfield, N.J.
Electro Sci. Inds., Portland, Ore... p 455
Freed Transformer Co., Bklyn., N.Y. p 482
General Resistance, Mt. Vernon, N.Y.
Hewlett-Packard, Palo Alto, Cal.
RCA Elctrns. Comps., Harrison, N.J. p 551
Southern Elctrns., Burbank, Cal.
Sprague Elec. Co., No. Adams, Mass.
A.O.I.P., 75/Paris 12eme, France
Central Scientific Co., Chicago, Ill.
Eico Electronic Instrument Co., Inc., Brooklyn, N.Y.
Electrical Instr. Svc., Inc., Mt. Vernon, N.Y.
General Radio Co., Concord, Mass.
Heath Co., Benton Harbor, Mich.
Leeds & Northrup Corp., No. Wales, Pa.
Lionmount & Co., Ltd., New Southgate, London, England
Midg-Line Instr. Co., Miami, Fla.
Muirhead, Inc., Mountainside, N.J.
Neptune Elctrns. Co., New York, N.Y.
Paraplegics Mfg., Bensenville, Ill.
Rohde & Schwarz Sls., Passaic, N.J.
Rystl Elctrns. Corp., N. Miami Beach, Fla.
Siemens Corp., Comm. Eq. Div., Iselin, N.J.
Stark Elctrn. Instrs., Ltd., Ajax, Ont., Canada

Decade Boxes, Delay Line

Elctrn. Concepts, Inc., Eatontown, N.J.

Decade Boxes, Inductance

AVX Aerovox Corp., New Bedford, Mass.
Coast Coil Co., Los Angeles, Calif. p 2487
Data Delay Devices, Clifton, N.J. p 2745
Freed Transformer Co., Bklyn., N.Y. p 482
Microtran Co., Valley Stream, N.Y.
Solid State Elctrns., Sepulveda, Cal.
Sprague Elec. Co., No. Adams, Mass.
Edison Elctrns. Div., Manchester, N.H.
Eico Electronic Instrument Co., Inc., Brooklyn, N.Y.
Electrical Instr. Svc., Inc., Mt. Vernon, N.Y.
Electrocom Inds., So. Bend, Indiana
General Radio Co., Concord, Mass.
Lionmount & Co., Ltd., New Southgate, London, England
Midg-Line Instr. Co., Miami, Fla.
Siemens Corp., Comm. Eq. Div., Iselin, N.J.

Decade Boxes, Resistance

AVX Aerovox Corp., New Bedford, Mass.
Beckman Instrs., Cedar Grove, N.J.
Biddle, James G., Plymouth Meeting, Pa.
Dale Elctrns., Inc., Columbus, Neb.
Digitran Co., Pasadena, Cal. ..... p 1904
Electro Sci. Inds., Portland, Ore... p 455
Fluke, John Mfg. Co., Inc., Seattle, Wash.
General Resistance, Mt. Vernon, N.Y. p 2851
Julie Research Lab., New York, N.Y. p 503,2853
Ohmite Mfg. Co., Skokie, Ill.
PPM, Inc., Bedford, Ohio
RCA Elctrns. Comps., Harrison, N.J. p 551
Shallco, Inc., Smithfield, N.C.
Shallcross, Selma, N.C. ..... p 555
Vishay Resistor Prod. Div., Malvern, Pa.
A.O.I.P., 75/Paris 12eme, France
AUL Instrs., Inc., Flushng, N.Y.
Canadian Research Institute, Don Mills, Ont., Canada
Central Scientific Co., Chicago, Ill.
Clarostat Mfg. Co., Inc., Dover, N.H.
Consolidated Resistance Sls., Yonkers, N.Y.
Ealing Corp., Cambridge, Mass.
Edison Elctrns. Div., Manchester, N.H.
Eico Electronic Instrument Co., Inc., Brooklyn, N.Y.
Electrical Instr. Svc., Inc., Mt. Vernon, N.Y.
General Radio Co., Concord, Mass.
Hallmark Standards, Inc., Mt. Vernon, N.Y.
Heath Co., Benton Harbor, Mich.
Jordan Electric Co., Van Nuys, Calif.
Leeds & Northrup Corp., No. Wales, Pa.
Lionmount & Co., Ltd., New Southgate, London, England
Midg-Line Instr. Co., Miami, Fla.
Muirhead, Inc., Mountainside, N.J.
Neptune Elctrns. Co., New York, N.Y.
Paraplegics Mfg., Bensenville, Ill.
Rho Engrg. Co., Los Angeles, Calif
Rohde & Schwarz Sls., Passaic, N.J.
Rystl Elctrns. Corp., N. Miami Beach, Fla.
Scientific Educational Prods., N.Y., N.Y.
Siemens Corp., Comm. Eq. Div., Iselin, N.J.
Stark Elctrn. Instrs., Ltd., Ajax, Ont., Canada
Winslow Tele-Tronics, Inc., Eatontown, N.J.

Decade Boxes, Transformer

Arnold Magnetics, Culver City, Cal.
Astrosystems, Lake Success, N.Y.
Coast Coil Co., Los Angeles, Calif.
Electro Sci. Inds., Portland, Ore... p 455
North Atlantic Inds., Plainview, N.Y.
Solid State Elctrns., Sepulveda, Cal.
B.H. Inds., Los Angeles, Cal.
General Radio Co., Concord, Mass.
Rho Engrg. Co., Los Angeles, Calif

Decalcomania-Also See Labels, Pressure Sensitive
—See Vol 2

Decimal Keyboards—See Keyboards, Decimal

Decoders, Audio Tone

Automation Dev., Culver City, Cal.
Bowmar Instr. Corp., Ft. Wayne, Ind.
Bramco Controls, Piqua, Ohio .... p 1406
Digitron Corp., Norristown, Pa.
Douglas Randall Div., Pawcatuck, Conn. p 1381
Dynamics Instr. Co., Monterey Pk., Cal.
Frequency Control, Inc., Austin, Tex.
J-B-T Instrs., Inc., New Haven, Conn.
Multitech Data Prods., Monterey Pk., Cal. ..... p 363
Quindar Elctrns., Inc., Springfield, N.J.
Seg Elctrns., Richmond Hill, N.Y.
Solid State Elctrns., Sepulveda, Cal.
Avco Corp., Cincinnati, Ohio
Cardion Elctrns., Woodbury, N.Y.
Conductron Corp., St. Charles, Mo.
Dorsett Elctrns., Tulsa, Okla.
Dynamic Precision Controls, Hagerstown, Ind.
GTE Sylvania Inc., Elctrn. Sys. Gp., Waltham, Mass.
HB Engrg. Corp., Silver Spring, Md.
Honeywell, Aerospace & Def., Minneapolis, Minn.
Honeywell Information Systems, Wellesley Hills, Mass
Hughes Aircraft Co, Culver City, Cal.
Instrumentation Tech. Corp., Northridge, Calif.
ISC/Telephonics Div, Huntington, N.Y.
Iso-Switch Corp., Costa Mesa, Cal.
Loral Elctrn. Sys., Bronx, N.Y.
Meson Elctrns. Co., Inc., Rochester, N.Y.
Mobil Elctrns., Inc., Anderson, Ind.
Noble Elctrns., Inc., Carpinteria, Calif.
RCA Govt. & Comm. Sys., Moorestown, N.J.
Reach Elctrns., Inc., Lexington, Neb.
RFL Inds., Comms. Div., Boonton, N.J.
Rohde & Schwarz Sls., Passaic, N.J.
Secode Elctrns., Dallas, Texas
Signetics Corp., Sunnyvale, Calif.
Singer - Tele-Signal, Woodbury, N.Y.
3M Co., St. Paul, Minn.
Trepac Corp. America, Englewood, N.J.
Western Microwave Labs., Los Gatos, Cal.

Decoders, Binary To Decimal
—See Converters, Binary To Decimal

Decoders, Digital To Analog
—See Converters, Digital To Analog

Decoders, Pulse

C & K Components, Watertown, Mass.
Dynamics Instr. Co., Monterey Pk., Cal.
Hughes Aircraft Co., Mos Div., Newport Beach, Cal.
Ind'l Elctrn. Engrs., Van Nuys, Cal.
Multitech Data Prods., Monterey Pk., Cal.
(NES) Nationwide Elctrn. Sys., Itasca, Ill.
Norden Div., Norwalk, Conn.
Vega Precision Labs., Vienna, Va. p 614
Aerospace Resch. Inc., Boston, Mass.
AMBAC Inds., Garden City, N.Y.
ASC Sys. Corp., Chicago, Ill.
Automatic Signal Div., E. Norwalk, Conn.
Computronics Engrg., Los Angeles, Calif.
Dorsett Elctrns., Tulsa, Okla.
Fabri-Tek, Pompano Beach, Fla.
General Instr. Corp., Hicksville, N.Y.
GTE Sylvania Inc., Elctrn. Sys. Gp., Waltham, Mass.
Gulton Inds., Albuquerque, N.M.
HB Engrg. Corp., Silver Spring, Md.
Hughes Aircraft Co, Culver City, Cal.
ISC/Telephonics Div, Huntington, N.Y.
Leupold & Stevens, Inc., Beaverton, Ore.
Loral Elctrn. Sys., Bronx, N.Y.
Mobil Elctrns., Inc., Anderson, Ind.
Reach Elctrns., Inc., Lexington, Neb.
Sanders Assocs., Nashua, N.H.
Secode Elctrns., Dallas, Texas
Servo Dev. Corp., Hicksville, N.Y.
Springer Aircraft Radio Co., Shelleyville, Ind.
Struthers-Dunn, Inc., Pitman, N.J.
Struthers-Dunn, Inc., Bettendorf, Iowa
Systems Resch. Labs., Dayton, Ohio
Theta Instr. Corp., Fairfield, N.J.
Trepac Corp. America, Englewood, N.J.
United Aircraft Corp., Norwalk, Conn.
Western Microwave Labs., Los Gatos, Cal.

Decoders, Readout—See Drivers & Decoders For Readouts—Vol 2

Decoders, Telemetry—See Decoders, Audio Tone

Decoders, Video

Alcor, Inc., Ithaca, N.Y.
ASC Sys. Corp., Chicago, Ill.
Cardion Elctrns., Woodbury, N.Y.
General Instr. Corp., Hicksville, N.Y.
Hughes Aircraft Co, Culver City, Cal.
ISC/Telephonics Div, Huntington, N.Y.
Lear Siegler, Inc., Santa Monica, Calif.
Loral Elctrn. Sys., Bronx, N.Y.
Rodale Elctrns., Inc., Garden City, N.Y.
Systems Resch. Labs., Dayton, Ohio
Video Resch. Corp., Rockville, Md.

Decommutators, Telemetering

Data-Control Systems, Danbury, Conn. p 345
Digitron Corp., Norristown, Pa.
Sonex, Inc., Bethayres, Pa.
Arnoux Corp., Santa Barbara, Cal
Aydin Data Systems, Ft. Washington, Pa
Continental Data Sys., Dayton, Ohio
Dynamic Sys. Elctrns. Corp., Tempe, Ariz.
Elctrn. Modules Corp., Timonium, Md.
Hughes Aircraft Co, Fullerton, Cal.
ISC/Telephonics Div, Huntington, N.Y.
Lear Siegler, Inc., Santa Monica, Calif.
Lear Siegler, Anaheim, Cal.
Lockheed Aircraft Svc., Ont., Cal.
Monitor Sys., Inc., Ft. Washington, Pa.
Systems Resch. Labs., Dayton, Ohio
Taft Electrosystems, Inc., Metuchen, N. J.
Video Resch. Corp., Rockville, Md.

Decontaminants—See Cleaners & Solvents—Vol 3

Deflection Yokes, Coils & Assemblies—See Yokes, Deflection—Vol 3

Degaussers—See Demagnetizers-Also See Coils, Degausing

Degreasing Chemicals—See Cleaners & Solvents—Vol 3

Degreasing Machines—See Machines, Vapor-Degreasing; Cleaners,Ultrasonic

Dehumidifiers (For Equipment)

Daco Instr. Co., Inc., Trumbull, Conn. p 2783
Electro Impulse, Inc., Red Bank, N.J.
Abbeon, Inc., Jamaica, N.Y.
Accessory Controls & Equip., Windsor, Conn.
Adel Div., Burbank, Calif.
Barium & Chems., Inc., Steubenville, Ohio
Buffalo Forge Co., Buffalo, N.Y.
Cargocaire Engrg. Corp., Amesbury, Mass.
Hotpack Corp., Phila., Pa.
Lear Siegler, Inc., Santa Monica, Calif.
Lear Siegler, Inc., Elyria, Ohio
Lectrodryer Div., Pittsburgh, Pa.
Logetronics, Inc., Springfield, Va.
Pall Corp., Glen Cove, N.Y.
Pall Trinity Micro Corp., Cortland, N.Y.
Porter, H.K. Co., Inc., Pittsburgh, Pa.
Puregas Equip. Corp., Copiague, N.Y.
Ross Engrg. Div., New Brunswick, N.J.

Dehydrators

Daco Instr. Co., Inc., Trumbull, Conn. p 2783
Adel Div., Burbank, Calif.
Andrew Corp., Orland Pk., Ill.
Barium & Chems., Inc., Steubenville, Ohio
Eastern Inds. Div., Hamden, Conn.
Kahn & Co., Inc., Wethersfield, Conn.
Kidde, Walter & Co., Belleville, N.J.
Lear Siegler, Inc., Santa Monica, Calif.
Lear Siegler, Inc., Elyria, Ohio
Lectrodryer Div., Pittsburgh, Pa.
Pall Corp., Glen Cove, N.Y.
Pall Trinity Micro Corp., Cortland, N.Y.
Phelps Dodge Comm., North Haven, Conn.
Precision Sci. Co., Chicago, Ill.
Prodelin, Inc., Hightstown, N.J.
Superior Continental Corp., Hickory, N.C.

Delay Line Cases—See Cases, Delay Line—Vol 3

Delay Line Synthesizers—See Vol 3

Delay Lines, Cable—See Vol 3

Delay Lines, Distributed, Constant (Fixed)—See Vol 3

Delay Lines, Distributed, Constant (Variable)—See Vol 3

Delay Lines, Glass & Quartz—See Vol 3

Delay Lines, Liquid—See Vol 3

Delay Lines, Lumped-Constant (Electrically Variable)—See Vol 3

Delay Lines, Lumped-Constant (Fixed)—See Vol 3

Delay Lines, Lumped-Constant (Mechanically Variable)—See Vol 3

Delay Lines, Magnetostrictive—See Vol 3

Delay Lines, Miniature & Subminiature-Also See Specific Types Of Delay Lines—See Vol 3

Delay Lines, Solid Blank—See Vol 3

Delay Lines, Strip—See Vol 3

Delay Lines, Trimmer—See Vol 3

Delay Lines, Ultrasonic—See Vol 3

Delay Lines, Waveguide—See Vol 3

Delay Lines, Wire—See Vol 3

Delays, Time (Excluding Delay Lines)—See Vol 2

Demagnetizers

A.L.A. Inds., Inc., Harrison, N.Y.
Bell, F.W., Inc., Columbus, Ohio.... p 418
GC Elctrns., Rockford, Ill.
Microtran Co., Valley Stream, N.Y. p 2963
RFL Inds., Instr. Div., Boonton, N.J. p 554
Ampex Corp., Redwood City, Calif.
Amplifier Corp. America, Westbury, N.Y.
Annis, R.B. Co., Indianapolis, Ind.
Barnes & Reinecke, Inc., Chicago, Ill.
Barwood Elctrns., Inc., Glendale, Cal.
Coil Co. of Amer., Northvale, N.J.
Crucible Steel Corp., Pittsburgh, Pa.
Eastern Delta Corp., Fair Lawn, N.J.
Elctrn. Brazing Co., Hackensack, N.J.
Fedtro, Inc., Rockville Centre, N.Y.
Green Elec. Corp., Fair Lawn, N.J.
Hammel, Riglander & Co., New York, N.Y.
Ideal Industries, Inc., Sycamore, Ill.
Indiana Gen'l.-Process Equip., Cudahy, Wisc.
Irwin Labs., Inc., Los Angeles, Calif.
L & R Mfg. Co., Kearny, N.J.
Luma Electric Equipment Co., Toledo, Ohio
Mag-Con Engrg. Co., St. Paul, Minn.
Magnaflux Corp., Chicago, Ill.
Magnetic Analysis Corp., Mt. Vernon, N.Y.
Permag Corp., Jamaica, N.Y.
Permanent Magnet Co., Inc., Indianapolis, Ind.
Philmore Mfg. Co., Richmond Hill, N.Y.
Recoton Corp., Long Island City, N.Y.
Shigoto Inds., Ltd., New York, N.Y.
Smallwood, S.G., Ltd., Kitchener, Ont., Canada
Stancor, Chicago, Ill.
Techni-Tool, Inc., Philadelphia, Pa.
Thomas & Skinner, Inc., Indianapolis, Ind.

Demodulators

Airpax Elctrns., Inc., Cambridge, Md.
American Elctrn. Labs., Inc., Lansdale, Pa.
Bulova Watch Co., Freq. Control Prods., Elctrns. Div., Woodside, N.Y.
Bulova Watch Co., Servo Prods. Elctrns. Div., Woodside, N.Y. .... p 1865
Clarke - Hess, New York, N.Y. ..... p 426
Control Technology Co., L.I.C., N.Y. p 1868
Data-Control Systems, Danbury, Conn. p 345
Dynamics Instr. Co., Monterey Pk., Cal.
General Magnetics, Bloomfield, N.J. p 1320
General Resistance, Mt. Vernon, N.Y.
Hewlett-Packard, Palo Alto, Cal.
Hybrid Sys. Corp., Burlington, Mass.
Ind'l. Control Co., Farmingdale, N.Y.
Ithaco, Inc., Ithaca, N.Y.
Lorch Elctrns. Corp., Englewood, N.J.
Microtran Co., Valley Stream, N.Y.
Multitech Data Prods., Monterey Pk., Cal. ..... p 363
Natel Engrg. Co., Canoga Pk., Cal. p 366
North Atlantic Inds., Plainview, N.Y.
North Hills Elctrns., Inc., Glen Cove, N.Y.
RHG Elctrns. Lab., Farmingdale, N.Y.
Solid State Elctrns., Sepulveda, Cal. p 2006
Sonex, Inc., Bethayres, Pa..... p 955
Transmagnetics Inc., Farmingdale, N.Y.
Trio Labs, Inc., Plainview, N.Y.
Vega Precision Labs., Vienna, Va. p 614
Automatic Timing & Controls, Inc., King of Prussia, Pa.
Aydin Data Systems, Ft. Washington, Pa
Biocom, Inc., Culver City, Cal.
Collins Radio Co., Dallas, Tex.
Comdel, Inc., Beverly, Mass.
Communication Elctrns., Rockville, Md.
Computer Conversions Corp., East Northport, N.Y.
Dynair Elctrns. Inc., San Diego, Calif.
Electrac, Inc., Anaheim, Calif.
Fairchild Semiconductor, Mountain View, Calif.
Feedback, Inc., Berkeley Hghts., N.J.
General Instr. Corp., Hicksville, N.Y.
Glentek, Inc., Santa Monica, Calif.
Hughes Aircraft Co, Fullerton, Cal.
Int'l. Comm., Miami, Fla.
Iso-Switch Corp., Costa Mesa, Cal.
Jerrold/Watkins Div., Toronto, 395, Ont., Can.
Milgo Electrn. Corp., Miami, Fla.
Motorola Semiconductor Prods., Phoenix, Ariz.
Olektron Corp., Dudley, Mass.
Optical Elctrns., Tucson, Ariz.
Philco-Ford Corp., Washington, D.C.
Polyphase Instr. Co., Bridgeport, Pa.
Princeton Applied Resch. Corp., Princeton, N.J.
Radiation Devices Co., Baltimore, Md.
Rohde & Schwarz Sls., Passaic, N.J.
Singer-General Precision, Inc., Little Falls, N.J.
Singer - Tele-Signal, Woodbury, N.Y.
Theta Instr. Corp., Fairfield, N.J.
Transducer Systems, Inc., Willow Grove, Pa.
Validyne Engrg. Corp., Northridge, Cal.
Video Resch. Corp., Rockville, Md.

Demodulators, Magnetic—See Vol 2

Densitometers, Electronic

Atec, Inc., Houston, Tex. ..... p 411
Aerospace Controls Corp., Gardena, Cal.
Artronix, Inc., St. Louis, Mo.
Automation Products, Inc., Houston, Tex.
Beckman Instrs., (AISSD), Fullerton, Cal.
Computer Meas., Gardena, Cal.
Dolan-Jenner Inds., Inc., Melrose, Mass.
Elctrn. Sys. Engrg., Cushing, Okla.
Gaertner Scientific Corp., Chicago, Ill.
Hughes Aircraft Co, Culver City, Cal.
Mann, David W. Co., Burlington, Mass.
Nester/Faust Mfg. Corp., Newark, Dela.
Packard Instrument Co., Inc., Downers Grove, Ill.
Photobell Co., Inc., New York, N.Y.
Photovolt Corp., New York, N.Y.
Sargent Welch Sci. Co., Skokie, Ill.
Schoeffel Instr. Corp., Westwood, N.J.
Waters Instrs., Inc., Rochester, Minn

Deposition Equipment, Vacuum & Accessories-Also See Evaporation Equipment, Electron Beam

Ceramaseal, Inc., New Lebanon Center, N.Y.
Cooke Vacuum Prods., S. Norwalk, Conn.
Denton Vacuum, Inc., Cherry Hill, N.J.
Edwards High Vacuum, Oakville, Ont., Can.
Edwards High Vacuum, Grand Island, N.Y.
Energy Sciences Inc., Burlington, Mass.
Forney Inds., Inc., Fort Collins, Colo.
Granville-Phillips Co., Boulder, Colo.
GTE Sylvania Inc., Danvers, Mass.
High Vacuum Equip. Corp., Hingham, Mass.
Hughes Aircraft Co, Culver City, Cal.
Johnson Corp., Three Rivers, Mich.
Kinney Vacuum Co., Boston, Mass.
Materials Resch. Corp., Orangeburg, N.Y.
Metal Ceram, Inc., Mt. Vernon, N.Y.
Middlesex Gen'l. Inds., Somerville, Mass.
Norton Co., Newton, Mass.
Nuclide Corp., N. Acton, Mass.
Pennwalt Corp., Phila., Pa.
Phoenix Materials Corp., Kittanning, Pa.
PMC Designing, Cincinnati,, Ohio
Sloan Technology Corp., Santa Barbara, Calif.
T-M Vacuum Prods., Riverton, N.J.
Torr Labs., Los Angeles, Cal.
Ultek Div., Palo Alto, Calif.
Vactronic Lab. Equip., Inc., E. Northport, N.Y.
Vacuum Equip. Div., Newton, Mass.
Vacuum Inds., Inc., Somerville, Mass.
Varian Assocs., Palo Alto, Cal.
Varian Assocs., Vacuum Div., Palo Alto, Cal.
Veeco Instrs., Inc., Plainview, N.Y.

Desiccators—See Dehumidifiers

Desoldering Tools & Equipment—See Soldering Accessories; Soldering Equip.; Soldering Guns; etc.—Vol 3

Detectors, A-F—See Detectors, Frequency

Detectors, Cable & Pipe—See Locators, Metal—Vol 3

Detectors, Chroma

Cohu Elctrns., Inc., San Diego, Calif.
Fairchild Semiconductor, Mountain View, Calif.

Detectors, Coaxial

Alford Mfg. Co., Winchester, Mass.
American Elctrn. Labs., Inc., Lansdale, Pa.
Bird Elctrn., Cleveland, Ohio
Electro/Data, Inc., Garland, Tex.
Hewlett-Packard, Palo Alto, Cal.
Lorch Elctrns. Corp., Englewood, N.J.
Microwave Cavity Labs., La Grange, Ill.
R L C Elctrns., Inc., Mt. Kisco, N.Y. p 1563
Weinschel Engrg. Co., Gaithersburg, Md.
Aertech Inds., Sunnyvale, Calif.
Anaren Microwave, Inc., Syracuse, N.Y.
Astrolab Inc., Linden, N J
AUL Instrs., Inc., Flushing, N.Y.
Automatic Signal Div., E. Norwalk, Conn.
Blonder-Tongue Labs., Inc., Old Bridge, N.J.
CES Elctrns., Brooklyn, N.Y.
Coax Devices Inc., Chelsea, Mass.
Dittmore-Freimuth Corp., Milwaukee, Wisc.
Engelmann Microwave, Montville, N.J.
General Microwave Corp., Farmingdale, N.Y.
General Radio Co., Concord, Mass.
GRFF, Port Salerno, Fla.
Guide Inds., Inc., Sun Valley, Calif.
Herley Inds., Inc., Syosset, N.Y.
Hughes Aircraft Co, Culver City, Cal.
Hyletronics Corp., Littleton, Mass.
Jerrold/Watkins Div., Toronto, 395, Ont., Can.
Kevlin Mfg. Co., Woburn, Mass.
Maury Microwave Corp., Cucamonga, Calif.
Meca Elctrns., Inc., Denville, N.J.
Microlab/FXR, Livingston, N.J.
Microwave Assocs., Inc., Burlington, Mass.
Microwave Labs. America, Brooklyn, N.Y.
Narda Microwave Corp., Plainview, N.Y.
Omega Labs., Inc., Rowley, Mass.
OMNI Spectra, Farmington, Mich.
Philco-Ford Corp., Washington, D.C.
PRD Elctrns., Inc., Westbury, N.Y.
Premier Microwave, Port Chester, N.Y.
Quartz & Silice, Paris 8e, France
Radiation Devices Co., Baltimore, Md.
Radio Resch. Co., Rockaway, N.J.
Sage Labs. Inc., Natick, Mass.
Scientific Communications, Garland, Tex.
Struthers Elctrns. Corp., Mamaroneck, N.Y.
Telonic Inds., Inc., Laguna Beach, Calif.
Tru-Connector Corp., Peabody, Mass.
Vectronics Microwave Corp., Middlesex, N.J.
Victor Microwave, Inc., Wakefield, Mass.

Detectors, Corona—See Testers, Corona

Detectors, Crystal

Alford Mfg. Co., Winchester, Mass.
American Elctrn. Labs., Inc., Lansdale, Pa.
Electro/Data, Inc., Garland, Tex.
Frequency Elctrns., New Hyde Pk., N.Y.
Hewlett-Packard, Palo Alto, Cal.
Lorch Elctrns. Corp., Englewood, N.J.
R L C Elctrns., Inc., Mt. Kisco, N.Y. p 1563
Waveline, Inc., W. Caldwell, N.J. p 1567
Aertech Inds., Sunnyvale, Calif.
Americon Corp., Waltham, Mass.
Dynographic Elctrns. Corp., Hicksville, N.Y.
Fuel Watchman Sls. & Svc., Inc., Bronx, N.Y.
Guide Inds., Inc., Sun Valley, Calif.
Harshaw Chem. Co., Cleveland, Ohio
Herley Inds., Inc., Syosset, N.Y.
Hope Elctrns., Clifton, N.J.
Kevlin Mfg. Co., Woburn, Mass.
Linden Labs., Inc., State College, Pa.
MCS Corp., Monrovia, Calif.
Meca Elctrns., Inc., Denville, N.J.
Microlab/FXR, Livingston, N.J.
Microwave Assocs., Inc., Burlington, Mass.
Narda Microwave Corp., Plainview, N.Y.
OMNI Spectra, Farmington, Mich.
Packard Instrument Co., Inc., Downers Grove, Ill.
Philco-Ford Corp., Washington, D.C.
Philmore Mfg. Co., Richmond Hill, N.Y.
PRD Elctrns., Inc., Westbury, N.Y.
Quartz & Silice, Paris 8e, France
Radiation Devices Co., Baltimore, Md.
Sage Labs. Inc., Natick, Mass.
Soltec Corp., No. Hollywood, Cal.
Systron-Donner Microwave Div., Van Nuys, Cal.
Wiltron Co., Palo Alto, Calif.

Detectors, Electrostatic—See Meters, Volt, Electrostatic

Detectors, F-M—See Detectors, Frequency

Detectors, Fire & Smoke (Electronic)—See Fire Detection & Fighting Equip.—Vol 2

Detectors, Flaw & Defect-Also See Locators, Cable & Line Fault; Locators, Open-Short

Beckman Instrs., Cedar Grove, N.J. p 415
Bell, F.W., Inc., Columbus, Ohio.... p 418
Dynarad, Inc., Norwood, Mass. .... p 439
General Elec. Co., Schenectady, N.Y.
Haydon, A. W. Co., Waterbury, Conn.
Ind'l. Control Co., Farmingdale, N.Y.
Nelson Ross Elctrns., Lake Success, N.Y.
PPM, Inc., Bedford, Ohio
Addison Div., Mountainside, N.J.
Alden Elctrn. & Impulse Record. Equip., Westboro, Mass.
Allis, Louis Co., Milwaukee, Wisc.
American Gas & Chemicals, New York, N.Y.
Amstro Corp., Fairfield, N.J.
Ann Arbor Div., Ann Arbor, Mich.
Arenberg Ultrasonic Lab., Inc., Jamaica Plain, Mass.
Automation Inds., Los Angeles, Cal.
Automation Inds., Danbury, Conn.
Barnes Engrg. Co., Stamford, Conn.
Black Light Corp. Amer., San Gabriel, Cal.
Black Light Eastern, Westbury, N.Y.
Black Light Prods., Chicago, Ill.
Branson Instruments Co., Stamford, Conn.
Davidson Elctrn. Dev. Co., Erie, Pa.
Decker Corp., Bala-Cynwyd, Pa.
Delcon Div., Mt. View, Calif.
Dolan-Jenner Inds., Inc., Melrose, Mass.
Dyonics, Inc., Woburn, Mass.
Electron-Machine Corp., Umatilla, Fla.
Ferranti Ltd., Hollinwood, Lancs., England
Fiber Photics, Inc., Santa Cruz, Cal.
Hill, E. Vernon, Inc., San Francisco, Calif.
Hughes Aircraft Co, Culver City, Cal.

Ind'l. Winding Mach., River Edge, N.J.
Interlind Elctrns., Doraville, Ga.
Jenkins', M.W. Sons, Inc., Cedar Grove, N.J.
Krautkramer Ultrasonics, Inc., Stratford, Conn.
Lockheed Aircraft Svce., Special Devices Div., Ontario, Calif.
Magnaflux Corp., Chicago, Ill.
Magnetic Analysis Corp., Mt. Vernon, N.Y.
Micro-Technical Inds., Laguna Beach, Cal.
Peschel Instrs., Cape Coral, Fla.
Photobell Co., Inc., New York, N.Y.
Sensor Corp., Greenwich, Conn.
Servo Corp. America, Hicksville, N.Y.
TAC Tech. Instr. Corp., Trenton, N.J.
Ultra-Violet Prods., Inc., San Gabriel, Cal.

Detectors, Frequency

Airpax Elctrns., Inc., Cambridge, Md.
Airpax Elctrns., Ft. Lauderdale, Fla. p 1308
Anadex Instrs., Inc., Van Nuys, Calif.
Autronics Corp., Pasadena, Calif.
Betamite Electronic Devices, Culver City, Calif.
Bowmar Instr. Corp., Ft. Wayne, Ind.
Bramco Controls, Piqua, Ohio .... p 1406
Data-Control Systems, Danbury, Conn.
Douglas Randall Div., Pawcatuck, Conn.
Electro/Data, Inc., Garland, Tex.
Frequency Control, Inc., Austin, Tex.
Frequency Elctrns., New Hyde Pk., N.Y.
Hewlett-Packard, Palo Alto, Cal.
Hi-G, Windsor Locks, Conn.
JFD Elctrns./Sub. Riker-Maxson, Bklyn., N.Y.
Kay Elemetrics, Pine Brook, N.J.
Kratos Instrument Div., Pasadena, Cal p 511
Logitek, Inc., Farmingdale, N.Y. .. p 1752
Lorch Elctrns. Corp., Englewood, N.J.
Nelson Ross Elctrns., Lake Success, N.Y.
North Hills Elctrns., Inc., Glen Cove, N.Y.
RHG Elctrns. Lab., Farmingdale, N.Y.
Solid State Elctrns., Sepulveda, Cal.
Sonex, Inc., Bethayres, Pa.
Sprague Elec. Co., No. Adams, Mass.
Texscan Corp., Indianapolis, Ind.
A & M Instrument, Inc., Great Neck, N.Y.
Acromag, Inc., Wixom, Mich.
Anaren Microwave, Inc., Syracuse, N.Y.
Applied Control Co., Fairfield, N.J.
A.R.F. Products, Inc., Boulder, Colo.
Arco Systems Inc., Palo Alto, Cal
Automatic Switch Co., Florham Park, N.J.
Blonder-Tongue Labs., Inc., Old Bridge, N.J.
Brower Laboratories, Inc., Waltham, Mass.
Dittmore-Freimuth Corp., Milwaukee, Wisc.
Dynalco Corp., Ft. Lauderdale, Fla.
Dynamic Precision Controls, Hagerstown, Ind.
Elcom Sys., Deer Pk., N.Y.
Engelmann Microwave, Montville, N.J.
General Microwave Corp., Farmingdale, N.Y.
Gold Line Connector, Inc., Norwalk, Conn.
Gosh Instrs., Inc., Wethersfield, Conn.
GTE Sylvania Inc., Elctrn. Sys. Gp., Waltham, Mass.
Guardian California, Culver City, Cal.
Guide Inds., Inc., Sun Valley, Calif.
HB Engrg. Corp., Silver Spring, Md.
ITT Mackay Marine, Clark, N.J.
Jerrold/Watkins Div., Toronto, 395, Ont., Can.
MCG Elctrns., Inc., Deer Park, N.Y.
Meson Elctrns. Co., Inc., Rochester, N.Y.
Microwave Assocs., Inc., Burlington, Mass.
Microwave/Sys., Inc., E. Syracuse, N.Y.
OMNI Spectra, Farmington, Mich.
Pacific Meas., Inc., Palo Alto, Calif.
PRD Elctrns., Inc., Westbury, N.Y.
Precision Elctrns., Inc., Amityville, N.Y.
Rafec Elctrns., Temple City, Calif.
Robot Inds., Inc., Dearborn, Mich.
Sage Labs. Inc., Natick, Mass.
Scientific Communications, Garland, Tex.
Techsonics, El Prado, N.M.
Telonic Inds., Inc., Laguna Beach, Calif.
Tempo Instr., Plainview, N.Y.
Vanguard Elctrns., Inglewood, Cal.
Wiltron Co., Palo Alto, Calif.

Detectors, Gas Leak

Hewlett-Packard, Palo Alto, Cal.
Acton Assocs., Pittston, Pa.
Aero Vac Corp., Troy, N.Y.
AMBAC Inds., Garden City, N.Y.
American Gas & Chemicals, New York, N.Y.
Bacharach Instr. Co., Pittsburgh, Pa.
Bacharach Instr. Co., Mt. View, Calif.
Beckman Instrs., Process Instrs., Fullerton, Cal.
Bell & Howell Co., Pasadena, Calif.
Broadview Inds. Corp., Hempstead, N.Y.
Corning Glass Works, Fluidic Products Dept., Corning, N.Y.
Decker Corp., Bala-Cynwyd, Pa.
Delcon Div., Mt. View, Calif.
Devco Engrg., W. Caldwell, N.J.
Edwards High Vacuum, Oakville, Ont., Can.
Edwards High Vacuum, Grand Island, N.Y.
Erdco Engrg. Corp., Addison, Ill.
Fischer & Porter Co., Warminster, Pa.
Gas Analysis Sys., Inc., Basking Ridge, N.J.
General Elec. Co., W. Lynn, Mass.
General Monitors, Inc., Costa Mesa, Calif.
Gow-Mac Instr. Co., Madison, N.J.
Hill, E. Vernon, Inc., San Francisco, Calif.
Honeywell, Apparatus Controls, Mpls., Minn.
Hughes Aircraft Co, Vacuum Tube Prods. Div/Vacuum Equip., Oceanside, Calif
Hyde Park Elctrns., Inc., Dayton, Ohio
Lion Precision Div., Newton, Mass.
MKS Instrs., Inc., Burlington, Mass.
Mullard, Inc., Farmingdale, N.Y.
N.Y. Testing Labs., Inc., Westbury, N.Y.
Norton Co., Newton, Mass.
Puregas Equip. Corp., Copiague, N.Y.
Puritan-Zep, El Segundo, Cal.
Rank Precision Inds., W. Nyack, N.Y.
Shannon Luminous Mat'ls., Hollywood, Cal.
Sunshine Sci. Instrs., Inc., Philadelphia, Pa
Superior Continental Corp., Hickory, N.C.
Techni-Tool, Inc., Philadelphia, Pa.
Techsonics, El Prado, N.M.
Trans-Sonics, Inc., Lexington, Mass.
Vacuum Equip. Div., Newton, Mass.
Varian Assocs., Palo Alto, Cal.
Varian Assocs., Vacuum Div., Palo Alto, Cal.
Veeco Instrs., Inc., Plainview, N.Y.
VWR Scientific, San Francisco, Cal.
Waveforms, No. Hollywood, Cal.

Detectors, Ice, Sleet & Snow

Cook Elec. Co., Morton Grove, Ill.
A.R.P. Inds., Inc., Huntington, N.Y.
Dynamic Controls Corp., S. Windsor, Conn.
Hygrodynamics, Inc., Silver Spring, Md.
Mag-Con Engrg. Co., St. Paul, Minn.
Rosemount Engrg. Co., Minneapolis, Minn.
Sundstrand Data Control, Redmond, Wash.

Detectors, Impedance—See Meters, Impedance

Detectors, Infrared—See Vol 2

Detectors, Ion

Victoreen Instr., Cleveland, Ohio
Avco Corp., Cincinnati, Ohio
Avco Elctrns., Tulsa, Okla.
Beckman Instrs., Process Instrs., Fullerton, Cal.
Corning Glass Works, Lab. Prods. Dept., Corning, N.Y.
Edison, T.A., Instr. Div., Ft. Lauderdale, Fla.
Foxboro Co., Foxboro, Mass.
GCA Technology Div., Bedford, Mass.
Hamamatsu TV Co., Ltd., Hamamatsu City, Shizuoka Pref., Japan
Hughes Aircraft Co, Malibu, Cal.
Johnston Labs., Inc., Cockeysville, Md.
Nuclear Diodes, Prairie View, Ill.
Soltec Corp., No. Hollywood, Cal.

Detectors, Light Intensity—See Meters, Light, Nonphotographic

Detectors, Magnetic

American Aerospace Controls, Farmingdale, N.Y. ..... p 1307
Bell, F.W., Inc., Columbus, Ohio.... p 418
California Elctrn. Mfg. Co., Alamo, Calif.
Electro-Mechanics Co., Austin, Tex. p 452
General Electc. Semiconductor, Syracuse,, N.Y.
Ind'l. Control Co., Farmingdale, N.Y.
Int'l. Electro-Magnetics, Palatine, Ill. p 311
ISC Magnetics Div., Huntington, N.Y.
Ohio Semitronics, Columbus, Ohiop 533
RFL Inds., Instr. Div., Boonton, N.J. p 554
Advanced Kinetics, Costa Mesa, Calif.
Amstro Corp., Fairfield, N.J.
Ann Arbor Div., Ann Arbor, Mich.
Automatic Signal Div., E. Norwalk, Conn.
Automation Inds., Danbury, Conn.
Barringer Research, Ltd., Rexdale, Ont., Can.
Controlcraft Corp., West Chicago, Ill.
Electro-Alarm Safety Devices, Fresno, Calif.
GTE Sylvania Inc., Elctrn. Sys. Gp., Waltham, Mass.
Honeywell, Aerospace & Def., Minneapolis, Minn.
Indiana Gen'l.-Process Equip., Cudahy, Wisc.
Infinetics, Inc., Wilmington, Del.
Irwin Labs., Inc., Los Angeles, Calif.
Mag-Con Engrg. Co., St. Paul, Minn.
Magnaflux Corp., Chicago, Ill.
Magnetic Sys. & Instrs., Worcester, Mass.
Magnetics Sys. & Instrs., Worcester, Mass.
Micro Switch, Freeport, Ill.
Mullard, Inc., Farmingdale, N.Y.
PECO, Milpitas, Cal.
Rank Precision Inds., W. Nyack, N.Y.
Sensor Corp., Greenwich, Conn.
Sigma Instrs., Inc., Braintree, Mass.
Sperry Marine Sys., Charlottesville, Va.
Struthers Elctrns. Corp., Mamaroneck, N.Y.
Thomas & Skinner, Inc., Indianapolis, Ind.

Detectors, Metal—See Locators, Metal—Vol 3

Detectors, Microwave

Alford Mfg. Co., Winchester, Mass.
American Elctrn. Labs., Inc., Lansdale, Pa.
Electro/Data, Inc., Garland, Tex. p 1558
General Elec. Co., Schenectady, N.Y.
Hewlett-Packard, Palo Alto, Cal.
Lorch Elctrns. Corp., Englewood, N.J.
RCA Elctrns. Comps., Harrison, N.J.
Singer Instrumentation Los Angeles Oper., Los Angeles, Cal. ..... p 562
Singer Instrumentation Palo Alto Oper., Palo Alto, Cal. ..... p 562
Texscan Corp., Indianapolis, Ind.
Waveline, Inc., W. Caldwell, N.J.
Weinschel Engrg. Co., Gaithersburg, Md.
Aertech Inds., Sunnyvale, Calif.
Aircom, Inc., Union, N.H.
AMBAC Inds., Garden City, N.Y.
Astrolab Inc., Linden, N J
Avantek, Inc., Santa Clara, Cal.
Cardwell Condenser, Lindenhurst, N.Y.
CES Elctrns., Brooklyn, N.Y.
Coax Devices Inc., Chelsea, Mass.
Collins Radio Co., Dallas, Tex.
Dittmore-Freimuth Corp., Milwaukee, Wisc.
Engelmann Microwave, Montville, N.J.
ESCA, Jupiter, Fla.
General Dynamics, San Diego, Cal.
General Microwave Corp., Farmingdale, N.Y.
General Radio Co., Concord, Mass.
GRFF, Port Salerno, Fla.
GTE Sylvania Inc., Elctrn. Sys. Gp., Waltham, Mass.
Guide Inds., Inc., Sun Valley, Calif.
Herley Inds., Inc., Syosset, N.Y.
Hughes Aircraft Co, Culver City, Cal.
Hyletronics Corp., Littleton, Mass.
Itek Corp., Lexington, Mass.
Kevlin Mfg. Co., Woburn, Mass.
Maury Microwave Corp., Cucamonga, Calif.
MCS Corp., Monrovia, Calif.
Meca Elctrns., Inc., Denville, N.J.
Microlab/FXR, Livingston, N.J.
Microphase Corp., Cos Cob, Conn.
Microwave Assocs., Inc., Burlington, Mass.
Microwave Development Labs., Inc., Needham Hgts., Mass.
Microwave Div, Nashua, N.H.
Microwave Filter Co., Inc., East Syracuse, N.Y.
Microwave Labs. America, Brooklyn, N.Y.
Mullard, Inc., Farmingdale, N.Y.
Narda Microwave Corp., Plainview, N.Y.
Omega Labs., Inc., Rowley, Mass.
OMNI Spectra, Farmington, Mich.
Parametric Inds., Inc., Winchester, Mass.
PRD Elctrns., Inc., Westbury, N.Y.
Premier Microwave, Port Chester, N.Y.
Radiation Devices Co., Baltimore, Md.
Rafec Elctrns., Temple City, Calif.
Sage Labs. Inc., Natick, Mass.
Sanders Assocs., Nashua, N.H.
Scientific Communications, Garland, Tex.
Special Microwave Devices Oper., Waltham, Mass.
Struthers Elctrns. Corp., Mamaroneck, N.Y.
TRG Prods., E. Boston, Mass.
Vectronics Microwave Corp., Middlesex, N.J.
Victor Microwave, Inc., Wakefield, Mass.
Wiltron Co., Palo Alto, Calif.

Detectors, Null—See Indicators, Null

Detectors, Phase-Sensitive

Arvin Magnetics, Eden Prairie, Minn.
Austron, Inc., Austin, Tex.
Autronics Corp., Pasadena, Calif. p 1311
Betamite Electronic Devices, Culver City, Calif.
Control Technology Co., L.I.C., N.Y.
Data-Control Systems, Danbury, Conn.
Dranetz Engrg. Labs., Plainfield, N.J. p 435
Dytronics Co., Columbus, Ohio .... p 441
General Magnetics, Bloomfield, N.J.
Hewlett-Packard, Palo Alto, Cal.
Hi-G, Windsor Locks, Conn. p 1326,1327
Hybrid Sys. Corp., Burlington, Mass. p 352
Ind'l. Control Co., Farmingdale, N.Y.
Ind'l. Test Equip., Port Washington, N.Y. p 497
Ithaco, Inc., Ithaca, N.Y.
JFD Elctrns./Sub. Riker-Maxson, Bklyn., N.Y.
Logitek, Inc., Farmingdale, N.Y.
Lorch Elctrns. Corp., Englewood, N.J.
North Atlantic Inds., Plainview, N.Y. p 531
North Hills Elctrns., Inc., Glen Cove, N.Y. ..... p 1339
PPM, Inc., Bedford, Ohio
Solid State Elctrns., Sepulveda, Cal.
Trio Labs, Inc., Plainview, N.Y.
Universal Ad-Yu Elctrns., Inc., Passaic, N.J. ..... p 579
Vari-L Co., Inc., Denver, Colo. .... p 1568
A & M Instrument, Inc., Great Neck, N.Y.
AMBAC Inds., Garden City, N.Y.
Applied Control Co., Fairfield, N.J.
Astrolab Inc., Linden, N J
Bergen Labs., Inc., Paterson, N.J.
Brower Laboratories, Inc., Waltham, Mass.
Canadian Research Institute, Don Mills, Ont., Canada
Climatronics Corp., Hauppauge, N.Y.
Cryotronics, Inc., High Bridge, N.J.
Defense Elctrns., Inc., Rockville, Md.
Dittmore-Freimuth Corp., Milwaukee, Wisc.
Dynamic Controls Corp., S. Windsor, Conn.
Elcom Sys., Deer Pk., N.Y.
Electrac, Inc., Anaheim, Calif.
Engelmann Microwave, Montville, N.J.
Guardian California, Culver City, Cal.
Mini-Circuits Lab., Brooklyn, N.Y.
Nuclear Meas. Corp., Indianapolis, Ind.
Olektron Corp., Dudley, Mass.
Pickard & Burns Inc., Lindenhurst, N.Y.
Princeton Applied Resch. Corp., Princeton, N.J.
Radio Resch. Co., Rockaway, N.J.
Rafec Elctrns., Temple City, Calif.
Rantec Div., Calabasas, Calif.
Relcom, Mt. View, Calif.

Servo Corp. America, Hicksville, N.Y.
Theta Instr. Corp., Fairfield, N.J.
Vanguard Elctrns., Inglewood, Cal.
Varian Assocs., Palo Alto, Cal.
Weston Instruments, Inc., Newark, N.J.

Detectors, Photovoltaic —See Cells, Photovoltaic—Vol 2

Detectors, Radiation—See Counters, Geiger Counters, Scintillation

Detectors,R-F—See Detectors, Frequency

Detectors, Standing Wave

Alford Mfg. Co., Winchester, Mass.
Bird Elctrn., Cleveland, Ohio..... p 421
Hewlett-Packard, Palo Alto, Cal.
Johnson E. F. Co., Waseca, Minn.
Singer Instrumentation Palo Alto Oper., Palo Alto, Cal.
Texscan Corp., Indianapolis, Ind.
Weinschel Engrg. Co., Gaithersburg, Md.
Aircom, Inc., Union, N.H.
Anzac Elctrns., Waltham, Mass.
Blonder-Tongue Labs., Inc., Old Bridge, N.J.
General Microwave Corp., Farmingdale, N.Y.
General Radio Co., Concord, Mass.
Heath Co., Benton Harbor, Mich.
Herley Inds., Inc., Syosset, N.Y.
Hughes Aircraft Co, Culver City, Cal.
MCS Corp., Monrovia, Calif.
Microlab/FXR, Livingston, N.J.
Olektron Corp., Dudley, Mass.
Omega Labs., Inc., Rowley, Mass.
PRD Elctrns., Inc., Westbury, N.Y.
Radiation Devices Co., Baltimore, Md.
Rank Precision Inds., W. Nyack, N.Y.
Rantec Div., Calabasas, Calif.
Rohde & Schwarz Sls., Passaic, N.J.
Telonic Inds., Inc., Laguna Beach, Calif.
TRG Prods., E. Boston, Mass.
Victor Microwave, Inc., Wakefield, Mass.
Wiltron Co., Palo Alto, Calif.

Detectors, Torque—See Indicators, Torque

Detectors, Ultraviolet

General Electc. Semiconductor, Syracuse,, N.Y.
United Detector Tech., Santa Monica, Cal.
American Ultraviolet Co., Chatham, N.J.
Black Light Corp. Amer., San Gabriel, Cal.
Dolan-Jenner Inds., Inc., Melrose, Mass.
Hird Brown America, Livingston, N.J.
Hughes Aircraft Co, Malibu, Cal.
Schoeffel Instr. Corp., Westwood, N.J.
Shannon Luminous Mat'ls., Hollywood, Cal.
Soltec Corp., No. Hollywood, Cal.
Ultra-Violet Prods., Inc., San Gabriel, Cal.
Westinghouse Elec. Corp., Pittsburgh, Pa.

Detectors, Vacuum

CGS/Datametrics, Watertown, Mass.
Delcon Div., Mt. View, Calif.
Edwards High Vacuum, Grand Island, N.Y.
Granville-Phillips Co., Boulder, Colo.
Hughes Aircraft Co, Vacuum Tube Prods. Div/Vacuum Equip., Oceanside, Calif
Materials Resch. Corp., Orangeburg, N.Y.
Norton Co., Newton, Mass.
Ultek Div., Palo Alto, Calif.
United Elec. Controls Co., Watertown, Mass.
Vacuum Equip. Div., Newton, Mass.
Varian Assocs., Palo Alto, Cal.

Detectors,Vibration—See Transducers, Vibration—Vol 2

Detectors, Voltage

ADC Prods., Minneapolis, Minn.
Airpax Elctrns., Inc., Cambridge, Md.
Autronics Corp., Pasadena, Calif.
Betamite Electronic Devices, Culver City, Calif. ..... p 1660
Bulova Watch Co., Servo Prods. Elctrns. Div., Woodside, N.Y. .... p 1865
California Elctrn. Mfg. Co., Alamo, Calif.
DDC, Hicksville, N.Y.
Diversified Elctrns., Evansville, Ind
Dranetz Engrg. Labs., Plainfield, N.J.
Electro Sci. Inds., Portland, Ore.. p 455
General Electc. Semiconductor, Syracuse,, N.Y.
General Magnetics, Bloomfield, N.J.
Hewlett-Packard, Palo Alto, Cal.
Hi-G, Windsor Locks, Conn. p 1328,1329
Ind'l. Test Equip., Port Washington, N.Y.
Kratos Instrument Div., Pasadena, Cal p 511
North Hills Elctrns., Inc., Glen Cove, N.Y.
RCA Elctrns. Comps., Harrison, N.J.
Solid State Elctrns., Sepulveda, Cal.
Texscan Corp., Indianapolis, Ind.
Trio Labs, Inc., Plainview, N.Y.
A & M Instrument, Inc., Great Neck, N.Y.
Applied Control Co., Fairfield, N.J.
Automatic Switch Co., Florham Park, N.J.
Bio-Medical Elctrns., Inc., Rockville, Md.
Brower Laboratories, Inc., Waltham, Mass.
Controlotron Corp., Farmingdale, N.Y.
Eagle Elec. Mfg. Co., L. I. C., N.Y.
Electrical Instr. Svc., Inc., Mt. Vernon, N.Y.
Electro-Alarm Safety Devices, Fresno, Calif.
Guardian California, Culver City, Cal.
Hallmark Standards, Inc., Mt. Vernon, N.Y.
Heidelex Corp., Chelmsford, Mass.
Ideal Industries, Inc., Sycamore, Ill.
Knopp, Inc., Oakland, Calif.
Mag-Con Engrg. Co., St. Paul, Minn.
MCG Elctrns., Inc., Deer Park, N.Y.
Micro Instr., Hawthorne, Cal.
Pacific Electro Dynamics, Bellevue, Wash
Parametric Inds., Inc., Winchester, Mass.
Peschel Instrs., Cape Coral, Fla.
Rochester Instr. Sys., Rochester, N.Y.
Space Age Microcircuits, Long Valley, N.J.
Tempo Instr., Plainview, N.Y.
Ultra Audio Prods., Beverly Hills, Calif.
Zeltex, Inc., Concord, Calif.

Detectors, Waveguide Arc

Hughes Aircraft Co, Culver City, Cal.
MCS Corp., Monrovia, Calif.
Varian Assocs., Palo Alto, Cal.

Dewars

Electro/Data, Inc., Garland, Tex.
Advanced Kinetics, Costa Mesa, Calif.
Aeronautical Div, Bryan, Ohio
Andonian Assocs., Inc., Waltham, Mass.
Avco Corp., Cincinnati, Ohio
Barnes Engrg. Co., Stamford, Conn.
Bendix Corp., Davenport, Iowa
Central Scientific Co., Chicago, Ill.
Coleman Instrs., Maywood, Ill.
Corning Glass Works, Lab. Prods. Dept., Corning, N.Y.
Electron Technology, Inc., Kearny, N.J.
Gardner Cryogenics Corp., Bethlehem, Pa.
Harshaw Chem. Co., Cleveland, Ohio
Hughes Aircraft Co, Culver City, Cal.
Infrared Inds., Inc., Santa Barbara, Cal.
Lab-Line Instrs., Inc., Melrose Park, Ill.
Magnetic Sys. & Instrs., Worcester, Mass.
Magnetics Sys. & Instrs., Worcester, Mass.
Nuclear Diodes, Prairie View, Ill.
Oxford Instr. Corp., Annapolis, Md.
Raytheon Co., Waltham, Mass.
Santa Barbara Resch. Ctr., Goleta, Calif.
Sargent Welch Sci. Co., Skokie, Ill.
Syncor Prods. Co., Inc., Malden, Mass.
Veeco Instrs., Inc., Plainview, N.Y.
VWR Scientific, San Francisco, Cal.
Westinghouse Elec., Pittsburgh, Pa.

Diagonal Cutters —See Wire Cutters, Hand Operated—Vol 3

Dial Locks—See Locks, Dial & Shaft—Vol 2

Dials, Instrument, Metal, Plastic, etc.—See Vol 2

Dials, Telephone-Type—See Vol 2

Dials, Turns-Counting—See Vol 2

Diaphragms—See Vol 3

Dielectric Constant Indicators —See Indicators, Dielectric Constant

Dielectric Coolants—See Coolants, Circuit & Component—Vol 3

Dielectric Heating Equipment —See Vol 2

Dielectrics—See Films; Insulation Materials—Vol 3

Dies & Taps—See Vol 3

Differential Analyzers—See Analyzers, Differential

Differentials Mechanical—See Gears & Gear Mechanisms—Vol 3

Digital Analyzers—See Analyzers, Differential

Digital Comparators—See Comparators, Digital

Digital Tape Recorders—See Data Recorders, Computer

Digital Voltmeters—See Meters, Volt, Digital

Digitizers, Pencil Follower (Inc. Coordinate & Graphic)

Bolt Beranek & Newman, Santa Ana, Calif. ..... p 587
Norden Div., Norwalk, Conn.
Boston Digital Corp., Ashland, Mass.
Data Technology Inc., Watertown, Mass.
Photo Digitizing Sys., Burbank,, Cal.
United Aircraft Corp., Norwalk, Conn.
Universal Drafting Mach., Bedford Hgts., Ohio

Dimmers—See Controls Photoelectric—Vol 2

Diode Arrays—See Vol 2

Diode Testers—See Testers, Diode

Diodes, Avalanche—See Vol 2

Diodes, Backward—See Vol 2

Diodes, Dual—See Vol 2

Diodes, Electroluminescent (Radiating)—See Vol 2

Diodes, Gallium Arsenide—See Vol 2

Diodes, Germanium—See Vol 2

Diodes, Gunn—See Vol 2

Diodes, High Voltage—See Vol 2

Diodes, Hot Carrier—See Vol 2

Diodes, Light-Emitting (Led)—See Vol 2

Diodes, Limiting—See Vol 2

Diodes, Matched Pairs—See Vol 2

Diodes, Matched Quads—See Vol 2

Diodes, Microwave Detector —See Vol 2

Diodes, Microwave Mixer—See Vol 2

Diodes, Noise—See Vol 2

Diodes, Photoelectric—See Vol 2

Diodes, Pin—See Vol 2

Diodes, Schottky—See Vol 2

Diodes, Selenium—See Rectifiers, Selenium—Vol 2

Diodes, Silicon—See Vol 2

Diodes, Step Recovery—See Vol 2

Diodes, Surface Barrier—See Vol 2

Diodes, Switching—See Vol 2

Diodes, Tunnel—See Vol 2

Diodes, Varactor—See Vol 2

Diodes, Video Detector—See Diodes, Microwave Detector —Vol 2

Diodes, Zener—See Vol 2

Diplexers

Alford Mfg. Co., Winchester, Mass.
American Elctrn. Labs., Inc., Lansdale, Pa.
American Nucleonics Corp., Woodland Hills, Cal
Bendix, Franklin, Ind.
E & M Labs., Westlake Village, Cal.
Frequency Engrg. Labs., Farmingdale, N.J. ..... p 605
Microwave Cavity Labs., La Grange, Ill.
R L C Elctrns., Inc., Mt. Kisco, N.Y.
Transco Prods., Inc., Venice, Cal.
Aircom, Inc., Union, N.H.
Astrolab Inc., Linden, N J
Blonder-Tongue Labs., Inc., Old Bridge, N.J.
Cardwell Condenser, Lindenhurst, N.Y.
CES Elctrns., Brooklyn, N.Y.
Collins Radio Co., Dallas, Tex.
Decibel Prods., Inc., Dallas, Tex.
Elctrn. Resources Div., Los Angeles, Cal.
General Microwave Corp., Farmingdale, N.Y.
GRFF, Port Salerno, Fla.
Guide Inds., Inc., Sun Valley, Calif.
Herley Inds., Inc., Syosset, N.Y.
Hughes Aircraft Co, Culver City, Cal.
Hyletronics Corp., Littleton, Mass.
Industrial Microwave, Scotch Plains, N.J.
Kevlin Mfg. Co., Woburn, Mass.
Maury Microwave Corp., Cucamonga, Calif.
MCS Corp., Monrovia, Calif.
Meca Elctrns., Inc., Denville, N.J.
Microlab/FXR, Livingston, N.J.
Microphase Corp., Cos Cob, Conn.
Microwave Assocs., Inc., Burlington, Mass.
Microwave Development Labs., Inc., Needham Hgts., Mass.
Microwave Div, Nashua, N.H.
Microwave Filter Co., Inc., East Syracuse, N.Y.
Microwave Labs. America, Brooklyn, N.Y.
Microwave Prods., Inc., Chatsworth, Cal.
N-H Microwave, Inc., Red Bank, N.J.
Olektron Corp., Dudley, Mass.
Peninsula Microwave Labs., Mountain View, Cal.
Philco-Ford Corp., Washington, D.C.
Premier Microwave, Port Chester, N.Y.
Radiation Sys., Inc., McLean, Va.
Rantec Div., Calabasas, Calif.
RF Systems, Inc., Cohasset, Mass.
Sage Labs. Inc., Natick, Mass.
Sanders Assocs., Nashua, N.H.
Sinclair Radio Labs., Maple, Ont., Can.
Singer - Tele-Signal, Woodbury, N.Y.
Special Microwave Devices Oper., Waltham, Mass.
Struthers Elctrns. Corp., Mamaroneck, N.Y.
Teledyne Micronetics, San Diego, Calif.
Teledyne Microwave, Sunnyvale, Cal.
Telonic Inds., Inc., Laguna Beach, Calif.
Texscan Microwave Prods., Indianapolis, Ind.
Thomson-CSF Inc., New York, N.Y.
Varian Assocs., Palo Alto, Cal.

Varian Assocs.Electron Tube & Device Grp., Palo Alto, Cal.
Vectronics Microwave Corp., Middlesex, N.J.
Wavecom, Inc., Northridge, Cal.
Zeta Labs., Inc., Mountain View, Calif.

Directional Couplers—See Couplers, Directional

Discharge Systems, Energy

Tobe Deutschmann Labs., Inc., Canton, Mass. ..... p 2476
Advanced Kinetics, Costa Mesa, Calif.
Energy Sciences Inc., Burlington, Mass.
U.S. Scientific Instrs., Watertown, Mass.

Discriminators

Airpax Elctrns., Inc., Cambridge, Md.
Airpax Elctrns., Ft. Lauderdale, Fla.
Almond Instrs. Co., Covina, Cal
Atomichron, Inc., New Hyde Park, N.Y. p 469
Automated Meas., Oakland, Calif. p 446
Automatic Coil, New Hyde Pk., N.Y.
Bliley Electric, Erie, Pa. ..... p 1371
Bulova Watch Co., Freq. Control Prods., Elctrns. Div., Woodside, N.Y. p 1364
CTS Corp, Elkhart, Ind..... p 1375
Damon Corp., Needham Hgts., Mass.
Data-Control Systems, Danbury, Conn.
E-H Resch. Labs., Inc., Oakland, Cal. p 446
Electronic Research Co., Shawnee Mission, Kans.
Freed Transformer Co., Bklyn., N.Y.
Frequency Elctrns., New Hyde Pk., N.Y. p 469
Frequency Engrg. Labs., Farmingdale, N.J. ..... p 605
Hewlett-Packard, Palo Alto, Cal.
Hughes Aircraft Co., Frequency Control Devices, Newport Bch., Cal.
Hughes Aircraft Co., Mos Div., Newport Beach, Cal.
Ind'l. Test Equip., Port Washington, N.Y.
Interstate Elctrns. Corp., Anaheim, Cal.
JFD Elctrns./Sub. Riker-Maxson, Bklyn., N.Y.
McCoy Elctrns. Co., Mt. Holly Springs, Pa.
Millen, James Mfg., Malden, Mass.
Piezo Technology, Orlando, Fla.
Reeves-Hoffman Div., Carlisle, Pa.
RHG Elctrns. Lab., Farmingdale, N.Y.
Ryka Scientific, Inc., Sunnyvale, Cal. p 1564
Solid State Elctrns., Sepulveda, Cal. p 954
Sonex, Inc., Bethayres, Pa..... p 955
Sprague Elec. Co., No. Adams, Mass.
Teledyne Geotech, Dallas, Tex.
Vega Precision Labs., Vienna, Va.
Adar Assocs., Cambridge, Mass.
AMBAC Inds., Garden City, N.Y.
American Trans-Coil Corp., Richmond Hill, N.Y.
Anaren Microwave, Inc., Syracuse, N.Y.
Berkeley Nucleonics Corp., Berkeley, Calif.
Bio-Medical Elctrns., Inc., Rockville, Md.
Dynalco Corp., Ft. Lauderdale, Fla.
Dynamic Precision Controls, Hagerstown, Ind.
Engelmann Microwave, Montville, N.J.
General Instr. Corp., Hicksville, N.Y.
Guide Inds., Inc., Sun Valley, Calif.
Heidelex Corp., Chelmsford, Mass.
Industrial Microwave, Scotch Plains, N.J.
Lear Siegler, Inc., Santa Monica, Calif.
Lear Siegler, Anaheim, Cal.
Lecroy Resch. Sys. Corp., West Nyack, N.Y.
Microwave Development Labs., Inc., Needham Hgts., Mass.
Microwave/Sys., Inc., E. Syracuse, N.Y.
MITEQ, Inc., Hauppauge, N.Y.
Nanosecond Systems, Inc., Fairfield, Conn.
Nuclear-Chicago, Des Plaines, Ill.
Nuclear Data, Inc., Palatine, Ill.
Olektron Corp., Dudley, Mass.
Physical Elctrn. Labs., Menlo Park, Calif.
Piconics Inc., Tyngsboro, Mass.
Polyphase Instr. Co., Bridgeport, Pa.
Premier Microwave, Port Chester, N.Y.
Sherold Crystal Prods., Kansas City, Mo.
Soltec Corp., No. Hollywood, Cal.
SSR Instrs. Co., Santa Monica, Cal.
Struthers Elctrns. Corp., Mamaroneck, N.Y.
Varian Assocs., Palo Alto, Cal.
Vidar Corp., Mountain View, Cal.

Disc Packs, Magnetic

Digital Equip. Corp., Maynard, Mass.
Barger Corp., Sunnyvale, Cal.
Computer Prods. Int'l., Inc., Santa Clara, Calif.
Datatron, Inc., Santa Ana, Cal
Honeywell Information Systems, Wellesley Hills, Mass
Memorex Corp., Santa Clara, Cal.
3M Co., St. Paul, Minn.

Discs, Computer Memory Also See Memory Systems, Disc

Digital Equip. Corp., Maynard, Mass.
Gould, Inc., Cleveland, Ohio
Alloys Unlimited, Inc., Encino, Calif.
Barger Corp., Sunnyvale, Cal.
Bryant Computer Prods., Walled Lake, Mich.
Century Data Systems, Anaheim, Cal.
Computer Prods. Int'l., Inc., Santa Clara, Calif.
Data Disc Inc., Computer Prods., Sunnyvale, Cal.
Data Prods. Corp., Woodland Hills, Calif.
Four-Phase Sys, Cupertino, Cal
Friden Div., San Leandro, Calif.
General Instr. Corp., Hawthorne, Cal.
Gould, Inc., El Monte, Calif.
Honeywell Information Systems, Wellesley Hills, Mass
Houston Scientific Inds., Inc., Houston, Tex
Hughes Aircraft Co, Culver City, Cal.
Memorex Corp., Santa Clara, Cal.
Whittaker Corp., Los Angeles, Cal.
Xerox Data Sys., El Segundo, Cal

Discs, Optical Encoder—See Coded Discs, Optical

Dispensers For Epoxy, Encapsulating Compounds, etc.

Ablestik Adhesive Div., Gardena, Calif.
Allaco Prods., Braintree, Mass.
Delsen Testing Corp., Glendale, Calif.
Fenwal, Inc., Ashland, Mass.
Hardman Inc., Belleville, N.J.
Hull Corp., Hatboro, Pa.
Hysol Div., Olean, N.Y.
Janel, Inc., Stirling, N.J.
Kenics Corp., Danvers, Mass.
Laurier Assocs., Westford, Mass.
Minnetech Labs., Inc., Minneapolis, Minn.
Packaged Resins Co., Braintree, Mass.
Sara Scientific Co., San Francisco, Calif.
Sta-Warm Elec. Co., Ravenna, Ohio
Techform Labs., Inc., Venice, Cal.
Techni-Tool, Inc., Philadelphia, Pa.
3M Co., St. Paul, Minn.
Tra-Con, Inc., Medford, Mass.
Ferranti Ltd., Hollinwood, Lance., England

Display Boards—See Boards, Plotting

Display Panels (Back-Lighted & Edge-Lighted)—See Vol 2

Displays, Projection Type (CRT, Electromechanical, Film Light Valve)—See Vol 2

Dissipators, Heat—See Heat Sinks—Vol 3

Distortion Analyzers—See Analyzers, A-F

Distortion Indicators—See Analyzers, A-F

Distribution Systems, Frequency

Data-Control Systems, Danbury, Conn.
Vectron Labs., Inc., Norwalk, Conn.
General Dynamics, San Diego, Cal.
HB Engrg. Corp., Silver Spring, Md.

Dividers, Analog

General Magnetics, Bloomfield, N.J. p 1318
Hybrid Sys. Corp., Burlington, Mass. p 1284
Intronics, Inc., Newton, Mass. .... p 1288
Teledyne Philbrick, Dedham, Mass.
Burr-Brown Resch. Corp., Tucson, Ariz.
Fairchild Semiconductor, Mountain View, Calif.
Foxboro Co., Foxboro, Mass.
Hughes Aircraft Co, Culver City, Cal.
Moore Inds., Van Nuys, Cal.
Zeltex, Inc., Concord, Calif.
Frequency Elctrns., New Hyde Pk., N.Y.

Dividers, Angular

Solid State Elctrns., Sepulveda, Cal.
Proto Tool Co, Los Angeles, Calif.
Teledyne Gurley, Troy, N.Y.
Theta Instr. Corp., Fairfield, N.J.

Dividers, Frequency

Accutronics, Inc., Geneva, Ill.
American Elctrn. Labs., Inc., Lansdale, Pa.
American Time Products, Woodside, N.Y.
Anadex Instrs., Inc., Van Nuys, Calif. p 391
Austron, Inc., Austin, Tex.
Bramco Controls, Piqua, Ohio
Bulova Watch Elctrns. Div. Amer. Time Prods., Woodside, N.Y.
Bulova Watch Co., Servo Prods. Elctrns. Div., Woodside, N.Y.
C & K Components, Watertown, Mass.
Coast Coil Co., Los Angeles, Calif. p 2487
Connor-Winfield Corp., Winfield, Ill.
Fork Standards, W. Chicago, Ill.
Frequency Elctrns., New Hyde Pk., N.Y.
General Elec. Co., Schenectady, N.Y.
Geo Space Sys., Tampa, Fla.
Gibbs Mfg. & Resch., Janesville, Wisc.
Hewlett-Packard, Palo Alto, Cal.
Hughes Aircraft Co., Mos Div., Newport Beach, Cal.
Interstate Elctrns. Corp., Anaheim, Cal.
LVC Ind's., Inc., Corona, N.Y.
Solid State Elctrns., Sepulveda, Cal.
Specific Products, Monrovia, Cal.
Spectrum Technology, Goleta, Cal.
Systron-Donner Concord Instr. Div., Concord, Cal.
A & M Instrument, Inc., Great Neck, N.Y.
Advanced Energy Conversion, Menlo Pk., Cal.
Aerospace Resch. Inc., Boston, Mass.
Anritsu Electric Co., Ltd., Tokyo, Japan
Communication Elctrns., Rockville, Md.
Digital Displays, Mendham, N.J.
Dittmore-Freimuth Corp., Milwaukee, Wisc.
Dynamic Precision Controls, Hagerstown, Ind.
Dynographic Elctrns. Corp., Hicksville, N.Y.
Fairchild Semiconductor, Mountain View, Calif.
Finney Co., Bedford, Ohio
General Radio Co., Concord, Mass.
Guide Inds., Inc., Sun Valley, Calif.
Hughes Aircraft Co, Fullerton, Cal.
Industrial Microwave, Scotch Plains, N.J.
Instrumentation Tech. Corp., Northridge, Calif.
Intercontinental Elctrns., E. Rochester, N.Y.
Kelk, George Ltd., Don Mills, Ont., Canada
Microphase Corp., Cos Cob, Conn.
Milletron, Inc., Pittsburgh, Pa.
Mullard, Inc., Farmingdale, N.Y.
NH Research, Inc., Santa Ana, Calif.
Optical Elctrns., Tucson, Ariz.
Philco-Ford Corp., Washington, D.C.
Philips Elctrns. Inds., Ltd., Toronto 17, Can.
Rohde & Schwarz Sls., Passaic, N.J.
Somerset Radiation Lab., Arlington, Va.
Systems Elctrns., Cleveland, Ohio
Tempo Instr., Plainview, N.Y.
3M Co., St. Paul, Minn.
Timing Sys., Inc., Marblehead, Mass.
Zehntel, Inc., Berkeley, Calif.
Zeta Labs., Inc., Mountain View, Calif.

Dividers, Magnetic—See Vol 2

Dividers, Power (LF, HF, VHF, UHF)

Alford Mfg. Co., Winchester, Mass. p 598
Daico Inds., Inc., Compton, Cal... p 1556
Lorch Elctrns. Corp., Englewood, N.J. p 609
RF Communications, Rochester, N.Y.
Vari-L Co., Inc., Denver, Colo.
Weinschel Engrg. Co., Gaithersburg, Md. ..... p 1571
Anaren Microwave, Inc., Syracuse, N.Y.
Anzac Elctrns., Waltham, Mass.
AUL Instrs., Inc., Flushng, N.Y.
Comdel, Inc., Beverly, Mass.
Engelmann Microwave, Montville, N.J.
FKS Comms., Inc., New Hyde Park, N.Y.
Hughes Aircraft Co, Fullerton, Cal.
Indit Corp., Albertson, N.Y.
Industrial Microwave, Scotch Plains, N.J.
Kevlin Mfg. Co., Woburn, Mass.
Merrimac Resch. & Dev., Inc., West Caldwell, N.J.
MI-KRO Connector Div., Long Island City, N.Y.
Microphase Corp., Cos Cob, Conn.
Mini-Circuits Lab., Brooklyn, N.Y.
Olektron Corp., Dudley, Mass.
Radio Resch. Co., Rockaway, N.J.
Relcom, Mt. View, Calif.
Sage Labs. Inc., Natick, Mass.
Scala Radio Corp., San Leandro, Cal.
Scientific Communications, Garland, Tex.
Wavecom, Inc., Northridge, Cal.

Dividers, Power, Microwave—See Vol 2

Dividers, Voltage Also See Transformers, Voltage Dividing

Amp Inc., Elizabethtown, Pa.
Astrosystems, Lake Success, N.Y. p 406
Beckman Instrs., Cedar Grove, N.J.
Caddock Elctrns., Riverside, Cal. p 2827
Coast Coil Co., Los Angeles, Calif. p 2487
Computer Instrs., Hempstead, N.Y.
CPS, Sunnyvale, Calif. ..... p 669
Del Elctrns. Corp., Mt. Vernon, N.Y.
Digitran Co., Pasadena, Cal. ..... p 1904
Electro Sci. Inds., Portland, Ore. p 455,2919
Fluke, John Mfg. Co., Inc., Seattle, Wash. ..... p 479
General Elec. Co., Schenectady, N.Y.
General Resistance, Mt. Vernon, N.Y.
Julie Research Lab., New York, N.Y. p 502,503
Kepco, Inc., Flushing, N.Y.
Lorch-Adret Corp., Englewood, N.J.
LVC Ind's., Inc., Corona, N.Y.
Microtran Co., Valley Stream, N.Y.
North Atlantic Inds., Plainview, N.Y. p 530,531
North Hills Elctrns., Inc., Glen Cove, N.Y. ..... p 2967
Ohmite Mfg. Co., Skokie, Ill. ..... p 2869
RFL Inds., Instr. Div., Boonton, N.J.
Ross Engrg. Corp., Campbell, Cal. p 1786
Shallcross, Selma, N.C.
Teledyne Philbrick, Dedham, Mass.
Vari-L Co., Inc., Denver, Colo. .... p 1570
Welwyn Int'l., Inc., Westlake, Ohio
A & M Instrument, Inc., Great Neck, N.Y.
Aerospace Resch. Inc., Boston, Mass.
A.O.I.P., 75/Paris 12eme, France
Burr-Brown Resch. Corp., Tucson, Ariz.
Collins, G.L. Corp., Long Beach, Calif.
Coral Magnetics Co., Farmingdale, N.Y.
Delta-Tronics Corp., Tempe, Ariz.
Edison Elctrns. Div., Manchester, N.H.
Electrical Instr. Svc., Inc., Mt. Vernon, N.Y.
General Radio Co., Concord, Mass.
Guildline Instrs., Inc., Larchmont, N.Y.
Hallmark Standards, Inc., Mt. Vernon, N.Y.
Idalee Elctrns. Corp., Valley Stream, N.Y.
Jan Hardware Mfg. Co., Inc., Long Island City, N.Y.
Jordan Electric Co., Van Nuys, Calif.
Leeds & Northrup Corp., No. Wales, Pa.
Lionmount & Co., Ltd., New Southgate, London, England
Marstan Resistor, Orange, N.J.
Muirhead, Inc., Mountainside, N.J.
Olektron Corp., Dudley, Mass.

Pearson Elctrns., Palo Alto, Cal.
Pyrofilm Corp., Whippany, N.J.
Rho Engrg. Co., Los Angeles, Calif
Westronics, Inc., Ft. Worth, Tex.

Dollies & Instrument Carts—See Carts, Instrument & Equipment—Vol 3

Domes, Optical—See Vol 2

Doors, Cabinet, Metal—See Cabinets & Accessories, Metal—Vol 3

Dope, Coil—See Insulating Compounds, Coil Dope—Vol 3

Dosimeters

Electrospace Corp., Westbury
Victoreen Instr., Cleveland, Ohio
Aeg-Telefunken Corp., Englewood Cliffs, N.J.
Avco Corp., Cincinnati, Ohio
Avco Elctrns., Tulsa, Okla.
Beckman Instrs., (AISSD), Fullerton, Cal.
Brinkmann Instrs., Inc., Westbury, N.Y.
General Microwave Corp., Farmingdale, N.Y.
Harshaw Chem. Co., Cleveland, Ohio
Hughes Aircraft Co, Malibu, Cal.
Kahl Scientific Instr. Corp., El Cajon, Calif.
Kaman Nuclear, Colorado Springs, Colo.
Landsverk Electrometer Co., Glendale, Cal.
Nuclear-Chicago, Des Plaines, Ill.
Nuclear Equip. Chem. Corp., Farmingdale, N.Y.
Nuclear Resch. Corp., Southampton, Pa.
Nuclear Supply Co., Washington, D.C.
Soltec Corp., No. Hollywood, Cal.

Doublers, Frequency—See Multipliers, Frequency

Drafting Machines—See Vol 3

Drafting Symbols, Dry Transfer, Pressure Sensitive, etc.—See Vol 3

Drafting Templates & Equip.—See Vol 3

Drawers, Sliding—See Vol 3

Drills & Accessories, Hand & Power—See Vol 3

Drivers, Chopper—See Vol 2

Drivers, Lamp—See Vol 2

Drivers, Nut—See Vol 3

Drivers, Solenoid—See Solenoid Drivers—Vol 2

Drivers, Speaker

Action Systems Co., Meriden, Conn.
Atlas Sound Div., Parsippany, N.J.
Electro-Voice, Inc., Buchanan, Mich.
Lansing, James B. Sound, Los Angeles, Cal.
Shigoto Inds., Ltd., New York, N.Y.
University Sound, Anaheim, Cal.

Drivers, Switch—See Vol 2

Drivers, Tube—See Vol 2

Drivers & Decoders For Readouts—See Vol 2

Drives, Dial—See Vol 2

Drivers & Drive Mechanisms—See Vol 2

Drums, Computer Memory Also See Memory Systems, Drum

Digital Equip. Corp., Maynard, Mass.
Alloys Unlimited, Inc., Encino, Calif.
Bryant Computer Prods., Walled Lake, Mich.
Cognitronics Corp., Mt. Kisco, N.Y.
Honeywell Information Systems, Wellesley Hills, Mass
Houston Scientific Inds., Inc., Houston, Tex
Hughes Aircraft Co, Culver City, Cal.
O E M Prods., Carlstadt, N.J.
RCA Govt. & Comm. Sys., Moorestown, N.J.

Dry Transfer Letters & Numbers—See Kits, Marking-Also See Drafting Symbols—Vol 2

Dryers, Air, Heatless

Daco Instr. Co., Inc., Trumbull, Conn. p 2783
Atlas Engrg. Corp., W. Hartford, Conn.
BTU Engrg. Corp., Waltham, Mass.
Cargocaire Engrg. Corp., Amesbury, Mass.
Corkpak Co., Inc., New Rochelle, N.Y.
Harshaw Chem. Co., Cleveland, Ohio
Hayes, C.I. Inc., Cranston, R.I.
Humphrey, Inc., San Diego, Calif.
Kahn & Co., Inc., Wethersfield, Conn.
Lear Siegler, Inc., Elyria, Ohio
Lectrodryer Div., Pittsburgh, Pa.
Lindsay Structure, Evansville, Ind.
Pall Corp., Glen Cove, N.Y.
Pall Trinity Micro Corp., Cortland, N.Y.
Podgor, Joseph Co., Pennsauken, N.J.
Puregas Equip. Corp., Copiague, N.Y.
Ross Engrg. Div., New Brunswick, N.J.
Sanders Assocs., GPL P.C. Prod. Equip., Manchester, N.H.
Superior Continental Corp., Hickory, N.C.

Ducts, Flexible—See Vol 3

Ducts, Wiring—See Vol 3

Dummy Loads—See Vol 3

Duplexer Equipment—See Recievers; Transmitters; etc.

Duplexers, Microwave

American Elctrn. Labs., Inc., Lansdale, Pa.
E & M Labs., Westlake Village, Cal.
Microwave Cavity Labs., La Grange, Ill.
Nippon Electric/NEC America, N.Y., N.Y.
R L C Elctrns., Inc., Mt. Kisco, N.Y.
Waveline, Inc., W. Caldwell, N.J.
Airtec, Inc., Roselle, N.J.
A.R.F. Products, Inc., Raton, N.M.
Cardion Communications, Woodbury, N.Y.
Cardwell Condenser, Lindenhurst, N.Y.
Coax Devices Inc., Chelsea, Mass.
Dittmore-Freimuth Corp., Milwaukee, Wisc.
Engelmann Microwave, Montville, N.J.
Ferranti Ltd., Hollinwood, Lancs., England
Guide Inds., Inc., Sun Valley, Calif.
Herley Inds., Inc., Syosset, N.Y.
Hughes Aircraft Co, Culver City, Cal.
Hughes Aircraft Co, Fullerton, Cal.
Hyletronics Corp., Littleton, Mass.
Kevlin Mfg. Co., Woburn, Mass.
Maury Microwave Corp., Cucamonga, Calif.
MCS Corp., Monrovia, Calif.
Microlab/FXR, Livingston, N.J.
Microwave Assocs., Inc., Burlington, Mass.
Microwave Development Labs., Inc., Needham Hgts., Mass.
Microwave Div, Nashua, N.H.
Microwave Filter Co., Inc., East Syracuse, N.Y.
Microwave Prods., Inc., Chatsworth, Cal.
N-H Microwave, Inc., Red Bank, N.J.
Peninsula Microwave Labs., Mountain View, Cal.
Philco-Ford Corp., Washington, D.C.
Premier Microwave, Port Chester, N.Y.
Radiation Sys., Inc., McLean, Va.
Rantec Div., Calabasas, Calif.
Raytheon Data Systems Co., Norwood, Mass.
RCA Govt. & Comm. Sys., Moorestown, N.J.
RF Systems, Inc., Cohasset, Mass.
Sage Labs. Inc., Natick, Mass.
Sanders Assocs., Nashua, N.H.
Special Microwave Devices Oper., Waltham, Mass.
Struthers Elctrns. Corp., Mamaroneck, N.Y.
Systron-Donner Microwave Div., Van Nuys, Cal.
Varian Assocs., Palo Alto, Cal.
Wavecom, Inc., Northridge, Cal.

Duplicators, Magnetic Tape

A. D. Data Sys., Inc., Rochester, N.Y. p 328
Crown Int'l., Elkhart, Ind. ..... p 951
Datacom, Inc., Ft. Walton Bch., Fla.
Ampex Corp., Redwood City, Calif.
Audiotronics, N. Hollywood, Cal.
Barger Corp., Sunnyvale, Cal.
Computerized Elctrn. Education, Upper Darby, Pa.
Magnetic Video Corp., Farmington, Mich.
Merchant, Robert C. Co., Carmel Valley, Calif.
Multi Media Engrg., Inc., Rockville, Md.
Telectro Sys. Corp., Corona, N.Y.
Telex Comm. Div., Minneapolis, Minn.
United Resch. Lab., Corp., New York, N.Y.
V-M Corp., Benton Harbor, Mich.
Viewlex, Holbrook, N.Y.

Dust-Free Chambers—See Rooms, Clean, Dust-Free

Dvm's—See Meters, Volt, Digital

Dynamometers

General Elec. Co., Schenectady, N.Y.
Jonard Inds. Corp., Bronx, N.Y.
Larson Instr. Co., Inc., Orangeburg, N.Y.
Simpson Elec. Co., Chicago, Ill.
Ametek/Testing Equip. Sys., Lausdale, Pa.
Auto Control Labs., Los Angeles, Calif.
Bear Mfg. Corp., Rock Island, Ill.
Chatillon John & Sons, Kew Gardens, N.Y.
Dillon, W.C. & Co., Van Nuys 340, Calif.
General Thermodynamics Corp., Wilmington, Mass.
Kahn & Co., Inc., Wethersfield, Conn.
Lear Siegler, Inc., Santa Monica, Calif.
Magtrol, Inc., Buffalo, N.Y.
McFadden Elctrns. Co., South Gate, Calif.
Siemens Corp., Comps. Div., Iselin, N.J.
Statham Instrs., Inc., Oxnard, Cal.
Stoelting Co., Chicago, Ill.
Task Corp., Anaheim, Calif.
Vibrac Corp., Chelmsford, Mass.
West Coast Resch. Corp., Los Angeles, Calif.
Westinghouse Elec. Corp., Pittsburgh, Pa.

Dynamotors—See Vol 2

Earphones—See Headphones & Headsets

Echo Boxes—See Boxes, Echo

Echo Ranging Equipment, Ultrasonic

Hewlett-Packard, Palo Alto, Cal.
Arenberg Ultrasonic Lab., Inc., Jamaica Plain, Mass.
Automation Inds., Los Angeles, Cal.
Edo Western Corp., Salt Lake City, Utah
Honeywell, Aerospace & Def., Minneapolis, Minn.
Hughes Aircraft Co, Fullerton, Cal.
InterOcean Systems, San Diego, Cal.
Massa Div., Hingham, Mass.
Pearce-Simpson, Miami, Fla.
Straza Inds., El Cajon, Calif.

Economizers, Carbon Dioxide

Hafstrom Tech. Prods., Inc., San Diego, Calif.

Editing Equipment—See Vol 3

Elastoners, Heat Shrinkable—See Caps, Forms & Tapes, Heat Shrinkable—Vol 3

Electrical Surge Arresters—See Arresters, Electrical Surge—Vol 2

Electrocardiographs (Ecg)

Computer Instrs., Hempstead, N.Y.
Gould, Inc., Cleveland, Ohio
Hewlett-Packard, Palo Alto, Cal.
Honeywell, Denver, Colo.
International Rectifier, El Segundo, Cal.
Tektronix, Inc., Beaverton, Ore.
AUL Instrs., Inc., Flushng, N.Y.
Avionics, Inc., South Bend, Ind.
Avionics Resch. Prods., Los Angeles, Calif.
Beckman Instrs., (AISSD), Fullerton, Cal.
Bendix, Rochester, N.Y.
Bio-Medical Elctrns., Inc., Rockville, Md.
Biocom, Inc., Culver City, Cal.
Bionic Instrs., Inc., Bala Cynwyd, Pa.
Datum, Inc., Anaheim, Calif.
Desman Elctrns., Rochester, N.Y.
Lehigh Valley Elctrn., Inc., Fogelsville, Pa.
Mennen-Greatbatch Elctrns., Inc., Clarence, N.Y.
Waters Instrs., Inc., Rochester, Minn
Wolff Industries, San Marino, Cal

Electrodes—See Tube Parts—Vol 2

Electrodes, Electroplating—See Electroplating Equipment & Supplies

Electrodes, Spherical—See Vol 3

Electroencephalographs (Eeg)

Gould, Inc., Cleveland, Ohio
Hewlett-Packard, Palo Alto, Cal.
Tektronix, Inc., Beaverton, Ore.
Beckman Instrs., (AISSD), Fullerton, Cal.
Bergen Labs., Inc., Paterson, N.J.
Bio-Medical Elctrns., Inc., Rockville, Md.
Biocom, Inc., Culver City, Cal.
Datum, Inc., Anaheim, Calif.
Lehigh Valley Elctrn., Inc., Fogelsville, Pa.
Mennen-Greatbatch Elctrns., Inc., Clarence, N.Y.
San-ei Instrument Co., Ltd., Shinjuku-ku, Tokyo 160, Japan
Shur-Lok Corp., Santa Ana, Calif.
Waters Instrs., Inc., Rochester, Minn
Yewtec Corporation, Larchmont, N.Y.

Electromechanical Readouts—See Readouts, Electromagnetic—Vol 2

Electromagnets—See Magnets, Electromagnetic—Vol 3

Electrometers—See Meters, Electrometer

Electromyographs

Gould, Inc., Cleveland, Ohio
Hewlett-Packard, Palo Alto, Cal.
Honeywell, Denver, Colo.
Beckman Instrs., (AISSD), Fullerton, Cal.
Bio-Medical Elctrns., Inc., Rockville, Md.
Biocom, Inc., Culver City, Cal.
Bionic Instrs., Inc., Bala Cynwyd, Pa.
Lehigh Valley Elctrn., Inc., Fogelsville, Pa.
Northern Precision Labs., Inc., Fairfield, N.J.
San-ei Instrument Co., Ltd., Shinjuku-ku, Tokyo 160, Japan

Electron Guns—See Tube Parts—Vol 2

Electroplating Equipment & Supplies

Beckman Instrs., Cedar Grove, N.J.
CML-Macarr, Inc., Edison, N.J.
Gates Elctrn. Co., Bronx, N.Y.
Opad Elec. Co., Inc., New York, N.Y.
Sangamo Elec. Co., Pickens, S.C.
Acheson Colloids Co., Port Huron, Mich.
Alpha Metals, Inc., Jersey City, N.J.
Aubin, A.E. Co., Glastonbury, Conn.
Beckman Instrs., Process Instrs., Fullerton, Cal.
Darrah Elec. Co., Inc., Cleveland, Ohio
Enthone, Inc., New Haven, Conn.
Etchomatic, Inc., Waltham, Mass.
Fidelity Chem. Prods. Corp., Newark, N.J.
Glo-Quartz Elec. Heater Co., Mentor, Ohio
Green Elec. Corp., Fair Lawn, N.J.
Halmar Elctrns., Inc., Columbus, Ohio
Harshaw Chem. Co., Cleveland, Ohio
Indium Corp. America, Utica, N.Y.
Kahn & Co., Inc., Wethersfield, Conn.
LEA Mfg. Co., Waterbury, Conn
Lea-Ronal, Inc., Freeport, N.Y.
Lehighton Elctrns., Inc., Lehighton, Pa.

Luft Instrs., Inc., Lincoln, Mass.
M & T Chemicals Inc., Rahway, N.J.
Materials Development, Los Angeles, Cal.
Materials Resch. Corp., Orangeburg, N.Y.
Metaplast Electrochemicals, Bronx, N.Y.
Richardson Co., Des Plaines, Ill.
Robicon Corp., Pittsburgh, Pa
Sel-Rex Corp., Nutley, N.J.
Selectrons, Ltd., New York, N.Y.
Servometer Corp., Clifton, N.J.
Sifco Metachemical, Cleveland, Ohio
Technic, Inc., Providence, R.I.
Westinghouse Elec. Int'l., New York, N.Y.

Electroplating Power Supplies—See Power Supplies, Electroplating Equipment

Electroplating Services—See Services, Plating

Electrostatic Spray Paint Systems—See Spray Systems, Electrostatic Paint

Elements, Heating—See Heating Elements—Vol 2

Elements, Sensing—See Transducers—Vol 2

Eliminators, Battery-Also See Power Supplies

Abbott Transistor Labs., L.A., Cal.
ADC Prods., Minneapolis, Minn.
American Time Products, Woodside, N.Y.
ATR Elctrns., Inc., St. Paul, Minn. p 652
Bulova Watch Elctrns. Div. Amer. Time Prods., Woodside, N.Y.
Christie Elec., Los Angeles, Cal.
Dynage, Bloomfield, Conn.
Dynamic Instr. Corp., Plainview, N.Y.
Electronic Resch. Assocs., Cedar Grove, N.J.
Gates Elctrn. Co., Bronx, N.Y. ..... p 721
GC Elctrns., Rockford, Ill.
International Rectifier, El Segundo, Cal.
Kepco, Inc., Flushing, N.Y.
Marathon Battery Co., Cold Spring, N.Y. p 811
Mid-Eastern Inds., Scotch Plains, N.J.
North Elec. Co., Galion, Ohio
Opad Elec. Co., Inc., New York, N.Y.
Power Designs, Westbury, N.Y.
Powertec, Chatsworth, Cal.
Schauer Mfg. Corp., Cincinnati, Ohio
Todd Prods., Farmingdale, N.Y.
Wanlass Div., Fort Washington, Pa.
A C Electronics Co., Santa Monica, Cal.
Applied Electro Mechanics, Alexandria, Va.
BECO Solid State Systems, Salem, Va.
Bogue Elec. Mfg. Co., Paterson, N.J.
Cal-Power Corp., El Segundo, Calif.
Coil Co. of Amer., Northvale, N.J.
Components Specialties, Inc., Freeport, N.Y.
Cyberex Inc., Willoughby, Ohio
Dual-Lite Co., Newtown, Conn.
Dynascan Corp., Chicago, Ill.
Eastern Delta Corp., Fair Lawn, N.J.
Eico Electronic Instrument Co., Inc., Brooklyn, N.Y.
Elasco-Eastern, Inc., Bloomfield, Conn.
Electro Prods. Labs., Power Supply, Chicago, Ill.
Electro Prods. Labs., Transducer Div., Chgo., Ill.
Elgin Elctrns., Waterford, Pa.
Engineering Assocs., Dayton, Ohio
Fedtro, Inc., Rockville Centre, N.Y.
Green Elec. Corp., Fair Lawn, N.J.
Gulton Inds., Hawthorne, Calif.
Heath Co., Benton Harbor, Mich.
Hyperion Inds. Corp., Watertown, Mass.
Instrulab, Inc., Dayton, Ohio
Model Rectifier Corp., Edison, N.J.
Modular Devices, Inc., Gardena, Calif.
Philips Elctrns. Inds., Ltd., Toronto 17, Can.
Philmore Mfg. Co., Richmond Hill, N.Y.
Power Control Corp., Pittsburgh, Pa.
Power Conversion Prods. Inc., Crystal Lake, Ill.
Ramm Rectifier Co., Inc., Bronx, N.Y.
Ratelco, Inc., Seattle, Wash.
Rectifier Engrg. & Supply, St. Louis, Mo.
Shigoto Inds., Ltd., New York, N.Y.
Stark Elctrn. Instrs., Ltd., Ajax, Ont., Canada
Sun Capacitors, Chicago, Ill.
Triple-A Specialty Co., Chicago, Ill.
Warren Communications, Littleton, Mass.
Westinghouse Elec. Int'l., New York, N.Y.

Emissometers-Also See Meters, Reflectometer

Hughes Aircraft Co, Culver City, Cal.

Enamel Insulation—See Insulating Compounds, Enamel—Vol 3

Encapsulating Cups—See Cups, Encapsulation—Vol 3

Encapsulating Materials—See Compounds, Encapsulating—Vol 3

Encapsulation Services—See Services, Encapsulation—Vol 3

Enclosures, Component, Plug-In—See Cans—Vol 3

Enclosures, Speaker (Excluding Kits)

GC Elctrns., Rockford, Ill.
Abalon Precision Mfg. Corp., Bronx, N.Y.
Alcor, Inc., Ithaca, N.Y.
Alloys Unlimited, Inc., Encino, Calif.
Altec, Anaheim, Calif.
American Geloso Elctrns., Inc., New York, N.Y.
Argos Prods. Co., Inc., Genoa, Ill.
Atlas Sound Div., Parsippany, N.J.
Barnes Engrg. Co., Santa Ana, Calif.
Bogen Div., Paramus, N.J.
Bozak, R.T. Mfg. Co., Darien, Conn.
Bud Radio, Inc., Willoughby, Ohio
Components Specialties, Inc., Freeport, N.Y.
Davis J.W. & Co., Dallas, Texas
Era Acoustics Corp., Moonachie, N.J.
Ercona Corp., Bellmore, N.Y.
Feiner, P. & Sons, Inc., New York, N.Y.
Fisher Radio, Long Island City, N.Y.
Fourjay Inds., Dayton, Ohio
Furniture Craftsmen, Grand Rapids, Mich.
Hammond Mfg. Co., Ltd., Guelph, Ont., Can.
Hartley Prods. Corp., Hohokus, N.J.
Hawley Prods., Hitco Co., Sub. Armco, St. Charles, Ill.
Heath Co., Benton Harbor, Mich.
Hoffman Engrg. Co., Anoka, Minn.
Keystone Elctrns. Corp., New York, N.Y.
Klipsch & Assocs., Inc., Hope, Ark.
Major Elctrns. Corp., Brooklyn, N.Y.
Metal Works, Inc., Hermann, Mo.
Mid-West Metal Prods., Kansas City, Kans.
Mobil Elctrns., Inc., Anderson, Ind.
Muckle Mfg. Co., Owatonna, Minn.
Nelson-Hershfield Elctrns., Phoenix, Ariz.
Oaktron Inds., Monroe, Wisc.
Philmore Mfg. Co., Richmond Hill, N.Y.
RCA Corp., Camden, N.J.
Shigoto Inds., Ltd., New York, N.Y.
Spring City Elec. Mfg. Co., Spring City, Pa.
Tannoy (America), Ltd., Bohemia, N.Y.
Utah Elctrns., Huntington, Ind.
Wald Sound, Sun Valley, Calif.
Warwick Prods. Co., Independence, Ohio
Wilder Engrg. Prods., Chicago, Ill.
Wilmer Mfg. Co., Beltsville, Md.
Zero Mfg. Co., Burbank, Cal.

Encoders, Binary

Airflyte Elctrns. Co., Bayonne, N.J. p 1580
Bendix Environmtl. Sci., Baltimore, Md. p 336
Data-Control Systems, Danbury, Conn.
Del Elctrns. Corp., Mt. Vernon, N.Y.
Hughes Aircraft Co., Mos Div., Newport Beach, Cal.
Norden Div., Norwalk, Conn. ..... p 370
Quindar Elctrns., Inc., Springfield, N.J.
Tempo/UTI Div., Chatsworth, Cal.
Vernitron Corp., Deer Pk., N.Y.
AMBAC Inds., Garden City, N.Y.
ASC Sys. Corp., Chicago, Ill.
Baldwin Elctrns., Little Rock, Ark.
Collectron Corp., New York, N.Y.
Computer Conversions Corp., East Northport, N.Y.
Data Technology Inc., Watertown, Mass.
Defense Elctrns., Inc., Rockville, Md.
Elctrn. Modules Corp., Timonium, Md.
Encoder Division, Chatsworth, Cal.
Fairchild Semiconductor, Mountain View, Calif.
Ferranti Ltd., Hollinwood, Lancs., England
HB Engrg. Corp., Silver Spring, Md.
H H Controls Co., Arlington, Mass.
Hughes Aircraft Co, Culver City, Cal.
Info-Lite Corp., Ft. Lee, N.J.
Instrumentation Tech. Corp., Northridge, Calif.
ISC/Telephonics Div, Huntington, N.Y.
Lancer Elctrns. Corp., Norristown, Pa.
Lem Instrument Corp., Farmingdale, N.Y.
Leupold & Stevens, Inc., Beaverton, Ore.
Loral Elctrn. Sys., Bronx, N.Y.
Massey Dickinson Co., Inc., Saxonville, Mass.
Metrological Data Corp., Garfield, N.J.
Micro Switch, Freeport, Ill.
Northern Precision Labs., Inc., Fairfield, N.J.
Novatronics, Inc., Pompano Beach, Fla.
Perfect Gear & Instr. Corp., Northridge, Calif.
Secode Elctrns., Dallas, Texas
Singer - Tele-Signal, Woodbury, N.Y.
Spectran Elctrns., Pompano Beach, Fla.
Springer Aircraft Radio Co., Shelleyville, Ind.
TEC, Inc., Eden Prairie, Minn.
Teledyne Gurley, Troy, N.Y.
Theta Instr. Corp., Fairfield, N.J.
United Aircraft Corp., Norwalk, Conn.

Encoders, Brush & Magnetic, Disc

Airflyte Elctrns. Co., Bayonne, N.J.
Arvin Magnetics, Eden Prairie, Minn.
Int'l. Electro-Magnetics, Palatine, Ill.
Norden Div., Norwalk, Conn. ..... p 370
Tohoku Metal Inds., Ltd., Tokyo, Japan
Vernitron Corp., Deer Pk., N.Y.
Computer Conversions Corp., East Northport, N.Y.
Conrac Corp., New York, N.Y.
Hughes Aircraft Co, Culver City, Cal.
Northern Precision Labs., Inc., Fairfield, N.J.
Theta Instr. Corp., Fairfield, N.J.
United Aircraft Corp., Norwalk, Conn.

Encoders, Digital

Airflyte Elctrns. Co., Bayonne, N.J.
Astrosystems, Lake Success, N.Y. p 332
Bendix Environmtl. Sci., Baltimore, Md. p 336
Data-Control Systems, Danbury, Conn.
Del Elctrns. Corp., Mt. Vernon, N.Y.
Digitron Corp., Norristown, Pa.
Dynamics Instr. Co., Monterey Pk., Cal.
Hewlett-Packard, Palo Alto, Cal.
Hughes Aircraft Co., Mos Div., Newport Beach, Cal.
Multitech Data Prods., Monterey Pk., Cal.
Norden Div., Norwalk, Conn. ..... p 370
Pinlites, Fairfield, N.J.
Remex Elctrns., Santa Ana, Cal.
Sonex, Inc., Bethayres, Pa.
Vega Precision Labs., Vienna, Va.
Vernitron Corp., Deer Pk., N.Y.
AMBAC Inds., Garden City, N.Y.
ASC Sys. Corp., Chicago, Ill.
Austin Elctrns., Roselle, N.J.
Avco Corp., Cincinnati, Ohio
Baldwin Elctrns., Little Rock, Ark.
Computer Conversions Corp., East Northport, N.Y.
Computronics Engrg., Los Angeles, Calif.
Conductron Corp., St. Charles, Mo.
Conrac Corp., New York, N.Y.
Data Technology Inc., Watertown, Mass.
Defense Elctrns., Inc., Rockville, Md.
Doric Sci. Corp., San Diego, Calif.
Dynamics Resch. Corp., Wilmington, Mass.
Dynapar Corp., Gurnee, Ill.
Elctrn. Modules Corp., Timonium, Md.
Fairchild Semiconductor, Mountain View, Calif.
Fairchild Space & Defense Sys., Syosset, N.Y.
Farrand Controls, Inc., Valhalla, N.Y.
Fifth Dimension, Princeton, N.J.
Gulton Inds., Albuquerque, N.M.
HB Engrg. Corp., Silver Spring, Md.
H H Controls Co., Arlington, Mass.
Hughes Aircraft Co, Culver City, Cal.
IKL, Inc., Newport Beach, Calif.
Info-Lite Corp., Ft. Lee, N.J.
Innovatek Enterprise, Millerton, N.Y.
Instrumentation Tech. Corp., Northridge, Calif.
Integrated Circuit Elctrns., Inc., Waltham, Mass.
ISC/Telephonics Div, Huntington, N.Y.
Lancer Elctrns. Corp., Norristown, Pa.
Lem Instrument Corp., Farmingdale, N.Y.
Leupold & Stevens, Inc., Beaverton, Ore.
Loral Elctrn. Sys., Bronx, N.Y.
Massey Dickinson Co., Inc., Saxonville, Mass.
Metrological Data Corp., Garfield, N.J.
Noble Elctrns., Inc., Carpinteria, Calif.
Perfect Gear & Instr. Corp., Northridge, Calif.
RCA Govt. & Comm. Sys., Moorestown, N.J.
Robins Inds. Corp., Flushing, N Y
Secode Elctrns., Dallas, Texas
Singer - Tele-Signal, Woodbury, N.Y.
TEC, Inc., Eden Prairie, Minn.
Teledyne Gurley, Troy, N.Y.
Theta Instr. Corp., Fairfield, N.J.
United Aircraft Corp., Norwalk, Conn.

Encoders, Displacement, Linear

Airflyte Elctrns. Co., Bayonne, N.J.
Astrosystems, Lake Success, N.Y. p 409
Norden Div., Norwalk, Conn.
Renco Corp., Goleta, Cal. ..... p 378
AMBAC Inds., Garden City, N.Y.
Baldwin Elctrns., Little Rock, Ark.
Computer Conversions Corp., East Northport, N.Y.
Data Technology Inc., Watertown, Mass.
Dynamics Resch. Corp., Wilmington, Mass.
Dynapar Corp., Gurnee, Ill.
Ferranti Ltd., Hollinwood, Lancs., England
Hughes Aircraft Co, Culver City, Cal.
IKL, Inc., Newport Beach, Calif.
Integrated Circuit Elctrns., Inc., Waltham, Mass.
Minnetech Labs., Inc., Minneapolis, Minn.
Perfect Gear & Instr. Corp., Northridge, Calif.
Theta Instr. Corp., Fairfield, N.J.
United Aircraft Corp., Norwalk, Conn.

Encoders, Keyboard

Dynamics Instr. Co., Monterey Pk., Cal.
Multitech Data Prods., Monterey Pk., Cal.
(NES) Nationwide Elctrn. Sys., Itasca, Ill.
Norden Div., Norwalk, Conn.
Raytheon Co., Quincy, Mass.
Sonex, Inc., Bethayres, Pa.
Bio-Medical Elctrns., Inc., Rockville, Md.
Computronics Engrg., Los Angeles, Calif.
Fairchild Semiconductor, Mountain View, Calif.
Harris Semiconductor, Melbourne, Fla.
Hughes Aircraft Co, Culver City, Cal.
Micro Switch, Freeport, Ill.
Nucleonic Prods., Canoga Pk, Cal.
TEC, Inc., Eden Prairie, Minn.
United Aircraft Corp., Norwalk, Conn.

Encoders, Optical—See Coded Discs, Optical

Encoders, Shaft Position

Airflyte Elctrns. Co., Bayonne, N.J. p 1580
Astrosystems, Lake Success, N.Y. p 332,334,409
Bendix Environmtl. Sci., Baltimore, Md. p 336
Bowmar Instr. Corp., Ft. Wayne, Ind.
DDC, Hicksville, N.Y. ..... p 347
Del Elctrns. Corp., Mt. Vernon, N.Y.
Dranetz Engrg. Labs., Plainfield, N.J.
Ind'l. Control Co., Farmingdale, N.Y.
Int'l. Electro-Magnetics, Palatine, Ill.

Magnetic Technology, Canoga Pk., Cal. p 386
Norden Div., Norwalk, Conn. ..... p 370
North Atlantic Inds., Plainview, N.Y. p 369
Remex Elctrns., Santa Ana, Cal.
Renco Corp., Goleta, Cal. ..... p 378
Solid State Elctrns., Sepulveda, Cal.
Tohoku Metal Inds., Ltd., Tokyo, Japan
Vernitron, Torrance, Cal. ..... p 386
Vernitron Corp., Deer Pk., N.Y. .... p 386
Analogic, Wakefield, Mass.
Austin Elctrns., Roselle, N.J.
Baldwin Elctrns., Little Rock, Ark.
Climatronics Corp., Hauppauge, N.Y.
Collectron Corp., New York, N.Y.
Computer Conversions Corp., East Northport, N.Y.
Conrac Corp., New York, N.Y.
Data Technology Inc., Watertown, Mass.
Dynamics Resch. Corp., Wilmington, Mass.
Dynapar Corp., Gurnee, Ill.
Electric Tachometer Corp., Philadelphia, Pa.
Encoder Division, Chatsworth, Cal.
Farrand Controls, Inc., Valhalla, N.Y.
Ferranti Ltd., Hollinwood, Lancs., England
HEI, Inc., Chaska, Minn.
H H Controls Co., Arlington, Mass.
IKL, Inc., Newport Beach, Calif.
Innovatek Enterprise, Millerton, N.Y.
Kelk, George Ltd., Don Mills, Ont., Canada
Lear Siegler, Inc., Santa Monica, Calif.
Lem Instrument Corp., Farmingdale, N.Y.
Leupold & Stevens, Inc., Beaverton, Ore.
Lockheed Aircraft Svce., Special Devices Div., Ontario, Calif.
Mast Dev. Co., Davenport, Iowa
Metrological Data Corp., Garfield, N.J.
Muirhead, Inc., Mountainside, N.J.
Northern Precision Labs., Inc., Fairfield, N.J.
Perfect Gear & Instr. Corp., Northridge, Calif.
Poly-Scientific, Blacksburg, Va.
Springer Aircraft Radio Co., Shelleyville, Ind.
Taylor Instr. Process Control Div., Rochester, N.Y.
Teledyne Gurley, Troy, N.Y.
Theta Instr. Corp., Fairfield, N.J.
Trump-Ross Ind'l. Controls, Inc., Billerica, Mass.
Weston-Transicoil, Worcester, Pa.

Energy Discharge Systems—
See Discharge Systems, Energy

Engineering Reference Books
—See Technical Books—Vol 3

Engraving & Profiling Equipment
Boston Digital Corp., Ashland, Mass.
Corkpak Co., Inc., New Rochelle, N.Y.
Dura Plastics N.Y., Inc., Westport, Conn.
Electro Stylus, Colorado Springs, Colo.
Hermes Plastics, Inc., New York, N.Y.
Mechanical Engraving Co., Inc., Bronx, N.Y.
Mico Instr. Co., Cambridge, Mass.
New Hermes Engraving Mach. Corp., New York, N.Y.
Preis, H.P. Engraving Mach. Co., Hillside, N.J.
Rank Precision Inds., W. Nyack, N.Y.
Seton Name Plate Corp., New Haven, Conn.
Star Enterprises-Div., Lowell, Mass.
Vigor Tool Co., New York, N.Y.
Wen Prods., Inc., Chicago, Ill.
Wilkens, Alwin Fr., Inc., Pawling, N.Y.

Engraving & Profiling Services—See Services, Engraving—Vol 3

Environmental Chambers—
See Chambers

Environmental Rooms—See Rooms, Environmental

Environmental Seals & Feedthrus—See Feedthrus & Seals, Environmental—Vol 3

Environmental Testing Services—See Services, Environmental Testing—Vol 3

Epoxy Resins—See Adhesives; Compounds—Vol 3

Equalizers, Audio
Bulova Watch Co., Freq. Control Prods., Elctrns. Div., Woodside, N.Y.
Hisonic, Inc., Olathe, Kans.
Kappa Networks, Inc., Carteret, N.J. p 1521
Melcor Elctrns. Corp., Farmingdale, N.Y.
Rockland Sys. Corp., Blauvelt, N.Y.
Seg Elctrns., Richmond Hill, N.Y. p 1525
Sprague Elec. Co., No. Adams, Mass.
Torotel, Inc., Grandview, Mo.
TT Elctrns., Inc., Culver City, Cal.
AGAC-Derritron, Inc., Alexandria, Va.
Alcor, Inc., Ithaca, N.Y.
Altec, Anaheim, Calif.
Audio Instr. Co., Union City, N.J.
Bose Corp., Natick, Mass.
Bozak, R.T. Mfg. Co., Darien, Conn.
Collins Radio Co., Newport Beach, Calif.
Edison Elctrns. Div., Manchester, N.H.
Gotham Audio Corp., New York, N.Y.
Gray Resch. & Dev. Co., E. Hartford, Conn.
Hughes Aircraft Co, Fullerton, Cal.
Philco-Ford Corp., Washington, D.C.
Polyphase Instr. Co., Bridgeport, Pa.
RFL Inds., Comms. Div., Boonton, N.J.
Shure Bros., Inc., Evanston, Ill.
Singer - Tele-Signal, Woodbury, N.Y.
Spectra Sonics, Ogden, Utah
United Resch. Lab., Corp., New York, N.Y.

Equalizers, Delay
Allen Avionics, Mineola, N.Y. ..... p 2730
Bulova Watch Co., Freq. Control Prods., Elctrns. Div., Woodside, N.Y.
Data Delay Devices, Clifton, N.J.
Hisonic, Inc., Olathe, Kans.
Kappa Networks, Inc., Carteret, N.J. p 1521
Melcor Elctrns. Corp., Farmingdale, N.Y.
RHG Elctrns. Lab., Farmingdale, N.Y.
Rockland Sys. Corp., Blauvelt, N.Y.
Sangamo Elec. Co., Pickens, S.C.
Seg Elctrns., Richmond Hill, N.Y. p 1525
TMC Systems (Ariz.), Tempe, Ariz. p 1430
Torotel, Inc., Grandview, Mo.
Universal Ad-Yu Elctrns., Inc., Passaic, N.J. ..... p 2752
Audio Instr. Co., Union City, N.J.
Bowmar/Ali, Inc., Acton, Mass.
Collins Radio Co., Newport Beach, Calif.
Hughes Aircraft Co, Fullerton, Cal.
Microwave Assocs., Inc., Burlington, Mass.
Polyphase Instr. Co., Bridgeport, Pa.
RFL Inds., Comms. Div., Boonton, N.J.
Singer - Tele-Signal, Woodbury, N.Y.
Superior Continental Corp., Hickory, N.C.
Technical Mat'l., Mamaroneck, N.Y.
Telemodem, Inc., Queens Village, N.Y.
Wandel & Goltermann, E. Hanover, N.J.
Wavecom, Inc., Northridge, Cal.

Equalizers, Phase
Allen Avionics, Mineola, N.Y.
Bulova Watch Co., Freq. Control Prods., Elctrns. Div., Woodside, N.Y. p 1364,1512
Hisonic, Inc., Olathe, Kans.
Kappa Networks, Inc., Carteret, N.J. p 1521
Rockland Sys. Corp., Blauvelt, N.Y.
Sangamo Elec. Co., Pickens, S.C.
Seg Elctrns., Richmond Hill, N.Y. p 1525
Torotel, Inc., Grandview, Mo.
Universal Ad-Yu Elctrns., Inc., Passaic, N.J. ..... p 579
Audio Instr. Co., Union City, N.J.
Bowmar/Ali, Inc., Acton, Mass.
Collins Radio Co., Dallas, Tex.
Collins Radio Co., Newport Beach, Calif.
Computer Central, Detroit, Mich.
Defense Elctrns., Inc., Rockville, Md.
Dittmore-Freimuth Corp., Milwaukee, Wisc.
GTE Lenkurt Inc., San Carlos, Calif.
Hughes Aircraft Co, Fullerton, Cal.
Merrimac Resch. & Dev., Inc., West Caldwell, N.J.
Microwave Assocs., Inc., Burlington, Mass.
Microwave Div, Nashua, N.H.
Philco-Ford Corp., Washington, D.C.
Polyphase Instr. Co., Bridgeport, Pa.
Sanders Assocs., Nashua, N.H.
Struthers Elctrns. Corp., Mamaroneck, N.Y.
Vanguard Elctrns., Inglewood, Cal.
Wavecom, Inc., Northridge, Cal.

Erasers, Magnetic Tape (Bulk)
AVX Aerovox Corp., New Bedford, Mass.
GC Elctrns., Rockford, Ill.
Hewlett-Packard, Palo Alto, Cal.
Microtran Co., Valley Stream, N.Y. p 2963
Ampex Corp., Redwood City, Calif.
Amplifier Corp. America, Westbury, N.Y.
Avionics Resch. Prods., Los Angeles, Calif.
Bell & Howell Co., Pasadena, Calif.
Coil Co. of Amer., Northvale, N.J.
Ferranti Elec., Inc., Plainview, N.Y.
Hammond Mfg. Co., Ltd., Guelph, Ont., Can.
Philmore Mfg. Co., Richmond Hill, N.Y.
RCA Corp., Camden, N.J.

Error Correction Equipment, Teleprinter
Codex Corp., Newton, Mass.
Philco-Ford Corp., Washington, D.C.
Singer - Tele-Signal, Woodbury, N.Y.
Teletype Corp., Skokie, Ill.

Escutcheons—See Vol 2

Etchants, Printed Circuit—See Printed Circuit Etchants—Vol 3

Evaporation Equipment, Electron Beam
Bendix, Rochester, N.Y.
Cooke Vacuum Prods., S. Norwalk, Conn.
Denton Vacuum, Inc., Cherry Hill, N.J.
Edwards High Vacuum, Oakville, Ont., Can.
Edwards High Vacuum, Grand Island, N.Y.
Materials Resch. Corp., Orangeburg, N.Y.
Middlesex Gen'l. Inds., Somerville, Mass.
Norton Co., Newton, Mass.
Sloan Technology Corp., Santa Barbara, Calif.
Torr Labs., Los Angeles, Cal.
Ultek Div., Palo Alto, Calif.
Vacuum Equip. Div., Newton, Mass.
Varian Assocs., Palo Alto, Cal.
Varian Assocs., Vacuum Div., Palo Alto, Cal.
Veeco Instrs., Inc., Plainview, N.Y.
Westinghouse Elec. Int'l., New York, N.Y.

Exciters—See Oscillators

Exciters, Vibration—See Vibration Test Systems

Expanders, Data & Speech
AMBAC Inds., Garden City, N.Y.
Hughes Aircraft Co, Fullerton, Cal.
RFL Inds., Comms. Div., Boonton, N.J.
Singer - Tele-Signal, Woodbury, N.Y.

Expanders, Meter—See Multipliers, Meter

Explosive Gas Indicators—See Detectors, Gas Leak

Extensometers, Electro-Optical—See Vol 2

Extractors, Circuit Board, Fuse, Lamp, Tube—See Pullers—Vol 3

Eyelets—See Vol 3

Fabric, Insulation—See Insulating Materials, Fabric—Vol 3

Fabrics, Acoustic, Sound-Transparent—See Vol 3

Fabrics, Conductive—See Vol 3

Faceplates—See Vol 2

Facsimile Equipment—See Recievers; Transmitters; etc.

Fans—See Blowers & Fans—Vol 3

Fasteners, Metal—See Vol 3

Fasteners, Non-Metallic—See Vol 3

Fault Locators—See Detectors, Flaw & Defect

Feedthrus & Seals, Environmental—See Vol 3

Feedthrus, Terminal—See Terminals, Feedthru—Vol 3

Felt & Felt Parts—See Vol 3

Ferrite Parts-Also See Materials Ferrite;Cores, Ferrite—See Vol 3

Fiber Optic Bundles—See Vol 2

Fiber Optic Inspection Equipment
Christie Elec., Los Angeles, Cal.
ACMI Ind'l. Div., Bronx, N.Y.
Allyn, W., Inc., Skaneateles Falls, N.Y.
Bausch & Lomb, Rochester, N.Y.
Bendix, Sturbridge, Mass.
DoAll Co., Des Plaines, Ill.
Dolan-Jenner Inds., Inc., Melrose, Mass.
Dyonics, Inc., Woburn, Mass.
Eder Instrument Co., Inc., Chicago, Ill.
Electro Fiberoptics Corp., W. Boylston, Mass.
Fiber Photics, Inc., Santa Cruz, Cal.
General Electrodynamics Corp., Garland, Tex.
Laser Technology, Inc., N. Hollywood, Calif.
Lenox Instr. Co., Philadelphia, Pa.
Mechanical Technology, Inc., Latham, N.Y.
Olympus Corp. America, New Hyde Park, N.Y.
Opto-Metric Tools, Rockleigh, N.J.
Rank Precision Inds., W. Nyack, N.Y.
Sensor Corp., Greenwich, Conn.
Techni-Tool, Inc., Philadelphia, Pa.

Fibers—See Insulating Materials, Fiber—Vol 3

Field Plotters, Electric & Magnetic
Kelk, George Ltd., Don Mills, Ont., Canada
Magnetic Sys. & Instrs., Worcester, Mass.
Magnetics Sys. & Instrs., Worcester, Mass.
Scientific-Atlanta, Inc., Atlanta, Ga.
Sunshine Sci. Instrs., Inc., Philadelphia, Pa.
Thomas & Skinner, Inc., Indianapolis, Ind.

Film Badges—See Services, Film Badge—Vol 3

Film Thickness Indicators—See Indicators, Film Thickness

Films, Capacitor—See Vol 3

Films, Masking (Incl. Photographic)
Dynachem Corp., Santa Fe Springs, Cal.
Micro-Line, Jamestown, N.Y.
Owens-Illinois, C&TP Div., Elctrn. Mat'ls., Toledo, Ohio
Ulano Prods. Co. Inc., New York, N.Y.

Films, Resistance—See Vol 3

Filter Synthesizers—See Vol 2

Filters, A-F—See Vol 2

Filters, Active (All Types)—See Vol 2

Filters, Air—See Air Cleaners & Filters—Vol 3

Filters, Analog—See Filters, Continuously Variable—Vol 2

Filters, Antenna—See Vol 2

Filters, Band Elimination—See Vol 2

Filters, Band Pass—See Vol 2

Filters, Ceramic—See Vol 2

Filters, Coaxial—See Vol 2

Filters, Comb—See Vol 2

Filters, Continuously Variable—See Vol 2

Filters, Crystals (Incl. Monolithic Devices)

Bliley Electric, Erie, Pa. .....p 1370,1371
Bulova Watch Co., Freq. Control Prods., Elctrns. Div., Woodside, N.Y. p 1364
CTS Corp, Elkhart, Ind..... p 1375
Damon Corp., Needham Hgts., Mass. p 1379
Electronic Research Co., Shawnee Mission, Kans. ..... p 1384
Erie Frequency Control, Carlisle, Pa. p 1383
Erie Technological Prods. (EEM), Erie, Pa. ..... p 1383
Frequency Elctrns., New Hyde Pk., N.Y.
Hewlett-Packard, Palo Alto, Cal.
Hughes Aircraft Co., Frequency Control Devices, Newport Bch., Cal. .... p 1403
Hughes Aircraft Co., Hybrid Microelectronic Circuits, Newport Bch., Cal. ..... p 1403
McCoy Elctrns. Co., Mt. Holly Springs, Pa. .....p 1409,1410
Monitor Prods., S. Pasadena, Cal. p 1415
Motorola Communications & Electrns., Chicago, Ill. ..... p 1417
Piezo Technology, Orlando, Fla. p 1425
Reeves-Hoffman Div., Carlisle, Pa. p 1427
Seg Elctrns., Richmond Hill, N.Y. p 1525
Snelgrove, C. R. Ltd., Don Mills, Ont. Can. ..... p 1428
TMC Systems (Ariz.), Tempe, Ariz. p 1430,1431
Torotel, Inc., Grandview, Mo. ..... p 1432
Blackhawk Networks Corp., Janesville, Wisc.
Collins Radio Co., Dallas, Tex.
Components Corp., Chicago, Ill.
Crystal Network Prods. Corp., Erie, Pa.
Dell Optics Co., Inc., N. Bergen, N.J.
Dittmore-Freimuth Corp., Milwaukee, Wisc.
Exotic Materials, Inc., Costa Mesa, Cal.
Filtech Corp., Franklin Park, Ill.
Harshaw Chem. Co., Cleveland, Ohio
Microsonics, Inc., Weymouth, Mass.
Nytronics, Inc., Alpha, N.J.
RFL Inds., Comps. Div., Boonton, N.J.
Sherold Crystal Prods., Kansas City, Mo.
Technical Mat'l., Mamaroneck, N.Y.
Tedford Crystal Labs., Cincinnati, Ohio
Valpey Corp., Holliston, Mass.
Vernitron Piezoelectric Div., Bedford, Ohio

Filters, Digital

Krohn-Hite, Cambridge, Mass.
Multimetric Ind., Inc., Richmond Hill, N.Y. ..... p 1524
Rockland Sys. Corp., Blauvelt, N.Y. p 1526
Analogic, Wakefield, Mass.
Hughes Aircraft Co, Culver City, Cal.
Teledyne Adcom, Cambridge, Mass.
Wavecom, Inc., Northridge, Cal.

Filters, Electric Wave Section—See Vol 2

Filters, Equalizer—See Vol 2

Filters, Fluid, Nonmetallic

Balston Ind'l. Ltd., Lexington, Mass
Circle Seal Corp., Anaheim, Cal.
Corning Glass Works, Fluidic Products Dept., Corning, N.Y.
Corning Glass Works, Lab. Prods. Dept., Corning, N.Y.
Pall Corp., Glen Cove, N.Y.
Pure Carbon Co., Inc., St. Marys, Pa.
Sethco Mfg. Corp., Freeport, N.Y.
Vanton Pump & Equip. Corp., Hillside, N.J.

Filters, Harmonic—See Vol 2

Filters, High-Pass—See Vol 2

Filters, I-F—See Vol 2

Filters, Industrial, Heavy Duty (Electronic)—See Vol 2

Filters, Interference—See Vol 2

Filters, Interstage & Line—See Filters, Telemetering

Filters, Line—See Vol 2

Filters, Linear Phase—See Vol 2

Filters, Low-Pass—See Vol 2

Filters, Mechanical—See Vol 2

Filters, Microwave—See Vol 2

Filters, Miniature—See Filters (Specific Types)—Vol 2

Filters, Optical—See Vol 2

Filters, Programmable—See Filters, Variable—Vol 2

Filters, R-F—See Vol 2

Filters, Reactor—See Vol 2

Filters, Screenroom—See Vol 2

Filters, Single Sideband—See Vol 2

Filters, Synchronous Tracking—See Vol 2

Filters,Telemetering

ACDC Elctrns., Oceanside, Cal.
ADC Prods., Minneapolis, Minn.
Allen-Bradley Co., Milwaukee, Wisc.
American Elctrn. Labs., Inc., Lansdale, Pa.
A. P. Circuit Corp., New York, N.Y.
Applied Research Inc., Port Washington, N.Y. ..... p 1554
Austron, Inc., Austin, Tex.
Bulova Watch Co., Freq. Control Prods., Elctrns. Div., Woodside, N.Y.
Coast Coil Co., Los Angeles, Calif.
Data-Control Systems, Danbury, Conn.
E & M Labs., Westlake Village, Cal. p 1557
Erie Technological Prods. (EEM), Erie, Pa.
ESC Elctrns. Corp., Palisades Pk., N.J. p 1513
Freed Transformer Co., Bklyn., N.Y.
Frequency Elctrns., New Hyde Pk., N.Y.
Genisco Tech. Corp., Genistron Div., Compton, Cal.
Gulton Inds., Inc., Metuchen, N.J.
Hisonic, Inc., Olathe, Kans.
Hopkins Engrg., San Fernando, Cal. p 1519
Hughes Aircraft Co., Frequency Control Devices, Newport Bch., Cal.
Kappa Networks, Inc., Carteret, N.J.
Krohn-Hite, Cambridge, Mass. .... p 1522
Lorch Elctrns. Corp., Englewood, N.J.
McCoy Elctrns. Co., Mt. Holly Springs, Pa.
Microwave Cavity Labs., La Grange, Ill.
Multimetric Ind., Inc., Richmond Hill, N.Y.
Nytronics, Inc., Essex Elctrns. Div., Darlington, S.C.
Quindar Elctrns., Inc., Springfield, N.J.
Reeves-Hoffman Div., Carlisle, Pa.
RF Interonics, Bay Shore, N.Y.
Rockland Sys. Corp., Blauvelt, N.Y.
San Fernando Elec. Mfg., San Fernando, Cal.
Seg Elctrns., Richmond Hill, N.Y.
Solid State Elctrns., Sepulveda, Cal.
Sonex, Inc., Bethayres, Pa.
Sprague Elec. Co., No. Adams, Mass.
Texscan Corp., Indianapolis, Ind. p 578
Torotel, Inc., Grandview, Mo. ..... p 1529
TT Elctrns., Inc., Culver City, Cal. p 1530
Aladdin Elctrns., Nashville, Tenn.
AMBAC Inds., Garden City, N.Y.
A.R.F. Products, Inc., Raton, N.M.
Astrolab Inc., Linden, N J
Bourns Pacific Magnetic Corp., Romoland, Calif.
Collins Radio Co., Newport Beach, Calif.
Components Corp., Chicago, Ill.
De Coursey Engrg. Lab., Culver City, Cal.
Defense Elctrns., Inc., Rockville, Md.
Electro Windings & Comps., Kenilworth, N.J.
Ferranti Ltd., Hollinwood, Lancs., England
Filtech Corp., Franklin Park, Ill.
Filtron Co., Flushing, N.Y.
Forbes & Wagner, Inc., Silver Creek, N.Y.
Gosh Instrs., Inc., Wethersfield, Conn.
Gulton Inds., Albuquerque, N.M.
Hughes Aircraft Co, Fullerton, Cal.
Industrial Microwave, Scotch Plains, N.J.
K & L Microwave Inc., Salisbury, Md.
Kinetic Tech., Inc., Santa Clara, Cal.
Lear Siegler, Inc., Santa Monica, Calif.
Linear Networks Co., San Pedro, Cal.
Lynch Communication Systems, San Francisco, Calif.
Maury Microwave Corp., Cucamonga, Calif.
Microlab/FXR, Livingston, N.J.
Nat'l. Coil Co., Douglas, Ariz.
Nytronics, Inc., Alpha, N.J.
Peninsula Microwave Labs., Mountain View, Cal.
Polyphase Instr. Co., Bridgeport, Pa.
Rantec Div., Calabasas, Calif.
RFL Inds., Comps. Div., Boonton, N.J.
Signal Analysis Inds. Corp., Hauppauge, N.Y.
Spectrum Instrs., Inc., New Rochelle, N.Y.
Stanford Applied Engrg., Santa Clara, Cal.
Teledyne Microwave, Sunnyvale, Cal.
Telonic Inds., Inc., Laguna Beach, Calif.
Texscan Microwave Prods., Indianapolis, Ind.
Torotron, Mt. Vernon, N.Y.
Triad Distributor Div., Huntington, Ind.
Vanguard Elctrns., Inglewood, Cal.
Vernitron Piezoelectric Div., Bedford, Ohio
Wavecom, Inc., Northridge, Cal.
Weston-Magnetics, Archbald, Pa.
White Instrs., Inc., Austin, Tex.

Filters, Tone, Telegraph—See Vol 2

Filters, Tunable—See Filters, Continuously Variable—Vol 2

Filters, Tuning Fork

American Time Products, Woodside, N.Y. ..... p 1366
Bramco Controls, Piqua, Ohio .... p 1406
Bulova Watch Elctrns. Div. Amer. Time Prods., Woodside, N.Y. ..... p 1366
Fork Standards, W. Chicago, Ill.
Frequency Control, Inc., Austin, Tex.
Murata Corp. of America, Elmsford, N.Y. ..... p 1418
Murata Mfg. Co. Ltd., Kyoto, Japan p 1418
Philamon, Inc., Westbury, N.Y. .... p 1424
Spectrum Technology, Goleta, Cal.
HB Engrg. Corp., Silver Spring, Md.
Polyphase Instr. Co., Bridgeport, Pa.

Filters, UHF & VHF—See Vol 2

Filters, Variable—See Vol 2

Filters, Vestigial Sideband—See Vol 2

Filters, Waveguide—See Vol 2

Finders, Range—See Range Finder Systems

Finger Contact Strips—See Contact Strips, Finger—Vol 3

Finishes—See Coatings; Paints; Plating Solutions—Vol 3

Fire Control Systems, Aircraft, Missile, Rocket—See Vol 2

Fire Detection & Fighting Equip.—See Vol 2

Flame Spraying Equipment

Plasmadyne, Santa Ana, Calif.
Porter, H.K. Co., Inc., Pittsburgh, Pa.

Flanges, Waveguide—See Vol 2

Flash Photolysis Systems & Components—See Vol 2

Flashers—See Vol 2

Flashlights & Lanterns

Marathon Battery Co., Cold Spring, N.Y.
Union Carbide, Consumer Prods., New York, N.Y.
Bright Star Inds., Inc., Clifton, N.J.
Shotec Inc., Clearlake Oaks, Cal.

Flat Packages, Integrated Circuit—See Packages, Integrated Circuit—Vol 2

Flaw Detection Equipment—See Detectors, Flaw & Defect

Fluid Conductivity Indicators—See Indicators, Fluid Conductivity

Fluid Flow Indicators—See Meters, Fluid Flow

Fluidic Control Systems & Equip.—See Vol 2

Fluorescent Compounds & Phosphors—See Vol 3

Fluorometers

American Instr. Co., Silver Spring, Md.
Beckman Instrs., (AISSD), Fullerton, Cal.
Coleman Instrs., Maywood, Ill.
Davidson Elctrn. Dev. Co., Erie, Pa.
Photovolt Corp., New York, N.Y.
Process & Instrs. Corp., Brooklyn, N.Y.
Schoeffel Instr. Corp., Westwood, N.J.
TRW Instrs., El Segundo, Cal.
VWR Scientific, San Francisco, Cal.
Zeiss, Carl, Inc., New York, N.Y.

Flux, Brazing & Soldering—See Vol 3

Fluxmeters—See Meters, Flux

Foil, Capacitor Electrode—See Vol 3

Foil, Magnetic—See Vol 3

Foil, Magnetic Shielding—See Shields, Magnetic—Vol 3

Force Links-Also See Cells, Load—See Vol 2

Forks, Tuning—See Tuning Forks

Forms, Coil—See Coil Forms—Vol 3

Forms, Wire—See Vol 3

Frames, Cabinet & Rack—See Vol 3

Frequency Analyzers—See Analyzers, Spectrum

Frequency Calibration Services—See Services, Calibration & Instrument Repair—Vol 3

Frequency Distribution Systems—See Distribution Systems, Frequency

Frequency Extenders—See Dividers, Frequency

Frequency Sources—See Oscillators

Frequency Standards—See Standards, Frequency

Frequency Synthesizers—See Synthesizers, Frequency

Fuel Cells

Engelhard Minerals & Chem., Murray Hill, N.J.
Chemalloy Elctrns., Santee, Cal.
Hughes Aircraft Co, Culver City, Cal.
Power Applications, Inc., Bayside, N.Y.
Zirconium Corp. of Amer., Solon, Ohio

Furnaces, Brazing

Watkins Johnson Co., Palo Alto, Cal.
Watkins-Johnson Co., Scotts Valley, Cal. ..... p 949
Aremco Prods., Inc., Briarcliff Manor, N.Y.
Astro Inds., Santa Barbara, Cal.
BTU Engrg. Corp., Waltham, Mass.
Despatch Oven Co., Minneapolis, Minn.
Hayes, C.I. Inc., Cranston, R.I.
Hotpack Corp., Phila., Pa.
Hydor Therme Corp., Pennsauken, N.J.
Lindberg Hevi-Duty, Chicago, Ill.
Pacific Scien. Co., City Commerce, Cal.
Pioneer Metals, Inc., Harrodsburg, Ky.
Research Instr. Co., Westbury, N.Y.
Selas Corp. America, Dresher, Pa.
Sunbeam Equip. Corp., Meadville, Pa.
T-M Vacuum Prods., Riverton, N.J.

Furnaces, Diffusion

Watkins Johnson Co., Palo Alto, Cal.
Watkins-Johnson Co., Scotts Valley, Cal. ..... p 949
Aremco Prods., Inc., Briarcliff Manor, N.Y.
BTU Engrg. Corp., Waltham, Mass.
Despatch Oven Co., Minneapolis, Minn.
HLS, Inc., Santa Clara, Cal.
Lindberg Hevi-Duty, Chicago, Ill.
Norton Co., Newton, Mass.
Vacuum Equip. Div., Newton, Mass.

Furnaces, Electric (Laboratory)

Blue M Engrg. Co., Blue Island, Ill. p 389
Engelhard Minerals & Chem., Murray Hill, N.J.
Watkins Johnson Co., Palo Alto, Cal.
Watkins-Johnson Co., Scotts Valley, Cal. ..... p 949
Aremco Prods., Inc., Briarcliff Manor, N.Y.
Astro Inds., Santa Barbara, Cal.
BTU Engrg. Corp., Waltham, Mass.
Caig Labs., Inc., Westbury, N.Y.
Custom Sci. Instrs., Inc., Whippany, N.J.
Despatch Oven Co., Minneapolis, Minn.
Feco, Cleveland, Ohio
Glo-Quartz Elec. Heater Co., Mentor, Ohio
Hotpack Corp., Phila., Pa.
Hydor Therme Corp., Pennsauken, N.J.
Jersey Tech. Conslts., Morristown, N.J.
L & L Mfg. Co., Twin Oaks, Pa.
Laser Technology, Inc., N. Hollywood, Calif.
Lindberg Hevi-Duty, Chicago, Ill.
N.Y. Testing Labs., Inc., Westbury, N.Y.
OAL Assocs., Inc., Westbury, N.Y.
Pacific Scien. Co., City Commerce, Cal.
Research Instr. Co., Westbury, N.Y.
Tem-Pres Research Div., State College, Pa.
Trent, Inc., Philadelphia, Pa.
Vacuum Equip. Div., Newton, Mass.
VWR Scientific, San Francisco, Cal.

Furnaces, Electric (Production)

Blue M Engrg. Co., Blue Island, Ill. p 389
Kahle Engrg. Co., Union City, N.J.
Watkins Johnson Co., Palo Alto, Cal.
Watkins-Johnson Co., Scotts Valley, Cal. ..... p 949
Aremco Prods., Inc., Briarcliff Manor, N.Y.
Astro Inds., Santa Barbara, Cal.
BTU Engrg. Corp., Waltham, Mass.
Caig Labs., Inc., Westbury, N.Y.
Central Scientific Co., Chicago, Ill.
Despatch Oven Co., Minneapolis, Minn.
Feco, Cleveland, Ohio
Glo-Quartz Elec. Heater Co., Mentor, Ohio
Hafstrom Tech. Prods., Inc., San Diego, Calif.
Hayes, C.I. Inc., Cranston, R.I.
HJS Engrg. Co., Park Ridge, Ill.
Hotpack Corp., Phila., Pa.
Hydor Therme Corp., Pennsauken, N.J.
Jersey Tech. Conslts., Morristown, N.J.
L & L Mfg. Co., Twin Oaks, Pa.
Lindberg Hevi-Duty, Chicago, Ill.
Litton Engrg. Labs., Carson City, Nev.
Mech-Tronic Equip. Co., Silver Spring, Md.
Mechanical Technology, Inc., Latham, N.Y.
N.Y. Testing Labs., Inc., Westbury, N.Y.
Norton Co., Newton, Mass.
OAL Assocs., Inc., Westbury, N.Y.
Pacific Scien. Co., City Commerce, Cal.
Research, Inc., Minneapolis, Minn.
Research Instr. Co., Westbury, N.Y.
Sara Scientific Co., San Francisco, Calif.
Sunbeam Equip. Corp., Meadville, Pa.
Trent, Inc., Philadelphia, Pa.
Vacuum Inds., Inc., Somerville, Mass.

Furnaces, Gas (Production)

Kahle Engrg. Co., Union City, N.J.
Watkins Johnson Co., Palo Alto, Cal.
Watkins-Johnson Co., Scotts Valley, Cal. ..... p 949
Despatch Oven Co., Minneapolis, Minn.
Feco, Cleveland, Ohio
Lindberg Hevi-Duty, Chicago, Ill.
Pacific Scien. Co., City Commerce, Cal.
Selas Corp. America, Dresher, Pa.
Sunbeam Equip. Corp., Meadville, Pa.

Furnaces, High-Frequency

Kahle Engrg. Co., Union City, N.J.
Ajax Magnethermic Corp., Warren, Ohio
Atomergic Chemetals, Carle Place, N.Y.
Cycle-Dyne, Inc., Jamaica, N.Y.
Laboratory Equipment Corp., St. Joseph, Mich.
Lepel High Frequency Labs., Maspeth, N.Y.
Sunbeam Equip. Corp., Meadville, Pa.
Tocco Div., Cleveland, Ohio
VWR Scientific, San Francisco, Cal.

Furnaces, Vacuum

Kahle Engrg. Co., Union City, N.J.
Showa Musen Kogyo Co., Ltd., Shinagawa-Ku Tokyo 141, Japan
Watkins Johnson Co., Palo Alto, Cal.
Watkins-Johnson Co., Scotts Valley, Cal. ..... p 949
Ajax Magnethermic Corp., Warren, Ohio
Astro Inds., Santa Barbara, Cal.
Bendix, Rochester, N.Y.
Brew Richard D. & Co., Inc., Concord, N.H.
BTU Engrg. Corp., Waltham, Mass.
Central Scientific Co., Chicago, Ill.
Denton Vacuum, Inc., Cherry Hill, N.J.
Edwards High Vacuum, Oakville, Ont., Can.
Edwards High Vacuum, Grand Island, N.Y.
Hayes, C.I. Inc., Cranston, R.I.
High Vacuum Equip. Corp., Hingham, Mass.
Hull Corp., Hatboro, Pa.
Leybold-Heraeus, Monroeville, Pa.
Lindberg Hevi-Duty, Chicago, Ill.
Norton Co., Newton, Mass.
Nuclide Corp., N. Acton, Mass.
Pacific Scien. Co., City Commerce, Cal.
Pennwalt Corp., Phila., Pa.
Research Instr. Co., Westbury, N.Y.
Systems Resch. Labs., Dayton, Ohio
T-M Vacuum Prods., Riverton, N.J.
Tem-Pres Research Div., State College, Pa.
Ultek Div., Palo Alto, Calif.
Vacuum Equip. Div., Newton, Mass.
Vacuum Inds., Inc., Somerville, Mass.
Varian Assocs., Palo Alto, Cal.

Furniture, Electronic Lab.—See Benches, Consoles, Stools, Tables (Lab & Shop)—Vol 3

Fuse Clips—See Clips & Holders, Fuse—Vol 3

Fuse Panels—See Panels, Fuse—Vol 2

Fused Plugs—See Plugs, Fused—Vol 3

Fused Quartz—See Quartz, Fused—Vol 3

Fuses—See Vol 2

Fuses, Failure Indicating—See Vol 2

Fuses, Thermal—See Vol 2

Fuses, Time Delay—See Vol 2

Galvanometers—See Meters, Galvanometer

Gamma Ray Tubes—See Tubes, Radiation Detection—Vol 2

Garnet Parts-Also See Materials, Garnet—See Vol 3

Gas Analyzers—See Analyzers, Gas

Gases, Inert—See Vol 3

Gaskets—See Seals—Vol 3

Gaskets, Shielding, R-F-Also See Shields, R-F—See Vol 3

Gates, Computer Circuit (AND, OR, NOR, ETC.)—See Cards, Logic; Circuits, Integrated; Modules, Logic

Gauges, Beta

Bendix, Dayton, Ohio
Harshaw Chem. Co., Cleveland, Ohio
Ind'l. Gauging & Control, Norwalk, Conn.
Industrial Nucleonics, Columbus, Ohio
Nuclear Equip. Chem. Corp., Farmingdale, N.Y.
Nuclear Resch. Corp., Southampton, Pa.
Ohmart Corp., Cincinnati, Ohio
Rank Precision Inds., W. Nyack, N.Y.
Soltec Corp., No. Hollywood, Cal.
Unit Process Assemblies, Woodside, N.Y.

Gauges, Connector

Jonard Inds. Corp., Bronx, N.Y.
Maury Microwave Corp., Cucamonga, Calif.

Gauges, Displacement, Linear—See Vol 3

Gauges, Fuel

Hickok Elect. Instr., Cleveland, Ohio
Ametek/U.S. Gauge, Sellersville, Pa
Astronautics Corp. of Amer., Milwaukee, Wisc.
Brooks Instr. Div., Hatfield, Pa.
Consolidated Ohmic Devices, Carle Pl., N.Y.
Faria, Thomas G. Corp., Uncasville, Conn.
Honeywell, Aerospace & Def., Minneapolis, Minn.
Simmonds Precision Prods., Inc., Bellows Falls, Vt.
Westberg Mfg. Co., Sonoma, Cal.

Gauges, Ionization

Addison Div., Mountainside, N.J.
Aero Vac Corp., Troy, N.Y.
Aremco Prods., Inc., Briarcliff Manor, N.Y.
Bendix, Rochester, N.Y.
Central Scientific Co., Chicago, Ill.
Cooke Vacuum Prods., S. Norwalk, Conn.
Denton Vacuum, Inc., Cherry Hill, N.J.
Edwards High Vacuum, Oakville, Ont., Can.
Edwards High Vacuum, Grand Island, N.Y.
Electron Technology, Inc., Kearny, N.J.
GCA Technology Div., Bedford, Mass.
General Elec. Co., W. Lynn, Mass.
Granville-Phillips Co., Boulder, Colo.
High Vacuum Equip. Corp., Hingham, Mass.
High Voltage Engrg. Corp., Burlington, Mass.
Hughes Aircraft Co, Vacuum Tube Prods. Div/Vacuum Equip., Oceanside, Calif
Kinney Vacuum Co., Boston, Mass.
Leybold-Heraeus, Monroeville, Pa.
Middlesex Gen'l. Inds., Somerville, Mass.
Mullard, Inc., Farmingdale, N.Y.
Norton Co., Newton, Mass.
Nuclear Equip. Chem. Corp., Farmingdale, N.Y.
Nuclear Resch. Corp., Southampton, Pa.
Ohmart Corp., Cincinnati, Ohio
Soltec Corp., No. Hollywood, Cal.
Torr Labs., Los Angeles, Cal.
Ultek Div., Palo Alto, Calif.
Vactronic Lab. Equip., Inc., E. Northport, N.Y.
Vacuum Equip. Div., Newton, Mass.
Vacuum Inds., Inc., Somerville, Mass.
Varian Assocs., Palo Alto, Cal.
Varian Assocs., Vacuum Div., Palo Alto, Cal.
Veeco Instrs., Inc., Plainview, N.Y.
Westinghouse Elec., Elmira, N.Y.

Gauges, Lead Bending—See Vol 3

Gauges, Photoelectric—See Vol 2

Gauges, Pirani

RCA Elctrns. Comps., Harrison, N.J.
Bendix, Rochester, N.Y.
Central Scientific Co., Chicago, Ill.
Cooke Vacuum Prods., S. Norwalk, Conn.
Edwards High Vacuum, Oakville, Ont., Can.
Edwards High Vacuum, Grand Island, N.Y.
Kinney Vacuum Co., Boston, Mass.
Leybold-Heraeus, Monroeville, Pa.
Thor Elctrns. Corp., Elizabeth, N.J.
Varian Assocs., Palo Alto, Cal.
Varian Assocs., Vacuum Div., Palo Alto, Cal.
Westinghouse Elec., Elmira, N.Y.

Gauges, Pressure-Also See Transducers, Pressure

Astrosystems, Lake Success, N.Y.
Jonard Inds. Corp., Bronx, N.Y.
Kratos Instrument Div., Pasadena, Cal p 511
Schauer Mfg. Corp., Cincinnati, Ohio
SRC Div., Newport Bch., Cal.
Aero Mechanism, Inc., Van Nuys, Calif.
Alnor Instr. Co., Chicago, Ill.
Ametek/U.S. Gauge, Sellersville, Pa
Astronautics Corp. of Amer., Milwaukee, Wisc.
Automatic Timing & Controls, Inc., King of Prussia, Pa.
Bailey Meter Co., Wickliffe, Ohio
Beckman Instrs., Process Instrs., Fullerton, Cal.
Bell & Howell Co., Pasadena, Calif.
Bendix, S. Montrose, Pa.
Bourns, Inc., Riverside, Calif.
Bristol Div, Waterbury, Conn
CGS/Datametrics, Watertown, Mass.
Cooke Vacuum Prods., S. Norwalk, Conn.
Crystal Resch., Inc., Cambridge, Mass.
Doric Sci. Corp., San Diego, Calif.
Dyna Magnetic Devices, Inc., Hicksville, N.Y.
Dynisco Div., Westwood, Mass.
Edison, Thomas A. Instr. Div., W. Orange, N.J.
Edison, T.A., Instr. Div., Ft. Lauderdale, Fla.
Ellison Draft Gage Co., Inc., New Buffalo, Mich.
Foxboro Co., Foxboro, Mass.
Hafstrom Tech. Prods., Inc., San Diego, Calif.
Hill, E. Vernon, Inc., San Francisco, Calif.
Honeywell, Ft. Washington, Pa.
Kingmann-White, Inc., Placentia, Calif.
Kistler Instr. Co., Redmond, Wash.
Kollsman Instr. Corp., Syosset, N.Y.
Kulite Semiconductor Prod., Ridgefield, N.J.
Lewis Engrg. Co., Naugatuck, Conn.
Lion Precision Div., Newton, Mass.
Lunkenheimer Co., Cincinnati, Ohio
MB Elctrns/Textron Co., New Haven, Conn.
MKS Instrs., Inc., Burlington, Mass.
Non-Linear Sys., Inc., Del Mar, Cal.
Pall Trinity Micro Corp., Cortland, N.Y.
Pennwalt Corp., Phila., Pa.

Puregas Equip. Corp., Copiague, N.Y.
Roylyn, Glendale, Cal.
Scanivalve, Inc., San Diego, Calif.
Sensotec, Inc., Columbus, Ohio
Sparton Southwest, Inc., Albuquerque, N.M.
Statham Instrs., Inc., Oxnard, Cal.
Superior Continental Corp., Hickory, N.C.
Texas Instruments, Inc., Houston, Tex.
Transducer Controls Corp., Covina, Calif.
Transidyne-General Corp., Ann Arbor, Mich.
Tyco Instr. Div., Waltham, Mass.
Wallace & Tiernan Div., Belleville, N.J.
Weksler Instrs. Corp., Freeport, N.Y.
Westberg Mfg. Co., Sonoma, Cal.
Westinghouse Elec. Int'l., New York, N.Y.

Gauges, Radiation, Microwave

Electro/Data, Inc., Garland, Tex.
AMBAC Inds., Garden City, N.Y.
Kay-Ray, Inc., Palatine, Ill.
Rank Precision Inds., W. Nyack, N.Y.
Scientific Communications, Garland, Tex.

Gauges, Strain—See Vol 2

Gauges, Tension

Hickok Elect. Instr., Cleveland, Ohio
Jonard Inds. Corp., Bronx, N.Y.... p 2941
Ametek/Testing Equip. Sys., Lausdale, Pa.
Ametek/U.S. Gauge, Sellersville, Pa
Automatic Timing & Controls, Inc., King of Prussia, Pa.
Celtic Inds., Inc., Van Nuys, Cal.
Chatillon John & Sons, Kew Gardens, N.Y.
Dillon, W.C. & Co., Van Nuys 340, Calif.
Doric Sci. Corp., San Diego, Calif.
Electromatic Equip. Co., Cedarhurst, N.Y.
E.T.M. Corp., Monrovia, Calif.
Imtra Corp., Medford, Mass.
Ind'l. Winding Mach., River Edge, N.J.
Janel, Inc., Stirling, N.J.
Kenney Engrg. Corp., Monrovia, Cal.
Minnetech Labs., Inc., Minneapolis, Minn.
Pacific Scien. Co., City Commerce, Cal.
Snap-On Tools Corp., Kenosha, Wisc.
Techni-Tool, Inc., Philadelphia, Pa.
Tensitron, Inc., Harvard, Mass.
Transducer Controls Corp., Covina, Calif.
Tyco Instr. Div., Waltham, Mass.
Varied Ind'l. Prods., Inc., Paterson, N.J.
West Coast Resch. Corp., Los Angeles, Calif.
Wharton Unitools, Moosup, Conn.
Wintriss Controls, New York, N.Y.
Wood, C.N. Mfg. Co., Newtown, Pa.

Gauges, Thickness (Electronic)—See Indicators, Film Thickness; Indicators, Material Thickness

Gauges, Vacuum

Dixson Inc., Grand Junction, Colo.
RCA Elctrns. Comps., Harrison, N.J.
Schauer Mfg. Corp., Cincinnati, Ohio
Abbeon, Inc., Jamaica, N.Y.
Ametek/U.S. Gauge, Sellersville, Pa
Andonian Assocs., Inc., Waltham, Mass.
Aremco Prods., Inc., Briarcliff Manor, N.Y.
Bailey Meter Co., Wickliffe, Ohio
Bendix, Rochester, N.Y.
Bristol Div, Waterbury, Conn
Central Scientific Co., Chicago, Ill.
CGS/Datametrics, Watertown, Mass.
Cole-Parmer Instr. Co., Chicago, Ill.
Cooke Vacuum Prods., S. Norwalk, Conn.
Denton Vacuum, Inc., Cherry Hill, N.J.
Dyna Magnetic Devices, Inc., Hicksville, N.Y.
Edwards High Vacuum, Oakville, Ont., Can.
Edwards High Vacuum, Grand Island, N.Y.
Electron Technology, Inc., Kearny, N.J.
Ellison Draft Gage Co., Inc., New Buffalo, Mich.
Foxboro Co., Foxboro, Mass.
Fredericks Co., Huntingdon Valley, Pa.
General Elec. Co., W. Lynn, Mass.
Granville-Phillips Co., Boulder, Colo.
Hastings-Raydist, Hampton, Va.
High Vacuum Equip. Corp., Hingham, Mass.
High Voltage Engrg. Corp., Burlington, Mass.
Hill, E. Vernon, Inc., San Francisco, Calif.
Honeywell, Ft. Washington, Pa.
Janel, Inc., Stirling, N.J.
Kinney Vacuum Co., Boston, Mass.
Leybold-Heraeus, Monroeville, Pa.
Lion Precision Div., Newton, Mass.
Materials Resch. Corp., Orangeburg, N.Y.
MKS Instrs., Inc., Burlington, Mass.
Nester/Faust Mfg. Corp., Newark, Dela.
Norton Co., Newton, Mass.
Nuclear Resch. Corp., Southampton, Pa.
Pennwalt Corp., Phila., Pa.
Precision Sci. Co., Chicago, Ill.
RIL Elctrns., Inc., Southampton, Pa.
Snap-On Tools Corp., Kenosha, Wisc.
Statham Instrs., Inc., Oxnard, Cal.
Taylor Instr. Process Control Div., Rochester, N.Y.
Texas Instruments, Inc., Houston, Tex.
Tyco Instr. Div., Waltham, Mass.
Ultek Div., Palo Alto, Calif.
Vacuum Equip. Div., Newton, Mass.
Vacuum Resch. Mfg., San Ramon, Cal.
Varian Assocs., Palo Alto, Cal.
Varian Assocs., Vacuum Div., Palo Alto, Cal.
VirTis Co., Inc., Gardiner, N.Y.
VWR Scientific, San Francisco, Cal.
Wallace & Tiernan Div., Belleville, N.J.
Weksler Instrs. Corp., Freeport, N.Y.
Westinghouse Elec., Elmira, N.Y.

Gauges, Wire Measuring—See Wire Measuring Gauges—Vol 3

Gear Measuring Wire—See Vol 3

Gears & Gear Mechanisms (Precision)—See Vol 3

Geiger Counters—See Counters, Geiger—Vol 3

Geiger-Mueller Tubes—See Tubes, Geiger-Mueller—Vol 2

Generators, A-C

Astrosystems, Lake Success, N.Y.
Behlman Div., San Diego, Cal
Bowmar Instr. Corp., Ft. Wayne, Ind.
CML-Macarr, Inc., Edison, N.J. ..... p 665
Eastern Air Devices, Inc., Dover, N.H.
EEMCO Div., Los Angeles, Cal. .. p 1590
Electronic Resch. Assocs., Cedar Grove, N.J.
Elgar Corp., San Diego, Cal.
Elin Div., San Diego, Cal.
General Elec. Co., Schenectady, N.Y.
Georator Corp., Manassas, Va. p 722,723
Ind'l. Test Equip., Port Washington, N.Y. p 497
Magnetic Technology, Canoga Pk., Cal. p 1634
Rotating Comps., Bay Shore, N.Y.
Vernitron, Torrance, Cal. ..... p 1634
Vernitron Corp., Deer Pk., N.Y. .. p 1634
Allis-Chalmers, Milwaukee, Wisc.
Allis, Louis Co., Milwaukee, Wisc.
American Elctrns., Inc., Fullerton, Cal.
AMF Electrosystems Div., Vandalia, Ohio
Armec Corp., Huntington Sta., N.Y.
Bendix, Eatontown, N.J.
Bogue Elec. Mfg. Co., Paterson, N.J.
California Instrs. Co., San Diego, Cal.
Century Elec. Co., St. Louis, Mo.
Clifton Div., Clifton Hgts., Pa.
Columbia Elec. Mfg. Co., Cleveland, Ohio
Dyna Technology Inc., Sioux City, Iowa
Electric Indicator Co., Inc., Wilton, Conn.
Electric Machinery Mfg. Co., Minneapolis, Minn.
Electro-Pacific, Inc., Goleta, Calif.
Elctrn. Specialty, Thomaston, Conn.
Forney Inds., Inc., Fort Collins, Colo.
General Lab. Assocs., Norwich, N.Y.
Holt Instr. Labs., Oconto, Wisc.
Homelite, Port Chester, N.Y.
Horlick, William I. Co., Inc., Boston, Mass.
Ideal Elec. & Mfg. Co., Mansfield, Ohio
Kato Engrg. Co., Mankato, Minn.
Katolight Corp., Mankato, Minn.
Kurz & Root Co., Inc., Appleton, Wisc.
Lear Siegler, Inc., Santa Monica, Calif.
Lincoln Elec. Co., Cleveland, Ohio
Motor Generator Div., Troy, Ohio
MPC Prods. Corp., Chicago, Ill.
NH Research, Inc., Santa Ana, Calif.
ONAN Div., Mipls., Minn.
Optimation, Inc., Sun Valley, Calif.
Reliance Elec. Co., Cleveland, Ohio
Siemens Corp., Comps. Div., Iselin, N.J.
Singer Co., Somerville, N.J.
Singer-General Precision, Inc., Little Falls, N.J.
Superior Continental Corp., Hickory, N.C.
Task Corp., Anaheim, Calif.
Taylor-Winfield Corp., Warren, Ohio
Tel-Instr. Elctrns. Corp., Carlstadt, N.J.
Teledyne Inet, Gardena, Cal.
Varo, Inc., Santa Barbara, Cal.
Vibrac Corp., Chelmsford, Mass.
Western Gear Corp., Pasadena, Cal.
Westinghouse Elec. Corp., Pittsburgh, Pa.
Westinghouse Elec. Corp., Pittsburgh, Pa.
Westinghouse Elec. Int'l., New York, N.Y.
Winpower Mfg Co., Newton, Iowa

Generators, A-M

Hewlett-Packard, Palo Alto, Cal.
Hickok Elect. Instr., Cleveland, Ohio
Kay Elemetrics, Pine Brook, N.J... p 504
LogiMetrics, Greenvale, N.Y. ..... p 515
Marconi Instrs., Englewood, N.J... p 519
Polarad Elctrn. Instrs., Lake Success, N.Y. .....p 538,539
RCA Elctrns. Comps., Harrison, N.J.
RF Communications, Rochester, N.Y. p 553
Wavetek, San Diego, Cal.
Anritsu Electric Co., Ltd., Tokyo, Japan
AUL Instrs., Inc., Flushng, N.Y.
CCA Elctrns. Corp., Gloucester, N.J.
Edison Elctrns. Div., Manchester, N.H.
Electronic Meas. Corp., New York, N.Y.
Franel Corp., So. River, N.J.
General Radiotelephone Co., Burbank, Cal.
Heath Co., Benton Harbor, Mich.
Leader Instr. Corp., Long Island City, N.Y.
Matsushita Comm. Ind'l. Co., Ltd., Yokohama, Japan
Radio Resch. Co., Rockaway, N.J.
RCA Corp., Camden, N.J.
Rohde & Schwarz Sls., Passaic, N.J.
Siemens Corp., Comm. Eq. Div., Iselin, N.J.
Stark Elctrn. Instrs., Ltd., Ajax, Ont., Canada
Tel-Instr. Elctrns. Corp., Carlstadt, N.J.
Trepac Corp. America, Englewood, N.J.
Wandel & Goltermann, E. Hanover, N.J.
Weston Instrs. Div., Hatboro, Pa
Wiltron Co., Palo Alto, Calif.

Generators, A-M(F-M

Hewlett-Packard, Palo Alto, Cal.
Hickok Elect. Instr., Cleveland, Ohio
Kay Elemetrics, Pine Brook, N.J.
Krohn-Hite, Cambridge, Mass.
LogiMetrics, Greenvale, N.Y. ..... p 515
London Co., Cleveland, Ohio ..... p 516
Lorch-Adret Corp., Englewood, N.J.
Lorch Elctrns. Corp., Englewood, N.J.
Marconi Instrs., Englewood, N.J... p 519
Polarad Elctrn. Instrs., Lake Success, N.Y. .....p 538,539
RCA Elctrns. Comps., Harrison, N.J.
RF Communications, Rochester, N.Y. p 553
Solid State Elctrns., Sepulveda, Cal.
Texscan Corp., Indianapolis, Ind.
Wavetek, San Diego, Cal.
Anritsu Electric Co., Ltd., Tokyo, Japan
AUL Instrs., Inc., Flushng, N.Y.
CCA Elctrns. Corp., Gloucester, N.J.
Defense Elctrns., Inc., Rockville, Md.
Edison Elctrns. Div., Manchester, N.H.
Franel Corp., So. River, N.J.
Heath Co., Benton Harbor, Mich.
Leader Instr. Corp., Long Island City, N.Y.
Matsushita Comm. Ind'l. Co., Ltd., Yokohama, Japan
Microdot Inc., S. Pasadena, Calif.
MSE, Inc., Westlake, Ohio
Radio Resch. Co., Rockaway, N.J.
RCA Corp., Camden, N.J.
Rohde & Schwarz Sls., Passaic, N.J.
Stark Elctrn. Instrs., Ltd., Ajax, Ont., Canada
Wandel & Goltermann, E. Hanover, N.J.
Weston Instrs. Div., Hatboro, Pa
Wiltron Co., Palo Alto, Calif.

Generators, Acoustic, High Intensity Noise

General Radio Co., Concord, Mass.
Sanders Nuclear Corp, Nashua, N H
Wyle Labs., El Segundo, Calif.

Generators, Audio

Austron, Inc., Austin, Tex.
Behlman Div., San Diego, Cal
Bramco Controls, Piqua, Ohio .... p 1406
Clarke - Hess, New York, N.Y. ..... p 426
Connor-Winfield Corp., Winfield, Ill.
Dranetz Engrg. Labs., Plainfield, N.J.
Electro Sci. Inds., Portland, Ore... p 455
Elin Div., San Diego, Cal.
Exact Elctrns., Inc., Hillsboro, Ore.p 466
Fork Standards, W. Chicago, Ill.
Frequency Control, Inc., Austin, Tex.
Frequency Elctrns., New Hyde Pk., N.Y.
Gibbs Mfg. & Resch., Janesville, Wisc.
Hewlett-Packard, Palo Alto, Cal.
Hickok Elect. Instr., Cleveland, Ohio
Ind'l. Test Equip., Port Washington, N.Y.
Interstate Elctrns. Corp., Anaheim, Cal. p 499
Kay Elemetrics, Pine Brook, N.J... p 504
Krohn-Hite, Cambridge, Mass. ..... p 512
Lorch-Adret Corp., Englewood, N.J.
Marconi Instrs., Englewood, N.J... p 520
Microdot Inc., City of Industry, Cal. p 522
Nelson Ross Elctrns., Lake Success, N.Y. .....p 536,537
Polarad Elctrn. Instrs., Lake Success, N.Y.
RCA Elctrns. Comps., Harrison, N.J. p 551
Solid State Elctrns., Sepulveda, Cal.
Systron-Donner Datapulse Div., Culver City, Cal.
Texscan Corp., Indianapolis, Ind.
Wavetek, San Diego, Cal. .....p 584,585
Altec, Anaheim, Calif.
Anritsu Electric Co., Ltd., Tokyo, Japan
B & K Instrs., Inc., Cleveland, Ohio
Barker & Williamson, Bristol, Pa.
BECO Solid State Systems, Salem, Va.
B.H. Inds., Los Angeles, Cal.
California Instrs. Co., San Diego, Cal.
Defense Elctrns., Inc., Rockville, Md.
Dynamic Precision Controls, Hagerstown, Ind.
Dynascan Corp., Chicago, Ill.
Eico Electronic Instrument Co., Inc., Brooklyn, N.Y.
Franel Corp., So. River, N.J.
General Radio Co., Concord, Mass.
HB Engrg. Corp., Silver Spring, Md.
Heath Co., Benton Harbor, Mich.
Holt Instr. Labs., Oconto, Wisc.
Hope Elctrns., Clifton, N.J.
Hughes Aircraft Co, Fullerton, Cal.
Instrument Labs. Corp., Chicago, Ill.
Lab Electro-Acoustique, 92-Rueil, Malmaison, France
Leader Instr. Corp., Long Island City, N.Y.
Lehigh Valley Elctrn., Inc., Fogelsville, Pa.
Levell Electronics Ltd., High Barnet, Herts,, England
Matsushita Comm. Ind'l. Co., Ltd., Yokohama, Japan
Nelson-Hershfield Elctrns., Phoenix, Ariz.
NH Research, Inc., Santa Ana, Calif.
Northeast Elctrns. Corp., Concord, N.H.
Optimation, Inc., Sun Valley, Calif.
Philco-Ford Corp., Washington, D.C.
Riverbank Labs., Geneva, Ill.
Rohde & Schwarz Sls., Passaic, N.J.
Siemens Corp., Comm. Eq. Div., Iselin, N.J.
Solar Elctrns. Co., Hollywood, Calif.
Spectral Dynamics Corp. San Diego, San Diego, Cal.
Systems Resch. Labs., Dayton, Ohio
Telonic Inds., Inc., Laguna Beach, Calif.
Wandel & Goltermann, E. Hanover, N.J.
Waveforms, No. Hollywood, Cal.

Generators, Character

Data Technology, Palo Alto, Cal... p 429
Dynamics Instr. Co., Monterey Pk., Cal.
E-H Resch. Labs., Inc., Oakland, Cal.
Exact Elctrns., Inc., Hillsboro, Ore.
Geo Space Sys., Tampa, Fla. ..... p 350
Hughes Aircraft Co., Mos Div., Newport Beach, Cal.

Multitech Data Prods., Monterey Pk., Cal.
Systron-Donner Corp., Concord, Cal. p 564
Systron-Donner Concord Instr. Div., Concord, Cal. ..... p 564
Systron-Donner Datapulse Div., Culver City, Cal. ..... p 564
Systron Donner Trygon Elctrns. Sub., Roosevelt, N.Y. ..... p 564
Adar Assocs., Cambridge, Mass.
Cooke Engrg. Co., Alexandria, Va.
Data Dynamics Div., Englewood, N.J.
Data Technology Corp., Palo Alto, Cal.
Digitech Data Inds., Inc., Ridgefield, Conn.
Fairchild Semiconductor, Mountain View, Calif.
Hughes Aircraft Co, Culver City, Cal.
Information Displays, Inc., Mt. Kisco, N.Y.
Kemper Engrg. Co., Northridge, Cal.
Link Div., Binghamton, N.Y.
Monitor Sys., Inc., Ft. Washington, Pa.
Mostek Corp., Carrollton,, Tex.
Philco-Ford Corp., Washington, D.C.
Rohde & Schwarz Sls., Passaic, N.J.
Singer - Tele-Signal, Woodbury, N.Y.
Thomson-CSF Electron Tubes, N.Y., N.Y.
Transystems Elctrn. Co., Fort Lee, N.J.
Varian Data Machines, Palo Alto, Cal.

Generators, Color Tv

Hickok Elect. Instr., Cleveland, Ohio
Kay Elemetrics, Pine Brook, N.J.
Marconi Instrs., Englewood, N.J... p 520
RCA Elctrns. Comps., Harrison, N.J.
Tektronix, Inc., Beaverton, Ore.
American Elctrn. Controls Co., Barrington, N.J.
Cohu Elctrns., Inc., San Diego, Calif.
Dynascan Corp., Chicago, Ill.
Eico Electronic Instrument Co., Inc., Brooklyn, N.Y.
Leader Instr. Corp., Long Island City, N.Y.
Midg-Line Instr. Co., Miami, Fla.
RCA Corp., Camden, N.J.
Stark Elctrn. Instrs., Ltd., Ajax, Ont., Canada
Tel-Instr. Elctrns. Corp., Carlstadt, N.J.

Generators, Cross Hatch

Hickok Elect. Instr., Cleveland, Ohio
RCA Elctrns. Comps., Harrison, N.J.
Tektronix, Inc., Beaverton, Ore.
American Elctrn. Controls Co., Barrington, N.J.
Cohu Elctrns., Inc., San Diego, Calif.
Dynascan Corp., Chicago, Ill.
Eico Electronic Instrument Co., Inc., Brooklyn, N.Y.
Heath Co., Benton Harbor, Mich.
Leader Instr. Corp., Long Island City, N.Y.
Midg-Line Instr. Co., Miami, Fla.
Stark Elctrn. Instrs., Ltd., Ajax, Ont., Canada
Tel-Instr. Elctrns. Corp., Carlstadt, N.J.

Generators, D-C

General Elec. Co., Schenectady, N.Y.
Lorch-Adret Corp., Englewood, N.J.
Servo-Tek Prods. Co., Hawthorne, N.J.
AMF Electrosystems Div., Vandalia, Ohio
Barger Corp., Sunnyvale, Cal.
Bendix, Eatontown, N.J.
Bogue Elec. Mfg. Co., Paterson, N.J.
Century Elec. Co., St. Louis, Mo.
Clifton Div., Clifton Hgts., Pa.
Columbia Elec. Mfg. Co., Cleveland, Ohio
Electro-Craft Corp, Hopkins, Minn
Elctrn. Specialty, Thomaston, Conn.
Franel Corp., So. River, N.J.
Homelite, Port Chester, N.Y.
Inland Motor Corp. of Va., Radford, Va.
Kato Engrg. Co., Mankato, Minn.
Katolight Corp., Mankato, Minn.
Kurz & Root Co., Inc., Appleton, Wisc.
Lear Siegler, Inc., Santa Monica, Calif.
ONAN Div., Mipls., Minn.
Pittman Corp., Sellersville,, Pa.
Robotron Corp., Detroit, Mich.
Siemens Corp., Comps. Div., Iselin, N.J.
Westinghouse Elec. Corp., Pittsburgh, Pa.
Weston-Transicoil, Worcester, Pa.
Winpower Mfg Co., Newton, Iowa

Generators, Digital Delay

Austron, Inc., Austin, Tex.
Automated Meas., Oakland, Calif. p 446
Computer Devices, Commack, N.Y.
E-H Resch. Labs., Inc., Oakland, Cal. p 446
Exact Elctrns., Inc., Hillsboro, Ore.
Hughes Aircraft Co., Mos Div., Newport Beach, Cal.
Metric Sys., Ft. Walton Beach, Fla.p 358
Systron-Donner Concord Instr. Div., Concord, Cal.
Systron-Donner Datapulse Div., Culver City, Cal.
Adar Assocs., Cambridge, Mass.
Aerospace Resch. Inc., Boston, Mass.
Control Logic, Natick, Mass.
Data Dynamics Div., Englewood, N.J.
Defense Elctrns., Inc., Rockville, Md.
General Radio Co., Concord, Mass.
Hughes Aircraft Co, Culver City, Cal.
Microwave/Sys., Inc., E. Syracuse, N.Y.
Nano Fast, Inc., Chicago, Ill.
Philips Elctrns. Inds., Ltd., Toronto 17, Can.
Siemens Corp., Measuring Instrs. Div., Iselin, N.J.
Systems Resch. Labs., Dayton, Ohio
Timing Sys., Inc., Marblehead, Mass.
Zehntel, Inc., Berkeley, Calif.

Generators, Emergency Power

General Elec. Co., Schenectady, N.Y.
Aircraft & Missile Consits., Manhattan Beach, Cal.
Allis-Chalmers, Milwaukee, Wisc.
Allis, Louis Co., Milwaukee, Wisc.
American Elctrns., Inc., Fullerton, Cal.
AMF Electrosystems Div., Vandalia, Ohio
Bendix, Eatontown, N.J.
Bogue Elec. Mfg. Co., Paterson, N.J.
Columbia Elec. Mfg. Co., Cleveland, Ohio
Detroit Diesel Allison Div., Detroit, Mich.
Dyna Technology Inc., Sioux City, Iowa
Electric Machinery Mfg. Co., Minneapolis, Minn.
Fermont Div., Bridgeport, Conn.
Forney Inds., Inc., Fort Collins, Colo.
Homelite, Port Chester, N.Y.
Ideal Elec. & Mfg. Co., Mansfield, Ohio
Katolight Corp., Mankato, Minn.
Lear Siegler, Inc., Santa Monica, Calif.
Lincoln Elec. Co., Cleveland, Ohio
Miller Elec. Mfg. Co., Appleton, Wisc.
ONAN Div., Mipls., Minn.
Power Applications, Inc., Bayside, N.Y.
Singer-General Precision, Inc., Little Falls, N.J.
Task Corp., Anaheim, Calif.
Technical Mat'l., Mamaroneck, N.Y.
Teledyne Inet, Gardena, Cal.
Universal Motor Div., Oshkosh, Wisc.
Varo, Inc., Santa Barbara, Cal.
Waukesha Motor Co., Waukesha, Wisc.
Westinghouse Elec. Corp., Pittsburgh, Pa.
Westinghouse Elec. Int'l., New York, N.Y.
Winpower Mfg Co., Newton, Iowa

Generators, F-M

Clarke - Hess, New York, N.Y. ..... p 426
Data-Control Systems, Danbury, Conn.
Exact Elctrns., Inc., Hillsboro, Ore.
Hewlett-Packard, Palo Alto, Cal.
Hickok Elect. Instr., Cleveland, Ohio
Interstate Elctrns. Corp., Anaheim, Cal.
Kay Elemetrics, Pine Brook, N.J. p 504,506,507
Krohn-Hite, Cambridge, Mass.
LogiMetrics, Greenvale, N.Y. ..... p 515
Microdot Inc., City of Industry, Cal.
Polarad Elctrn. Instrs., Lake Success, N.Y. .....p 538,539
RF Communications, Rochester, N.Y. p 553
Solid State Elctrns., Sepulveda, Cal.
Texscan Corp., Indianapolis, Ind.
Wavetek, San Diego, Cal. ..... p 584
Anritsu Electric Co., Ltd., Tokyo, Japan
Astro Comm. Lab., Gaithersburg, Md.
CCA Elctrns. Corp., Gloucester, N.J.
Defense Elctrns., Inc., Rockville, Md.
Dynamic Precision Controls, Hagerstown, Ind.
Edison Elctrns. Div., Manchester, N.H.
Eico Electronic Instrument Co., Inc., Brooklyn, N.Y.
Leader Instr. Corp., Long Island City, N.Y.
Matsushita Comm. Ind'l. Co., Ltd., Yokohama, Japan
Radio Resch. Co., Rockaway, N.J.
Rohde & Schwarz Sls., Passaic, N.J.
Transystems Elctrn. Co., Fort Lee, N.J.
Video Resch. Corp., Rockville, Md.
Weston Instrs. Div., Hatboro, Pa
Wiltron Co., Palo Alto, Calif.

Generators, F-M & F-M/Stereo

American Elctrn. Labs., Inc., Lansdale, Pa.
Hewlett-Packard, Palo Alto, Cal.
Hickok Elect. Instr., Cleveland, Ohio
London Co., Cleveland, Ohio ..... p 516
Marconi Instrs., Englewood, N.J... p 519
RCA Elctrns. Comps., Harrison, N.J.
CCA Elctrns. Corp., Gloucester, N.J.
Collins Radio Co., Dallas, Tex.
Edison Elctrns. Div., Manchester, N.H.
Eico Electronic Instrument Co., Inc., Brooklyn, N.Y.
Heath Co., Benton Harbor, Mich.
Leader Instr. Corp., Long Island City, N.Y.
Matsushita Comm. Ind'l. Co., Ltd., Yokohama, Japan
MSE, Inc., Westlake, Ohio
RCA Corp., Camden, N.J.
Rohde & Schwarz Sls., Passaic, N.J.

Generators, Frequency, Harmonic

American Elctrn. Labs., Inc., Lansdale, Pa.
Bulova Watch Co., Freq. Control Prods., Elctrns. Div., Woodside, N.Y.
Electro/Data, Inc., Garland, Tex. p 1559
Frequency Engrg. Labs., Farmingdale, N.J. ..... p 605
Hewlett-Packard, Palo Alto, Cal.
Hickok Elect. Instr., Cleveland, Ohio
Honeywell, Denver, Colo.
Lorch-Adret Corp., Englewood, N.J.
Lorch Elctrns. Corp., Englewood, N.J.
Marconi Instrs., Englewood, N.J... p 519
Polarad Elctrn. Instrs., Lake Success, N.Y.
Watkins Johnson Co., Palo Alto, Cal.
Aircom, Inc., Union, N.H.
CCA Elctrns. Corp., Gloucester, N.J.
GAF Corp., New York, N.Y.
Hughes Aircraft Co, Fullerton, Cal.
Hyletronics Corp., Littleton, Mass.
Leader Instr. Corp., Long Island City, N.Y.
Micro-Now Instr., Chicago, Ill.
Microlab/FXR, Livingston, N.J.
Microwave Assocs., Inc., Burlington, Mass.
Microwave/Sys., Inc., E. Syracuse, N.Y.
Premier Microwave, Port Chester, N.Y.
Sage Labs. Inc., Natick, Mass.
Scientific-Atlanta, Inc., Atlanta, Ga.
Scientific Communications, Garland, Tex.
Somerset Radiation Lab., Arlington, Va.
Special Microwave Devices Oper., Waltham, Mass.
Spectral Dynamics Corp. San Diego, San Diego, Cal.
Telonic Inds., Inc., Laguna Beach, Calif.
Transystems Elctrn. Co., Fort Lee, N.J.
Westinghouse Elec. Int'l., New York, N.Y.
Weston Instrs. Div., Hatboro, Pa
Zeta Labs., Inc., Mountain View, Calif.

Generators, Frequency-Offset

Lorch-Adret Corp., Englewood, N.J.
Microdot Inc., City of Industry, Cal.
Data Dynamics Div., Englewood, N.J.
Gosh Instrs., Inc., Wethersfield, Conn.
Leader Instr. Corp., Long Island City, N.Y.
Microwave/Sys., Inc., E. Syracuse, N.Y.
Weston Instrs. Div., Hatboro, Pa

Generators, Function

American Aerospace Controls, Farmingdale, N.Y.
C & K Components, Watertown, Mass.
CELCO, Mahwah, N.J. ..... p 339
Chronetics, Inc., Mt. Vernon, N.Y.
Clarke - Hess, New York, N.Y. ..... p 426
DDC, Hicksville, N.Y.
Elctrn. Assocs., W. Long Branch, N.J.
Exact Elctrns., Inc., Hillsboro, Ore.p 466
General Magnetics, Bloomfield, N.J. p 1319
Hewlett-Packard, Palo Alto, Cal.
Hickok Elect. Instr., Cleveland, Ohio
Hughes Aircraft Co., Mos Div., Newport Beach, Cal.
Hybrid Sys. Corp., Burlington, Mass.
Ind'l. Control Co., Farmingdale, N.Y.
Interstate Elctrns. Corp., Anaheim, Cal. p 499
Kepco, Inc., Flushing, N.Y. ..... p 762
Krohn-Hite, Cambridge, Mass. ..... p 512
Lorch-Adret Corp., Englewood, N.J.
Microdot Inc., City of Industry, Cal.
Norden Div., Norwalk, Conn.
Perkin-Elmer Corp., Wilton, Conn.
Polarad Elctrn. Instrs., Lake Success, N.Y.
Precision Monolithics, Santa Clara, Cal.
Solid State Elctrns., Sepulveda, Cal.
Systron-Donner Corp., Concord, Cal. p 564
Systron-Donner Concord Instr. Div., Concord, Cal. ..... p 564
Systron-Donner Datapulse Div., Culver City, Cal. ..... p 564
Systron Donner Trygon Elctrns. Sub., Roosevelt, N.Y. ..... p 564
Teledyne Philbrick, Dedham, Mass.
Transmagnetics Inc., Farmingdale, N.Y.
Wavetek, San Diego, Cal. .....p 583-585
Adar Assocs., Cambridge, Mass.
Avco Corp., Cincinnati, Ohio
Aydin Data Systems, Ft. Washington, Pa
BAC Elctrns., Pennsauken, N.J.
BECO Solid State Systems, Salem, Va.
Bowmar/Ali, Inc., Acton, Mass.
Burr-Brown Resch. Corp., Tucson, Ariz.
Computer Diode, Fair Lawn, N.J.
Data Dynamics Div., Englewood, N.J.
Elctrn. Modules Corp., Timonium, Md.
Feedback, Inc., Berkeley Hghts., N.J.
General Computers, Inc., Los Angeles, Calif.
General Radio Co., Concord, Mass.
Hughes Aircraft Co, Culver City, Cal.
Kikusui Elctrns. Corp., Kawasaki City, Kanagawa-Pref., Japan
Micro Networks, Worcester, Mass.
MSE, Inc., Westlake, Ohio
Philips Elctrn. Instrs., Mt. Vernon, N.Y.
Rohde & Schwarz Sls., Passaic, N.J.
Servo Corp. America, Hicksville, N.Y.
Signetics Corp., Sunnyvale, Calif.
Solar Elctrns. Co., Hollywood, Calif.
Spectral Dynamics Corp. San Diego, San Diego, Cal.
Telonic Inds., Inc., Laguna Beach, Calif.
Transystems Elctrn. Co., Fort Lee, N.J.
United Aircraft Corp., Norwalk, Conn.
Waveforms, No. Hollywood, Cal.
Weston Instrs. Div., Hatboro, Pa
Weston-Transicoil, Worcester, Pa.
Zeltex, Inc., Concord, Calif.

Generators, Hall-Also See Magnetoresistors; Multipliers, Hall; Probes, Hall—See Vol 2

Generators, Impulse-Also See Generators, Pulse

Chronetics, Inc., Mt. Vernon, N.Y. p 425
Dranetz Engrg. Labs., Plainfield, N.J.
E-H Resch. Labs., Inc., Oakland, Cal. p 447
Exact Elctrns., Inc., Hillsboro, Ore.p 466
General Elec. Co., Schenectady, N.Y.
Hipotronics, Inc., Brewster, N.Y.
Interstate Elctrns. Corp., Anaheim, Cal.
Polarad Elctrn. Instrs., Lake Success, N.Y.
Precision Timer, Westbrook, Conn.
Ross Engrg. Corp., Campbell, Cal.
Systron-Donner Datapulse Div., Culver City, Cal.
Advanced Kinetics, Costa Mesa, Calif.
BECO Solid State Systems, Salem, Va.
Bertan Assocs., Inc., Plainview, N.Y.
Chesapeake Instr. Corp., Shadyside, Md.
Data Dynamics Div., Englewood, N.J.
Ferranti Ltd., Hollinwood, Lancs., England
Hughes Aircraft Co, Culver City, Cal.
Instr. Resch. Co., Lincoln, Mass.
LAD Electro-Sys., Inc., Hicksville, N.Y.
Maxwell Labs., Inc., San Diego, Calif.
U.S. Scientific Instrs., Watertown, Mass.
Velonex, Santa Clara, Calif.

Generators, Infrared—See Lamps, Infrared—Vol 2

Generators, Interference Raster

Exact Elctrns., Inc., Hillsboro, Ore.
Honeywell, Denver, Colo.
Solar Elctrns. Co., Hollywood, Calif.

Generators, Keyed Video Signal—See Generators, TV Signal

Generators, Line & Vector

Aydin Data Systems, Ft. Washington, Pa

Generators, Low-Frequency

Accutronics, Inc., Geneva, Ill.
Austron, Inc., Austin, Tex.
Behlman Div., San Diego, Cal
Bulova Watch Co., Freq. Control Prods., Elctrns. Div., Woodside, N.Y.
Clarke - Hess, New York, N.Y. ..... p 426
CML-Macarr, Inc., Edison, N.J. ..... p 665
Connor-Winfield Corp., Winfield, Ill.
Exact Elctrns., Inc., Hillsboro, Ore. p 466
Fork Standards, W. Chicago, Ill.
Frequency Control, Inc., Austin, Tex.
Frequency Elctrns., New Hyde Pk., N.Y.
Gibbs Mfg. & Resch., Janesville, Wisc.
Hewlett-Packard, Palo Alto, Cal.
Interstate Elctrns. Corp., Anaheim, Cal. p 499
Kay Elemetrics, Pine Brook, N.J. p 505,506
Krohn-Hite, Cambridge, Mass. ..... p 512
LogiMetrics, Greenvale, N.Y. ..... p 515
Lorch-Adret Corp., Englewood, N.J.
Meloy Laboratories, Springfield, Va.
Microdot Inc., City of Industry, Cal. p 522
Monsanto Company, Electronic Instruments, W. Caldwell, N.J.
Reeves-Hoffman Div., Carlisle, Pa.
Rockland Sys. Corp., Blauvelt, N.Y.
Solid State Elctrns., Sepulveda, Cal.
Spectrum Technology, Goleta, Cal.
Systron-Donner Datapulse Div., Culver City, Cal.
Tektronix, Inc., Beaverton, Ore.
Texscan Corp., Indianapolis, Ind.
Wavetek, San Diego, Cal. ..... p 585
American Elctrns., Inc., Fullerton, Cal.
Anritsu Electric Co., Ltd., Tokyo, Japan
BAC Elctrns., Pennsauken, N.J.
California Instrs. Co., San Diego, Cal.
CCA Elctrns. Corp., Gloucester, N.J.
Data Dynamics Div., Englewood, N.J.
Defense Elctrns., Inc., Rockville, Md.
Digiac Corp., Plainview, N.Y.
Feedback, Inc., Berkeley Hghts., N.J.
General Radio Co., Concord, Mass.
HB Engrg. Corp., Silver Spring, Md.
Hope Elctrns., Clifton, N.J.
Horlick, William I. Co., Inc., Boston, Mass.
Ideal Elec. & Mfg. Co., Mansfield, Ohio
Kikusui Elctrns. Corp., Kawasaki City, Kanagawa-Pref., Japan
Lear Siegler, Inc., Santa Monica, Calif.
Levell Electronics Ltd., High Barnet, Herts,, England
Optimation, Inc., Sun Valley, Calif.
Riverbank Labs., Geneva, Ill.
Rohde & Schwarz Sls., Passaic, N.J.
Spectral Dynamics Corp. San Diego, San Diego, Cal.
Teledyne Inet, Gardena, Cal.
Tracor, Inc., Austin, Tex.
Wandel & Goltermann, E. Hanover, N.J.
Waveforms, No. Hollywood, Cal.
Weston Instrs. Div., Hatboro, Pa

Generators, Marker

Accutronics, Inc., Geneva, Ill.
Austron, Inc., Austin, Tex.
Dranetz Engrg. Labs., Plainfield, N.J.
Electro/Data, Inc., Garland, Tex. p 1559
Fork Standards, W. Chicago, Ill.
Hewlett-Packard, Palo Alto, Cal.
Hickok Elect. Instr., Cleveland, Ohio
Kay Elemetrics, Pine Brook, N.J. p 504-506
Meloy Laboratories, Springfield, Va.
PPM, Inc., Bedford, Ohio ..... p 535
RCA Elctrns. Comps., Harrison, N.J.
Tektronix, Inc., Beaverton, Ore.
Aerospace Resch. Inc., Boston, Mass.
Blonder-Tongue Labs., Inc., Old Bridge, N.J.
Dumont Oscilloscope Labs., Inc., W. Caldwell, N.J.
Dynascan Corp., Chicago, Ill.
Eico Electronic Instrument Co., Inc., Brooklyn, N.Y.
Heath Co., Benton Harbor, Mich.
Jackson Elec. Instr. Co., Mineola, N.Y.
Jerrold Elctrns. Corp., Philadelphia, Pa.
Leader Instr. Corp., Long Island City, N.Y.
Matsushita Comm. Ind'l. Co., Ltd., Yokohama, Japan
Microwave/Sys., Inc., E. Syracuse, N.Y.
Philips Elctrns. Inds., Ltd., Toronto 17, Can.
Telonic Inds., Inc., Laguna Beach, Calif.
Zeta Labs., Inc., Mountain View, Calif.

Generators, Microwave

American Elctrn. Labs., Inc., Lansdale, Pa.
Applied Microwave Lab., Andover, Mass. ..... p 599
Cober Elctrns., Inc., Stamford, Conn. p 600,601
E-H Resch. Labs., Inc., Oakland, Cal.
Electro/Data, Inc., Garland, Tex. p 1559
Frequency Engrg. Labs., Farmingdale, N.J. ..... p 604
Greenray Inds., Inc., Mechanicsburg, Pa. ..... p 607
Hewlett-Packard, Palo Alto, Cal.
Kay Elemetrics, Pine Brook, N.J. p 504,506
Microdot Inc., City of Industry, Cal.
Microwave Cavity Labs., La Grange, Ill. p 611
Nippon Electric/NEC America, N.Y., N.Y.
Polarad Elctrn. Instrs., Lake Success, N.Y. ..... p 538,539
RCA Elctrns. Comps., Harrison, N.J.
Signalite, Neptune, N.J. ..... p 1952
Singer Instrumentation Los Angeles Oper., Los Angeles, Cal. ..... p 562
Singer Instrumentation Palo Alto Oper., Palo Alto, Cal. ..... p 562
Systron-Donner Corp., Concord, Cal. p 565
Systron-Donner Alpha Div., Oakland, Cal. ..... p 565
Systron-Donner Concord Instr. Div., Concord, Cal. ..... p 565
Systron-Donner Kruse Elctrns. Sub., Mountain View, Cal. ..... p 565
Texscan Corp., Indianapolis, Ind. p 578
Watkins Johnson Co., Palo Alto, Cal.
AIL, Div. Cutler-Hammer, Inc., Deer Park, N.Y.
Aircom; Inc., Union, N.H.
AMBAC Inds., Garden City, N.Y.
Anritsu Electric Co., Ltd., Tokyo, Japan
AUL Instrs., Inc., Flushng, N.Y.
Bertan Assocs., Inc., Plainview, N.Y.
Collins Radio Co., Dallas, Tex.
Energy Systems, Palo Alto, Cal.
Engineering Assocs., Dayton, Ohio
GAF Corp., New York, N.Y.
General Microwave Corp., Farmingdale, N.Y.
General Radio Co., Concord, Mass.
Guide Inds., Inc., Sun Valley, Calif.
Hope Elctrns., Clifton, N.J.
Hughes Aircraft Co, Culver City, Cal.
Hyletronics Corp., Littleton, Mass.
Int'l. Microwave, Cos Cob, Conn.
Litton Inds., San Carlos, Calif.
Micro-Now Instr., Chicago, Ill.
Micro-Power, Inc., Long Island City, N.Y.
Micromega, Los Angeles, Cal.
Microwave Assocs., Inc., Burlington, Mass.
Microwave Development Labs., Inc., Needham Hgts., Mass.
Microwave Div, Nashua, N.H.
Narda Microwave Corp., Plainview, N.Y.
PRD Elctrns., Inc., Westbury, N.Y.
Raytheon Co., Waltham, Mass.
Reeve Elctrns., Inc., Chicago, Ill.
RFD, Inc., Tampa, Fla.
Rohde & Schwarz Sls., Passaic, N.J.
Sage Labs. Inc., Natick, Mass.
Sanders Assocs., Nashua, N.H.
Scientific-Atlanta, Inc., Atlanta, Ga.
Scientific Communications, Garland, Tex.
Scintillonics, Inc., Ft. Collins, Colo.
Servo Corp. America, Hicksville, N.Y.
Siemens Corp., Comps. Div., Iselin, N.J.
Siemens Corp., Comm. Eq. Div., Iselin, N.J.
Somerset Radiation Lab., Arlington, Va.
Special Microwave Devices Oper., Waltham, Mass.
Struthers Elctrns. Corp., Mamaroneck, N.Y.
Systron-Donner Microwave Div., Van Nuys, Cal.
Telonic Inds., Inc., Laguna Beach, Calif.
Trak Microwave, Tampa, Fla.
Varian Assocs., Beverly, Mass.
Varian, Beverly, Mass.
Wiltron Co., Palo Alto, Calif.
Zeta Labs., Inc., Mountain View, Calif.

Generators, Neutron

Amperex Electronic Corp., Hicksville, N.Y.
High Voltage Engrg. Corp., Burlington, Mass.
Instr. Resch. Co., Lincoln, Mass.
Kaman Nuclear, Colorado Springs, Colo.
Radiation Dynamics, Inc., Westbury, N.Y.

Generators, Noise, Random (Electrical)

Beckman Instruments, Shiller Pk., Ill. p 413
Electro/Data, Inc., Garland, Tex.
Elgenco, Inc., Santa Monica, Cal. p 460-465
Hewlett-Packard, Palo Alto, Cal.
Kay Elemetrics, Pine Brook, N.J.
Marconi Instrs., Englewood, N.J... p 521
Quan-Tech, Whippany, N.J. ..... p 548
Signalite, Neptune, N.J. ..... p 1952
Systron-Donner Datapulse Div., Culver City, Cal.
Waveline, Inc., W. Caldwell, N.J.
Aerospace Resch. Inc., Boston, Mass.
AIL, Div. Cutler-Hammer, Inc., Deer Park, N.Y.
AMBAC Inds., Garden City, N.Y.
B & K Instrs., Inc., Cleveland, Ohio
Baganoff Assocs., Inc., St. Louis, Mo.
Burr-Brown Resch. Corp., Tucson, Ariz.
Computer Diode, Fair Lawn, N.J.
FKS Comms., Inc., New Hyde Park, N.Y.
General Microwave Corp., Farmingdale, N.Y.
General Radio Co., Concord, Mass.
Instr. Resch. Co., Lincoln, Mass.
Interlind Elctrns., Doraville, Ga.
Int'l. Microwave, Cos Cob, Conn.
Lehigh Valley Elctrn., Inc., Fogelsville, Pa.
Massey Dickinson Co., Inc., Saxonville, Mass.
Northeast Elctrns. Corp., Concord, N.H.
Philco-Ford Corp., Washington, D.C.
PRD Elctrns., Inc., Westbury, N.Y.
Rohde & Schwarz Sls., Passaic, N.J.
Scientific Communications, Garland, Tex.
Siemens Corp., Comps. Div., Iselin, N.J.
Siemens Corp., Comm. Eq. Div., Iselin, N.J.
Tau-Tron, Inc., Lowell, Mass.
Wandel & Goltermann, E. Hanover, N.J.
Weston Instrs. Div., Hatboro, Pa
Winslow Tele-Tronics, Inc., Eatontown, N.J.

Generators, Phase

Dranetz Engrg. Labs., Plainfield, N.J.
Elgar Corp., San Diego, Cal.
Exact Elctrns., Inc., Hillsboro, Ore.
Hewlett-Packard, Palo Alto, Cal.
Lorch-Adret Corp., Englewood, N.J. p 517
Magnetic Technology, Canoga Pk., Cal. p 1634
North Atlantic Inds., Plainview, N.Y. p 368
Solid State Elctrns., Sepulveda, Cal.
Universal Ad-Yu Elctrns., Inc., Passaic, N.J. ..... p 579
Vernitron, Torrance, Cal. ..... p 1634
Vernitron Corp., Deer Pk., N.Y. .. p 1634
Wavetek, San Diego, Cal. .....p 583,585
Bowmar/Ali, Inc., Acton, Mass.
Defense Elctrns., Inc., Rockville, Md.
Feedback, Inc., Berkeley Hghts., N.J.
Instrumentation Tech. Corp., Northridge, Calif.
Kato Engrg. Co., Mankato, Minn.
Optimation, Inc., Sun Valley, Calif.
Servo Corp. America, Hicksville, N.Y.
Special Microwave Devices Oper., Waltham, Mass.
Theta Instr. Corp., Fairfield, N.J.

Generators, Plasma

Advanced Kinetics, Costa Mesa, Calif.
Hughes Aircraft Co, Malibu, Cal.
Instr. Resch. Co., Lincoln, Mass.
Maxwell Labs., Inc., San Diego, Calif.
Microwave Assocs., Inc., Burlington, Mass.
Plasmadyne, Santa Ana, Calif.
Reeve Elctrns., Inc., Chicago, Ill.
Scintillonics, Inc., Ft. Collins, Colo.

Generators, Portable, Engine Driven

EEMCO Div., Los Angeles, Cal.
General Elec. Co., Schenectady, N.Y.
Dyna Technology Inc., Sioux City, Iowa
Electric Machinery Mfg. Co., Minneapolis, Minn.
Fermont Div., Bridgeport, Conn.
Forney Inds., Inc., Fort Collins, Colo.
Homelite, Port Chester, N.Y.
Katolight Corp., Mankato, Minn.
Kurz & Root Co., Inc., Appleton, Wisc.
Lear Siegler, Inc., Santa Monica, Calif.
Lincoln Elec. Co., Cleveland, Ohio
Miller Elec. Mfg. Co., Appleton, Wisc.
ONAN Div., Mipls., Minn.
Superior Continental Corp., Hickory, N.C.
Teledyne Inet, Gardena, Cal.
Universal Motor Div., Oshkosh, Wisc.
Waukesha Motor Co., Waukesha, Wisc.
Winpower Mfg Co., Newton, Iowa

Generators, Power, High

Applied Microwave Lab., Andover, Mass. ..... p 599
Behlman Div., San Diego, Cal
CML-Macarr, Inc., Edison, N.J. ..... p 665
Cober Elctrns., Inc., Stamford, Conn.
General Elec. Co., Schenectady, N.Y.
Ind'l. Test Equip., Port Washington, N.Y. p 497
Instrs. For Ind., Inc., Farmingdale, N.Y. p 1285
Microdot Inc., City of Industry, Cal.
Systron-Donner Datapulse Div., Culver City, Cal.
Texscan Corp., Indianapolis, Ind.
Advanced Kinetics, Costa Mesa, Calif.
AIL, Div. Cutler-Hammer, Inc., Deer Park, N.Y.
Allis, Louis Co., Milwaukee, Wisc.
American Elctrns., Inc., Fullerton, Cal.
AMF Electrosystems Div., Vandalia, Ohio
Aperco Co., East Meadow, N.Y.
California Instrs. Co., San Diego, Cal.
CCA Elctrns. Corp., Gloucester, N.J.
Electric Machinery Mfg. Co., Minneapolis, Minn.
Elctrn. Enterprises, Pasadena, Calif.
Energy Systems, Palo Alto, Cal.
Engineering Assocs., Dayton, Ohio
Fermont Div., Bridgeport, Conn.
Kato Engrg. Co., Mankato, Minn.
Lear Siegler, Inc., Santa Monica, Calif.
Litton Inds., San Carlos, Calif.
Maxwell Labs., Inc., San Diego, Calif.
Raytheon Co., Waltham, Mass.
Reeve Elctrns., Inc., Chicago, Ill.
RF Communications, Inc., Rochester, N.Y.
Robotron Corp., Detroit, Mich.
Rohde & Schwarz Sls., Passaic, N.J.
Siemens Corp., Comps. Div., Iselin, N.J.
Tel-Instr. Elctrns. Corp., Carlstadt, N.J.
Teledyne Inet, Gardena, Cal.
Telonic Inds., Inc., Laguna Beach, Calif.
Varo, Inc., Santa Barbara, Cal.
Velonex, Santa Clara, Calif.
Westinghouse Elec. Int'l., New York, N.Y.

Generators, Pulse-Also See Generators, Impulse

Accutronics, Inc., Geneva, Ill.
American Elctrn. Labs., Inc., Lansdale, Pa.
Applied Microwave Lab., Andover, Mass. ..... p 599
Automated Meas., Oakland, Calif. p 442,443,447
Automation Dev., Culver City, Cal. p 1310
Chronetics, Inc., Mt. Vernon, N.Y. p 425
Cober Elctrns., Inc., Stamford, Conn. p 600
Computer Devices of Calif., Santa Fe Springs, Cal.
Computer Devices, Commack, N.Y.
Computer Prods., Ft. Lauderdale, Fla.

Daico Inds., Inc., Compton, Cal.
Dranetz Engrg. Labs., Plainfield, N.J.
E-H Resch. Labs., Inc., Oakland, Cal. p 442,443,447
Exact Elctrns., Inc., Hillsboro, Ore. p 466
Gibbs Mfg. & Resch., Janesville, Wisc.
Hewlett-Packard, Palo Alto, Cal.
Hickok Elect. Instr., Cleveland, Ohio
Hughes Aircraft Co., Mos Div., Newport Beach, Cal.
Icon Corp., Cambridge, Mass.
Interstate Elctrns. Corp., Anaheim, Cal. p 499
Kay Elemetrics, Pine Brook, N.J. p 504,505,509
Kilovolt Corp., Hackensack, N.J.
Krohn-Hite, Cambridge, Mass. ..... p 512
Ledex, Inc., Dayton, Ohio
Light Elec. Corp., Rancocas, N.J.
Lorch-Adret Corp., Englewood, N.J.
Microwave Cavity Labs., La Grange, Ill. p 611
Polarad Elctrn. Instrs., Lake Success, N.Y. .....p 538,539
Precision Timer, Westbrook, Conn.
Solid State Elctrns., Sepulveda, Cal.
SRC Div., Newport Bch., Cal. ..p 560,561
Systron-Donner Corp., Concord, Cal. p 564
Systron-Donner Concord Instr. Div., Concord, Cal. ..... p 564
Systron-Donner Datapulse Div., Culver City, Cal. ..... p 564
Systron Donner Trygon Elctrns. Sub., Roosevelt, N.Y. ..... p 564
Tektronix, Inc., Beaverton, Ore.
Veeder-Root, Hartford, Conn.
Vega Precision Labs., Vienna, Va. p 614
Venus Scientific, Farmingdale, N.Y. p 945
Watkins Johnson Co., Palo Alto, Cal.
Abtronics, Inc., Livermore, Calif.
Adar Assocs., Cambridge, Mass.
Allis-Chalmers, Milwaukee, Wisc.
Allis, Louis Co., Milwaukee, Wisc.
Anritsu Electric Co., Ltd., Tokyo, Japan
Avtron Mfg., Inc., Cleveland, Ohio
BAC Elctrns., Pennsauken, N.J.
BECO Solid State Systems, Salem, Va.
Berkeley Nucleonics Corp., Berkeley, Calif.
Bertan Assocs., Inc., Plainview, N.Y.
Broadview Inds. Corp., Hempstead, N.Y.
Clifton Div., Clifton Hgts., Pa.
Collins Radio Co., Dallas, Tex.
Computer Meas., Gardena, Cal.
Computer Test Corp., Cherry Hill, N.J.
Data Dynamics Div., Englewood, N.J.
Dataprobe, Inc., So. Hackensack, N.J.
Digiac Corp., Plainview, N.Y.
Dumont Oscilloscope Labs., Inc., W. Caldwell, N.J.
Dynamics Resch. Corp., Wilmington, Mass.
Eberline Instr. Corp., Santa Fe, N.M.
Elctrn. Enterprises, Pasadena, Calif.
Energy Systems, Palo Alto, Cal.
Entron Inc., Morganville, N.J.
Foster & Allen, Inc., Chatham, N.J.
G-V Controls, Livingston, N.J.
General Microwave Corp., Farmingdale, N.Y.
General Radio Co., Concord, Mass.
Gralex Inds., Inc., Farmingdale, N.Y.
Houston Magnetics Corp., Houston, Tex
Hughes Aircraft Co, Culver City, Cal.
ILC, Inc., Sunnyvale, Calif.
IMC Magnetics Corp., Maywood, Cal.
Instr. Resch. Co., Lincoln, Mass.
KDI Adtrol, Inc., Broomall, Pa.
Kelk, George Ltd., Don Mills, Ont., Canada
LAD Electro-Sys., Inc., Hicksville, N.Y.
Lasermetrics, Inc., Rochelle Park, N.J.
Lear Siegler, Inc., Santa Monica, Calif.
Lear Siegler, Anaheim, Cal.
Ling Elctrns., Anaheim, Calif.
Litton Inds., San Carlos, Calif.
Maxwell Labs., Inc., San Diego, Calif.
Metrological Data Corp., Garfield, N.J.
Microdot Inc., S. Pasadena, Calif.
Nanosecond Systems, Inc., Fairfield, Conn.
Non-Linear Sys., Inc., Del Mar, Cal.
Northeast Elctrns. Corp., Concord, N.H.
Novatronics, Inc., Pompano Beach, Fla.
Pek, Inc., Sunnyvale, Calif.
Philips Elctrn. Instrs., Mt. Vernon, N.Y.
Philips Elctrns. Inds., Ltd., Toronto 17, Can.
Servo Dev. Corp., Hicksville, N.Y.
Singer - Tele-Signal, Woodbury, N.Y.
Spencer-Kennedy Labs., Inc., Winchester, Mass.
Stark Elctrn. Instrs., Ltd., Ajax, Ont., Canada
Tau-Tron, Inc., Lowell, Mass.
Teledyne Gurley, Troy, N.Y.
Texas Instruments, Inc., Houston, Tex.
U.S. Scientific Instrs., Watertown, Mass.
Velonex, Santa Clara, Calif.
Weston-Transicoil, Worcester, Pa.
Winslow Tele-Tronics, Inc., Eatontown, N.J.

Generators, R-F

Accutronics, Inc., Geneva, Ill.
Applied Microwave Lab., Andover, Mass. ..... p 599
Cober Elctrns., Inc., Stamford, Conn. p 600
Electro/Data, Inc., Garland, Tex. p 1559
Gibbs Mfg. & Resch., Janesville, Wisc.
Hewlett-Packard, Palo Alto, Cal.
Hickok Elect. Instr., Cleveland, Ohio
Honeywell, Denver, Colo.
Instrs. For Ind., Inc., Farmingdale, N.Y.
Kay Elemetrics, Pine Brook, N.J. p 504-507,509
LogiMetrics, Greenvale, N.Y. ..... p 514
London Co., Cleveland, Ohio ..... p 516
Lorch-Adret Corp., Englewood, N.J.
Marconi Instrs., Englewood, N.J... p 519
Microdot Inc., City of Industry, Cal. p 522
Microwave Cavity Labs., La Grange, Ill. p 611
Polarad Elctrn. Instrs., Lake Success, N.Y.
RCA Elctrns. Comps., Harrison, N.J. p 551
RF Communications, Rochester, N.Y. p 553
Singer Instrumentation Los Angeles Oper., Los Angeles, Cal. ..... p 562
Singer Instrumentation Palo Alto Oper., Palo Alto, Cal. ..... p 562
Tektronix, Inc., Beaverton, Ore.
Texscan Corp., Indianapolis, Ind. p 578
Wavetek, San Diego, Cal. .....p 583,585
Aerospace Resch. Inc., Boston, Mass.
AIL, Div. Cutler-Hammer, Inc., Deer Park, N.Y.
Ajax Magnethermic Corp., Warren, Ohio
AMBAC Inds., Garden City, N.Y.
Anritsu Electric Co., Ltd., Tokyo, Japan
Astro Comm. Lab., Gaithersburg, Md.
Bertan Assocs., Inc., Plainview, N.Y.
BF Elctrns., Solana Beach, Calif.
B.H. Inds., Los Angeles, Cal.
Buck Engrg. Co., Farmingdale, N.J.
CCA Elctrns. Corp., Gloucester, N.J.
Clemens Mfg. Co., St. Louis, Mo.
Collins Radio Co., Dallas, Tex.
Cooke Vacuum Prods., S. Norwalk, Conn.
Cycle-Dyne, Inc., Jamaica, N.Y.
Dynascan Corp., Chicago, Ill.
Edison Elctrns. Div., Manchester, N.H.
Eico Electronic Instrument Co., Inc., Brooklyn, N.Y.
Elctrn. Resources Div., Los Angeles, Cal.
Engineering Assocs., Dayton, Ohio
Feco, Cleveland, Ohio
General Microwave Corp., Farmingdale, N.Y.
General Radio Co., Concord, Mass.
Granville-Phillips Co., Boulder, Colo.
Heath Co., Benton Harbor, Mich.
Hughes Aircraft Co, Culver City, Cal.
Jerrold/Watkins Div., Toronto, 395, Ont., Can.
Leader Instr. Corp., Long Island City, N.Y.
Litton Inds., San Carlos, Calif.
Mann-Russell Elctrns., Inc., Tacoma, Wash.
Micro-Power, Inc., Long Island City, N.Y.
Microwave Assocs., Inc., Burlington, Mass.
Optimation, Inc., Sun Valley, Calif.
Philco-Ford Corp., Washington, D.C.
Radio Resch. Co., Rockaway, N.J.
Reeve Elctrns., Inc., Chicago, Ill.
RF Communications, Inc., Rochester, N.Y.
RFD, Inc., Tampa, Fla.
Robicon Corp., Pittsburgh, Pa
Robotron Corp., Detroit, Mich.
Rohde & Schwarz Sls., Passaic, N.J.
Scintillonics, Inc., Ft. Collins, Colo.
Servo Corp. America, Hicksville, N.Y.
Siemens Corp., Comps. Div., Iselin, N.J.
Special Microwave Devices Oper., Waltham, Mass.
Stark Elctrn. Instrs., Ltd., Ajax, Ont., Canada
Taylor-Winfield Corp., Warren, Ohio
Tel-Instr. Elctrns. Corp., Carlstadt, N.J.
Telonic Inds., Inc., Laguna Beach, Calif.
Varian Assocs., Beverly, Mass.
Varian, Beverly, Mass.
Wand Elctrns., Inc., Old Bethpage, N.Y.
Wandel & Goltermann, E. Hanover, N.J.
Westinghouse Elec., Sykesville, Md.
Westinghouse Elec. Corp., Pittsburgh, Pa.
Weston Instrs. Div., Hatboro, Pa
Wiltron Co., Palo Alto, Calif.
Winslow Tele-Tronics, Inc., Eatontown, N.J.

Generators, Sawtooth

Accutronics, Inc., Geneva, Ill.
Beta Instr., Newton Upper Falls, Mass. p 337
CELCO, Mahwah, N.J. ..... p 339
Chronetics, Inc., Mt. Vernon, N.Y.
Exact Elctrns., Inc., Hillsboro, Ore. p 466
Gibbs Mfg. & Resch., Janesville, Wisc.
Hewlett-Packard, Palo Alto, Cal.
Ind'l. Control Co., Farmingdale, N.Y. p 1873
Interstate Elctrns. Corp., Anaheim, Cal. p 499
Kay Elemetrics, Pine Brook, N.J... p 504
Krohn-Hite, Cambridge, Mass. ..... p 512
Lorch-Adret Corp., Englewood, N.J.
Microdot Inc., City of Industry, Cal. p 522
Polarad Elctrn. Instrs., Lake Success, N.Y. .....p 538,539
Singer Instrumentation Palo Alto Oper., Palo Alto, Cal.
Tektronix, Inc., Beaverton, Ore.
Wavetek, San Diego, Cal. .....p 583,585
AMBAC Inds., Garden City, N.Y.
BAC Elctrns., Pennsauken, N.J.
Berkeley Nucleonics Corp., Berkeley, Calif.
Edison Elctrns. Div., Manchester, N.H.
Eico Electronic Instrument Co., Inc., Brooklyn, N.Y.
Randam Elctrns., Inc., Cincinnati, Ohio
Telonic Inds., Inc., Laguna Beach, Calif.

Generators, Signal, Standard Type

Accutronics, Inc., Geneva, Ill.
Applied Microwave Lab., Andover, Mass.
Dranetz Engrg. Labs., Plainfield, N.J.
Exact Elctrns., Inc., Hillsboro, Ore. p 466
Frequency Engrg. Labs., Farmingdale, N.J. ..... p 605
Hewlett-Packard, Palo Alto, Cal.
Hickok Elect. Instr., Cleveland, Ohio
Kay Elemetrics, Pine Brook, N.J... p 504
Krohn-Hite, Cambridge, Mass.
LogiMetrics, Greenvale, N.Y. ..... p 514
Marconi Instrs., Englewood, N.J... p 519
Meloy Laboratories, Springfield, Va.
Microdot Inc., City of Industry, Cal. p 522
Polarad Elctrn. Instrs., Lake Success, N.Y.
Reeves-Hoffman Div., Carlisle, Pa.
RF Communications, Rochester, N.Y. p 553
Tektronix, Inc., Beaverton, Ore.
Texscan Corp., Indianapolis, Ind. p 578
Anritsu Electric Co., Ltd., Tokyo, Japan
B & K Instrs., Inc., Cleveland, Ohio
BAC Elctrns., Pennsauken, N.J.
Clemens Mfg. Co., St. Louis, Mo.
Collins Radio Co., Dallas, Tex.
Data Dynamics Div., Englewood, N.J.
Dynamic Precision Controls, Hagerstown, Ind.
Dynascan Corp., Chicago, Ill.
Edison Elctrns. Div., Manchester, N.H.
Eico Electronic Instrument Co., Inc., Brooklyn, N.Y.
Engineering Assocs., Dayton, Ohio
Franel Corp., So. River, N.J.
General Radio Co., Concord, Mass.
Heath Co., Benton Harbor, Mich.
Hughes Aircraft Co, Culver City, Cal.
Jackson Elec. Instr. Co., Mineola, N.Y.
Leader Instr. Corp., Long Island City, N.Y.
Levell Electronics Ltd., High Barnet, Herts,, England
Mercury Elctrns. Corp., Mineola, N.Y.
New London Instr. Co., Inc., New London, Conn.
Optimation, Inc., Sun Valley, Calif.
Pace Div., Harbor City, Calif.
Philips Elctrn. Instrs., Mt. Vernon, N.Y.
Premier Microwave, Port Chester, N.Y.
Radio Resch. Co., Rockaway, N.J.
RCA Corp., Camden, N.J.
Rohde & Schwarz Sls., Passaic, N.J.
Siemens Corp., Comm. Eq. Div., Iselin, N.J.
Singer - Tele-Signal, Woodbury, N.Y.
Stark Elctrn. Instrs., Ltd., Ajax, Ont., Canada
Struthers Elctrns. Corp., Mamaroneck, N.Y.
Tracor, Inc., Austin, Tex.
Viewlex, Holbrook, N.Y.
Weston Instrs. Div., Hatboro, Pa

Generators, Sine-Wave

Accutronics, Inc., Geneva, Ill.
Behlman Div., San Diego, Cal
Bulova Watch Co., Freq. Control Prods., Elctrns. Div., Woodside, N.Y.
Clarke - Hess, New York, N.Y. ..... p 426
Connor-Winfield Corp., Winfield, Ill.
Dranetz Engrg. Labs., Plainfield, N.J.
Elgar Corp., San Diego, Cal.
Elin Div., San Diego, Cal.
Exact Elctrns., Inc., Hillsboro, Ore. p 466
Fork Standards, W. Chicago, Ill. .. p 718
Frequency Control, Inc., Austin, Tex.
Frequency Elctrns., New Hyde Pk., N.Y.
General Magnetics, Bloomfield, N.J. p 1319
Gibbs Mfg. & Resch., Janesville, Wisc.
Hewlett-Packard, Palo Alto, Cal.
Hickok Elect. Instr., Cleveland, Ohio
Ind'l. Test Equip., Port Washington, N.Y.
Interstate Elctrns. Corp., Anaheim, Cal. p 499
Ithaco, Inc., Ithaca, N.Y.
Krohn-Hite, Cambridge, Mass. ..... p 512
LogiMetrics, Greenvale, N.Y. ..... p 514
Lorch-Adret Corp., Englewood, N.J.
Marconi Instrs., Englewood, N.J... p 520
Meloy Laboratories, Springfield, Va.
Microdot Inc., City of Industry, Cal. p 522
Monsanto Company, Electronic Instruments, W. Caldwell, N.J.
Polarad Elctrn. Instrs., Lake Success, N.Y. .....p 538,539
Preston Scientific, Anaheim, Cal.
RCA Elctrns. Comps., Harrison, N.J. p 551
RF Communications, Rochester, N.Y. p 553
Spectrum Technology, Goleta, Cal.
Tektronix, Inc., Beaverton, Ore.
Wavetek, San Diego, Cal. .....p 583,585
AMBAC Inds., Garden City, N.Y.
Anritsu Electric Co., Ltd., Tokyo, Japan
B & K Instrs., Inc., Cleveland, Ohio
BAC Elctrns., Pennsauken, N.J.
Bowmar/Ali, Inc., Acton, Mass.
Buck Engrg. Co., Farmingdale, N.J.
Burr-Brown Resch. Corp., Tucson, Ariz.
California Instrs. Co., San Diego, Cal.
Collins Radio Co., Dallas, Tex.
Dynamic Precision Controls, Hagerstown, Ind.
Dynascan Corp., Chicago, Ill.
Eico Electronic Instrument Co., Inc., Brooklyn, N.Y.
Electric Indicator Co., Inc., Wilton, Conn.
Feedback, Inc., Berkeley Hghts., N.J.
General Radio Co., Concord, Mass.
Heath Co., Benton Harbor, Mich.
Holt Instr. Labs., Oconto, Wisc.
Hope Elctrns., Clifton, N.J.
Kato Engrg. Co., Mankato, Minn.
Kikusui Elctrns. Corp., Kawasaki City, Kanagawa-Pref., Japan
Lab Electro-Acoustique, 92-Rueil, Malmaison, France
Leader Instr. Corp., Long Island City, N.Y.
Levell Electronics Ltd., High Barnet, Herts,, England
Muirhead, Inc., Mountainside, N.J.
NH Research, Inc., Santa Ana, Calif.
Northeast Elctrns. Corp., Concord, N.H.
Optimation, Inc., Sun Valley, Calif.

Philips Elctrn. Instrs., Mt. Vernon, N.Y.
Riverbank Labs., Geneva, Ill.
Rohde & Schwarz Sls., Passaic, N.J.
Siemens Corp., Comps. Div., Iselin, N.J.
Singer - Tele-Signal, Woodbury, N.Y.
Solar Elctrns. Co., Hollywood, Calif.
Spectral Dynamics Corp. San Diego, San Diego, Cal.
Stark Elctrn. Instrs., Ltd., Ajax, Ont., Canada
Teledyne Inet, Gardena, Cal.
Telonic Inds., Inc., Laguna Beach, Calif.
Transystems Elctrn. Co., Fort Lee, N.J.
Trepac Corp. America, Englewood, N.J.
Waveforms, No. Hollywood, Cal.
Weston Instruments, Inc., Newark, N.J.
Weston Instrs. Div., Hatboro, Pa

Generators, Single-Sideband

RF Communications, Rochester, N.Y.
AMBAC Inds., Garden City, N.Y.
CCA Elctrns. Corp., Gloucester, N.J.
Collins Radio Co., Dallas, Tex.
Hughes Aircraft Co, Culver City, Cal.
ITT Mackay Marine, Clark, N.J.
Micro-Tel Corp., Baltimore, Md.
Microwave Development Labs., Inc., Needham Hgts., Mass.
Premier Microwave, Port Chester, N.Y.
Radio Resch. Co., Rockaway, N.J.
RF Communications, Inc., Rochester, N.Y.
Spectral Dynamics Corp. San Diego, San Diego, Cal.
Technical Mat'l., Mamaroneck, N.Y.
Victor Microwave, Inc., Wakefield, Mass.
Weston Instrs. Div., Hatboro, Pa

Generators, Spectrum—See Generators, Sweep

Generators, Square-Wave

Accutronics, Inc., Geneva, Ill.
Bulova Watch Co., Freq. Control Prods., Elctrns. Div., Woodside, N.Y.
Chronetics, Inc., Mt. Vernon, N.Y.
Clarke - Hess, New York, N.Y. ..... p 426
Exact Elctrns., Inc., Hillsboro, Ore.p 466
Fork Standards, W. Chicago, Ill.
Frequency Control, Inc., Austin, Tex.
Frequency Elctrns., New Hyde Pk., N.Y.
Gibbs Mfg. & Resch., Janesville, Wisc.
Hewlett-Packard, Palo Alto, Cal.
Interstate Elctrns. Corp., Anaheim, Cal. p 499
Krohn-Hite, Cambridge, Mass. ..... p 512
Lorch-Adret Corp., Englewood, N.J.
Microdot Inc., City of Industry, Cal. p 522
Monsanto Company, Electronic Instruments, W. Caldwell, N.J.
RCA Elctrns. Comps., Harrison, N.J. p 551
Spectrum Technology, Goleta, Cal.
Tektronix, Inc., Beaverton, Ore.
Wavetek, San Diego, Cal. .....p 583,585
Weinschel Engrg. Co., Gaithersburg, Md.
Adar Assocs., Cambridge, Mass.
AMBAC Inds., Garden City, N.Y.
BAC Elctrns., Pennsauken, N.J.
Bicron Elctrns. Co., Canaan, Conn.
Broadview Inds. Corp., Hempstead, N.Y.
Buck Engrg. Co., Farmingdale, N.J.
Digiac Corp., Plainview, N.Y.
Dynascan Corp., Chicago, Ill.
General Radio Co., Concord, Mass.
Heath Co., Benton Harbor, Mich.
Kikusui Elctrns. Corp., Kawasaki City, Kanagawa-Pref., Japan
Leader Instr. Corp., Long Island City, N.Y.
Levell Electronics Ltd., High Barnet, Herts,, England
Optimation, Inc., Sun Valley, Calif.
Philips Elctrn. Instrs., Mt. Vernon, N.Y.
Randam Elctrns., Inc., Cincinnati, Ohio
Seven Assocs., Sunnyvale, Calif.
Solar Elctrns. Co., Hollywood, Calif.
Spectral Dynamics Corp. San Diego, San Diego, Cal.
Telonic Inds., Inc., Laguna Beach, Calif.
Testex Inc., Sunnyvale, Cal.
Velonex, Santa Clara, Calif.
Waveforms, No. Hollywood, Cal.
Weston Instrs. Div., Hatboro, Pa

Generators, Sweep

Accutronics, Inc., Geneva, Ill.
CELCO, Mahwah, N.J. ..... p 339
Clarke - Hess, New York, N.Y. ..... p 426
Electro/Data, Inc., Garland, Tex.
Exact Elctrns., Inc., Hillsboro, Ore.p 466
Hewlett-Packard, Palo Alto, Cal.
Hickok Elect. Instr., Cleveland, Ohio
Ind'l. Control Co., Farmingdale, N.Y.
Instrs. For Ind., Inc., Farmingdale, N.Y.
Interstate Elctrns. Corp., Anaheim, Cal.
Kay Elemetrics, Pine Brook, N.J. p 504-506
Kepco, Inc., Flushing, N.Y.
Krohn-Hite, Cambridge, Mass.
Lorch-Adret Corp., Englewood, N.J.
Marconi Instrs., Englewood, N.J. p 519,520
Microdot Inc., City of Industry, Cal.
Millen, James Mfg., Malden, Mass.
Nelson Ross Elctrns., Lake Success, N.Y. ..... p 536
RCA Elctrns. Comps., Harrison, N.J.
RF Communications, Rochester, N.Y. p 553
Singer Instrumentation Los Angeles Oper., Los Angeles, Cal. ..... p 562
Singer Instrumentation Palo Alto Oper., Palo Alto, Cal. ..... p 562
Systron-Donner Corp., Concord, Cal. p 564,565
Systron-Donner Alpha Div., Oakland, Cal. ..... p 565
Systron-Donner Concord Instr. Div., Concord, Cal. .....p 564,565
Systron-Donner Datapulse Div., Culver City, Cal. ..... p 564
Systron-Donner Kruse Elctrns. Sub., Mountain View, Cal. ..... p 565
Systron Donner Trygon Elctrns. Sub., Roosevelt, N.Y. ..... p 564
Texscan Corp., Indianapolis, Ind. p 578
Wavetek, San Diego, Cal. .....p 583-585
Anritsu Electric Co., Ltd., Tokyo, Japan
Barry Resch. Corp., Palo Alto, Cal.
Blonder-Tongue Labs., Inc., Old Bridge, N.J.
Dynascan Corp., Chicago, Ill.
Eico Electronic Instrument Co., Inc., Brooklyn, N.Y.
Hope Elctrns., Clifton, N.J.
Hughes Aircraft Co., Torrance, Cal.
Jackson Elec. Instr. Co., Mineola, N.Y.
Jerrold Elctrns. Corp., Philadelphia, Pa.
Jerrold/Watkins Div., Toronto, 395, Ont., Can.
Kikusui Elctrns. Corp., Kawasaki City, Kanagawa-Pref., Japan
Leader Instr. Corp., Long Island City, N.Y.
Matsushita Comm. Ind'l. Co., Ltd., Yokohama, Japan
Micro-Now Instr., Chicago, Ill.
Micro-Power, Inc., Long Island City, N.Y.
Narda Microwave Corp., Plainview, N.Y.
Oxford Instr. Corp., Annapolis, Md.
Philips Elctrn. Instrs., Mt. Vernon, N.Y.
Radio Resch. Co., Rockaway, N.J.
Rohde & Schwarz Sls., Passaic, N.J.
Servo Corp. America, Hicksville, N.Y.
Siemens Corp., Comps. Div., Iselin, N.J.
Siemens Corp., Comm. Eq. Div., Iselin, N.J.
Solar Elctrns. Co., Hollywood, Calif.
Spectral Dynamics Corp. San Diego, San Diego, Cal.
Stark Elctrn. Instrs., Ltd., Ajax, Ont., Canada
Systems Resch. Labs., Dayton, Ohio
Tel-Instr. Elctrns. Corp., Carlstadt, N.J.
Telonic Inds., Inc., Laguna Beach, Calif.
Waveforms, No. Hollywood, Cal.
Wiltron Co., Palo Alto, Calif.

Generators, Thermoelectric—See Vol 2

Generators, Time Code

Chrono-log Corp., Broomall, Pa. .. p 340
Datacom, Inc., Ft. Walton Bch., Fla.
Dranetz Engrg. Labs., Plainfield, N.J.
Dynamics Instr. Co., Monterey Pk., Cal.
Elctrn. Engrg. Co. Cal., Santa Ana, Cal.
Exact Elctrns., Inc., Hillsboro, Ore.
Geo Space Sys., Tampa, Fla. ..... p 350
Haydon, A. W. Co., Waterbury, Conn. p 1597
Hughes Aircraft Co., Mos Div., Newport Beach, Cal.
LVC Ind's., Inc., Corona, N.Y.
Metric Sys., Ft. Walton Beach, Fla.p 358
Parabam, Inc., Compton, Cal.
Precision Timer, Westbrook, Conn.
Systron-Donner Corp., Concord, Cal. p 564
Systron-Donner Concord Instr. Div., Concord, Cal. ..... p 564
Systron-Donner Datapulse Div., Culver City, Cal. ..... p 564
Systron Donner Trygon Elctrns. Sub., Roosevelt, N.Y. ..... p 564
Tempo/UTI Div., Chatsworth, Cal.
Vega Precision Labs., Vienna, Va. p 614
Analogic, Wakefield, Mass.
Anritsu Electric Co., Ltd., Tokyo, Japan
Bicron Elctrns. Co., Canaan, Conn.
CGS/Datametrics, Watertown, Mass.
Collins Radio Co., Dallas, Tex.
Conductron Corp., St. Charles, Mo.
Data Dynamics Div., Englewood, N.J.
Datatron, Inc., Santa Ana, Cal
Gulton Inds., Albuquerque, N.M.
HRB-Singer, Inc., State College, Pa.
KDI Adtrol, Inc., Broomall, Pa.
Neutronic Corp., Bridgeton, Mo.
Philips Elctrns. Inds., Ltd., Toronto 17, Can.
Red Lake Labs, Inc., Santa Clara, Calif.
Sprengnether, W.F. Instr. Co., Inc., St. Louis, Mo.
Taft Electrosystems, Inc., Metuchen, N. J.
Timing Sys., Inc., Marblehead, Mass.
Transystems Elctrn. Co., Fort Lee, N.J.

Generators, Time Delay

Atec, Inc., Houston, Tex.
Austron, Inc., Austin, Tex.
Autronics Corp., Pasadena, Calif.
Chronetics, Inc., Mt. Vernon, N.Y.
Dranetz Engrg. Labs., Plainfield, N.J. p 434
Eldorado Electrodata, Concord, Cal. p 449
Exact Elctrns., Inc., Hillsboro, Ore.
Fork Standards, W. Chicago, Ill.
Haydon, A. W. Co., Waterbury, Conn.
Hewlett-Packard, Palo Alto, Cal.
Hughes Aircraft Co., Mos Div., Newport Beach, Cal.
Meloy Laboratories, Springfield, Va.
Metric Sys., Ft. Walton Beach, Fla.p 358
Precision Timer, Westbrook, Conn.
Solid State Elctrns., Sepulveda, Cal.
Systron-Donner Concord Instr. Div., Concord, Cal.
Systron-Donner Datapulse Div., Culver City, Cal.
Tektronix, Inc., Beaverton, Ore.
Tempo/UTI Div., Chatsworth, Cal.
Vega Precision Labs., Vienna, Va.
Abtronics, Inc., Livermore, Calif.
Aerospace Resch. Inc., Boston, Mass.
Audio Instr. Co., Union City, N.J.
Collins Radio Co., Dallas, Tex.
Conrac Corp., New York, N.Y.
Control Logic, Natick, Mass.
Controlcraft Corp., West Chicago, Ill.
Data Dynamics Div., Englewood, N.J.
De-Tec-Tronic Corp., Chicago, Ill.
Instrumentation Tech. Corp., Northridge, Calif.
Philips Elctrns. Inds., Ltd., Toronto 17, Can.
Techmetric Co., Redwood City, Calif.
Tempo Instr., Plainview, N.Y.
Timing Sys., Inc., Marblehead, Mass.
Transystems Elctrn. Co., Fort Lee, N.J.
TRW Instrs., El Segundo, Cal.

Generators, Time Delay & Gate

Anadex Instrs., Inc., Van Nuys, Calif.
Atec, Inc., Houston, Tex.
Austron, Inc., Austin, Tex.
Autronics Corp., Pasadena, Calif.
Chronetics, Inc., Mt. Vernon, N.Y.
Dranetz Engrg. Labs., Plainfield, N.J. p 434
Exact Elctrns., Inc., Hillsboro, Ore.
Haydon, A. W. Co., Waterbury, Conn. p 1597
Hewlett-Packard, Palo Alto, Cal.
Hughes Aircraft Co., Mos Div., Newport Beach, Cal.
Meloy Laboratories, Springfield, Va.
Metric Sys., Ft. Walton Beach, Fla.p 358
Precision Timer, Westbrook, Conn.
Solid State Elctrns., Sepulveda, Cal.
Systron-Donner Concord Instr. Div., Concord, Cal.
Tempo/UTI Div., Chatsworth, Cal.
Venus Scientific, Farmingdale, N.Y.
Aerospace Resch. Inc., Boston, Mass.
Berkeley Nucleonics Corp., Berkeley, Calif.
Collins Radio Co., Dallas, Tex.
Control Logic, Natick, Mass.
Controlcraft Corp., West Chicago, Ill.
Data Dynamics Div., Englewood, N.J.
De-Tec-Tronic Corp., Chicago, Ill.
Instrumentation Tech. Corp., Northridge, Calif.
Nanosecond Systems, Inc., Fairfield, Conn.
Philips Elctrns. Inds., Ltd., Toronto 17, Can.
Trepac Corp. America, Englewood, N.J.
TRW Instrs., El Segundo, Cal.

Generators, Timing, Digital

Accutronics, Inc., Geneva, Ill..... p 1353
Anadex Instrs., Inc., Van Nuys, Calif.
Atec, Inc., Houston, Tex.
Austron, Inc., Austin, Tex.
Automated Meas., Oakland, Calif. p 446
Automation Dev., Culver City, Cal.
Autronics Corp., Pasadena, Calif.
Chrono-log Corp., Broomall, Pa. .. p 340
Connor-Winfield Corp., Winfield, Ill.
Datacom, Inc., Ft. Walton Bch., Fla.
Dranetz Engrg. Labs., Plainfield, N.J. p 434
Dytro Corp., Hicksville, N.Y.
E-H Resch. Labs., Inc., Oakland, Cal. p 446
Eldorado Electrodata, Concord, Cal. p 449
Exact Elctrns., Inc., Hillsboro, Ore.
Ferwalt, W.H., Inc., Lapwai, Idaho
Fork Standards, W. Chicago, Ill.
Geo Space Sys., Tampa, Fla. ..... p 350
Gibbs Mfg. & Resch., Janesville, Wisc.
Haydon, A. W. Co., Waterbury, Conn.
Hughes Aircraft Co., Mos Div., Newport Beach, Cal.
Meloy Laboratories, Springfield, Va.
Metric Sys., Ft. Walton Beach, Fla.p 358
Parabam, Inc., Compton, Cal. ..... p 371
PPM, Inc., Bedford, Ohio ..... p 535
Precision Timer, Westbrook, Conn.
RF Communications, Rochester, N.Y.
Spectrum Technology, Goleta, Cal. p 1429
SRC Div., Newport Bch., Cal. ..p 560,561
Systron-Donner Corp., Concord, Cal. p 564
Systron-Donner Concord Instr. Div., Concord, Cal. ..... p 564
Systron-Donner Datapulse Div., Culver City, Cal. ..... p 564
Systron Donner Trygon Elctrns. Sub., Roosevelt, N.Y. ..... p 564
Tempo/UTI Div., Chatsworth, Cal.
Adar Assocs., Cambridge, Mass.
Aerospace Resch. Inc., Boston, Mass.
Allis, Louis Co., Milwaukee, Wisc.
Analogic, Wakefield, Mass.
Avtron Mfg., Inc., Cleveland, Ohio
Berkeley Nucleonics Corp., Berkeley, Calif.
Cal-Power Corp., El Segundo, Calif.
Collins Radio Co., Dallas, Tex.
Conductron Corp., St. Charles, Mo.
Control Logic, Natick, Mass.
Controlcraft Corp., West Chicago, Ill.
Cooke Engrg. Co., Alexandria, Va.
Data Dynamics Div., Englewood, N.J.
Datatron, Inc., Santa Ana, Cal
Digiac Corp., Plainview, N.Y.
Fairchild Space & Defense Sys., Syosset, N.Y.
Hughes Aircraft Co, Culver City, Cal.
Instrumentation Tech. Corp., Northridge, Calif.
KDI Adtrol, Inc., Broomall, Pa.
Philips Elctrns. Inds., Ltd., Toronto 17, Can.
Singer - Tele-Signal, Woodbury, N.Y.
Sprengnether, W.F. Instr. Co., Inc., St. Louis, Mo.
Tau-Tron, Inc., Lowell, Mass.
Techmetric Co., Redwood City, Calif.
Tempo Instr., Plainview, N.Y.

Testex Inc., Sunnyvale, Cal.
Timing Sys., Inc., Marblehead, Mass.
Transystems Elctrn. Co., Fort Lee, N.J.
Zehntel, Inc., Berkeley, Calif.

Generators, Tone

Accutronics, Inc., Geneva, Ill.
Austron, Inc., Austin, Tex.
Autronics Corp., Pasadena, Calif.
Bramco Controls, Piqua, Ohio .... p 1406
Bulova Watch Co., Freq. Control Prods., Elctrns. Div., Woodside, N.Y.
Connor-Winfield Corp., Winfield, Ill.
Dranetz Engrg. Labs., Plainfield, N.J.
Dynamics Instr. Co., Monterey Pk., Cal.
Exact Elctrns., Inc., Hillsboro, Ore.
Fork Standards, W. Chicago, Ill.
Frequency Control, Inc., Austin, Tex.
Meloy Laboratories, Springfield, Va.
Microdot Inc., City of Industry, Cal.
Multitech Data Prods., Monterey Pk., Cal.
Philamon, Inc., Westbury, N.Y. .... p 1424
Solid State Elctrns., Sepulveda, Cal.
Systron-Donner Datapulse Div., Culver City, Cal.
Wavetek, San Diego, Cal.
Armec Corp., Huntington Sta., N.Y.
Collins Radio Co., Dallas, Tex.
Electrocom Inds., So. Bend, Indiana
HB Engrg. Corp., Silver Spring, Md.
Mobil Elctrns., Inc., Anderson, Ind.
Nelson-Hershfield Elctrns., Phoenix, Ariz.
Northeast Elctrns. Corp., Concord, N.H.
Ramsay Engrg. Co., Anaheim, Calif.
Singer - Tele-Signal, Woodbury, N.Y.
Technical Mat'l., Mamaroneck, N.Y.
Tempo Instr., Plainview, N.Y.
Trepac Corp. America, Englewood, N.J.
Warren Communications, Littleton, Mass.

Generators, Tone-Burst

Austron, Inc., Austin, Tex.
Clarke - Hess, New York, N.Y. ..... p 426
Dranetz Engrg. Labs., Plainfield, N.J. p 434
Exact Elctrns., Inc., Hillsboro, Ore. p 466
Fork Standards, W. Chicago, Ill.
Interstate Elctrns. Corp., Anaheim, Cal.
Microdot Inc., City of Industry, Cal.
RF Communications, Rochester, N.Y.
Systron-Donner Datapulse Div., Culver City, Cal.
Wavetek, San Diego, Cal.
Aerospace Resch. Inc., Boston, Mass.
Bicron Elctrns. Co., Canaan, Conn.
Cohu Elctrns., Inc., San Diego, Calif.
Feedback, Inc., Berkeley Hghts., N.J.
General Radio Co., Concord, Mass.

Generators, TV Signal

Accutronics, Inc., Geneva, Ill.
C-COR Elctrns., State College, Pa.
Hickok Elect. Instr., Cleveland, Ohio
Kay Elemetrics, Pine Brook, N.J... p 506
Tektronix, Inc., Beaverton, Ore.
Wavetek, San Diego, Cal.
Anritsu Electric Co., Ltd., Tokyo, Japan
Cohu Elctrns., Inc., San Diego, Calif.
Colorado Video, Inc., Boulder, Colo.
Consolidated Resistance Sls., Yonkers, N.Y.
Dynascan Corp., Chicago, Ill.
General Electrodynamics Corp., Garland, Tex.
Leader Instr. Corp., Long Island City, N.Y.
Lear Siegler, Inc., Santa Monica, Calif.
RCA Corp., Camden, N.J.
Rohde & Schwarz Sls., Passaic, N.J.
Spencer-Kennedy Labs., Inc., Winchester, Mass.
Stark Elctrn. Instrs., Ltd., Ajax, Ont., Canada
Tel-Instr. Elctrns. Corp., Carlstadt, N.J.
Telonic Inds., Inc., Laguna Beach, Calif.
Visual Elctrns. Corp., New York, N.Y.

Generators, TV Synch

Austron, Inc., Austin, Tex.
Hughes Aircraft Co., Mos Div., Newport Beach, Cal. ..... p 1541
Tektronix, Inc., Beaverton, Ore.
Cohu Elctrns., Inc., San Diego, Calif.
Colorado Video, Inc., Boulder, Colo.
Concord Elctrns., Los Angeles, Cal.
GBC Closed Circuit TV Corp., New York, N.Y.
General Electrodynamics Corp., Garland, Tex.
Leader Instr. Corp., Long Island City, N.Y.
Lear Siegler, Inc., Santa Monica, Calif.
Lear Siegler, Anaheim, Cal.
Link Div., Binghamton, N.Y.
Litton Inds., San Carlos, Calif.
Multi Media Engrg., Inc., Rockville, Md.
RCA Corp., Camden, N.J.
Tel-Instr. Elctrns. Corp., Carlstadt, N.J.
Teletronics, Inc., Orange, Calif.
Visual Educom, Michigan City, Ind.

Generators, UHF(VHF

Applied Microwave Lab., Andover, Mass. ..... p 599
Electro/Data, Inc., Garland, Tex. p 1559
Frequency Engrg. Labs., Farmingdale, N.J. ..... p 604
Hewlett-Packard, Palo Alto, Cal.
Instrs. For Ind., Inc., Farmingdale, N.Y.
Kay Elemetrics, Pine Brook, N.J. p 504-506
LogiMetrics, Greenvale, N.Y. ..... p 515
Marconi Instrs., Englewood, N.J... p 519
Microdot Inc., City of Industry, Cal. p 522
Microwave Cavity Labs., La Grange, Ill. p 611
Polarad Elctrn. Instrs., Lake Success, N.Y. .....p 538,539
RF Communications, Rochester, N.Y. p 553
Texscan Corp., Indianapolis, Ind. p 578
Watkins Johnson Co., Palo Alto, Cal.
Wavetek, San Diego, Cal. ..... p 585
AIL, Div. Cutler-Hammer, Inc., Deer Park, N.Y.
Anritsu Electric Co., Ltd., Tokyo, Japan
Blonder-Tongue Labs., Inc., Old Bridge, N.J.
CCA Elctrns. Corp., Gloucester, N.J.
Collins Radio Co., Dallas, Tex.
Energy Systems, Palo Alto, Cal.
Engineering Assocs., Dayton, Ohio
General Radio Co., Concord, Mass.
Jerrold/Watkins Div., Toronto, 395, Ont., Can.
Leader Instr. Corp., Long Island City, N.Y.
Litton Inds., San Carlos, Calif.
RCA Corp., Camden, N.J.
Rohde & Schwarz Sls., Passaic, N.J.
Scientific Communications, Garland, Tex.
Somerset Radiation Lab., Arlington, Va.
Special Microwave Devices Oper., Waltham, Mass.
Tel-Instr. Elctrns. Corp., Carlstadt, N.J.
Telonic Inds., Inc., Laguna Beach, Calif.
VIKOA, Hoboken, N.J.
Wand Elctrns., Inc., Old Bethpage, N.Y.
Weston Instrs. Div., Hatboro, Pa
Wiltron Co., Palo Alto, Calif.
Zeta Labs., Inc., Mountain View, Calif.

Generators, Ultrasonic

Accutronics, Inc., Geneva, Ill.
CML-Macarr, Inc., Edison, N.J.
Exact Elctrns., Inc., Hillsboro, Ore. p 466
Hewlett-Packard, Palo Alto, Cal.
James Elctrns., Inc., Chicago, Ill.
Kay Elemetrics, Pine Brook, N.J.
Krohn-Hite, Cambridge, Mass.
Microdot Inc., City of Industry, Cal.
Wavetek, San Diego, Cal.
Advanced Patent Technology, Inc., Las Vegas, Nev.
Aperco Co., East Meadow, N.Y.
Arenberg Ultrasonic Lab., Inc., Jamaica Plain, Mass.
Automation Inds., Los Angeles, Cal.
Bendix Corp., Davenport, Iowa
Branson Instruments Co., Stamford, Conn.
Branson Sonic Power, Danbury, Conn
Dynasonics Corp., Pipestone, Minn.
General Radio Co., Concord, Mass.
Inspection Systems, Hawthorne, Calif
Kurz & Root Co., Inc., Appleton, Wisc.
L & R Mfg. Co., Kearny, N.J.
Lewis Corp., Woodbury, Conn.
Linden Labs., Inc., State College, Pa.
Nuclear Equip. Chem. Corp., Farmingdale, N.Y.
Phillips Mfg. Co., Chicago, Ill.
Sara Scientific Co., San Francisco, Calif.
TAC Tech. Instr. Corp., Trenton, N.J.
Telonic Inds., Inc., Laguna Beach, Calif.

Generators, Word

Computer Devices, Commack, N.Y.
Dynamics Instr. Co., Monterey Pk., Cal.
E-H Resch. Labs., Inc., Oakland, Cal.
Exact Elctrns., Inc., Hillsboro, Ore.
Hughes Aircraft Co., Mos Div., Newport Beach, Cal.
LVC Ind's., Inc., Corona, N.Y.
Multitech Data Prods., Monterey Pk., Cal.
SRC Div., Newport Bch., Cal. ..p 560,561
Systron-Donner Datapulse Div., Culver City, Cal.
Adar Assocs., Cambridge, Mass.
Computer Test Corp., Cherry Hill, N.J.
Control Logic, Natick, Mass.
Data Dynamics Div., Englewood, N.J.
Dataprobe, Inc., So. Hackensack, N.J.
Digitech Data Inds., Inc., Ridgefield, Conn.
Instrumentation Tech. Corp., Northridge, Calif.
Kemper Engrg. Co., Northridge, Cal.
Lear Siegler, Inc., Santa Monica, Calif.
Lear Siegler, Anaheim, Cal.
Monitor Sys., Inc., Ft. Washington, Pa.
Non-Linear Sys., Inc., Del Mar, Cal.
Servo Dev. Corp., Hicksville, N.Y.
Signetics Meas/Data, Mountain View, Cal.
Singer - Tele-Signal, Woodbury, N.Y.
Tau-Tron, Inc., Lowell, Mass.
Texas Instruments, Inc., Houston, Tex.
Zehntel, Inc., Berkeley, Calif.

Geophysical Equip.—See Hydrophones; Transducers—Vol 2

Germanium—See Crystals, Semiconductor

Germanium Semiconductors—See Diodes; Transistors—Vol 2

Glass Fibers—See Insulation Materials, Glass Fiber Impregnated—Vol 3

Glass Parts—See Insulation Parts, Glass—Vol 3

Glove Boxes—See Boxes, Glove—Vol 3

Gloves, Protective, Parts Handling
Eberline Instr. Corp., Santa Fe, N.M.
Edmont-Wilson, Coshocton, Ohio
Edmund Scientific Co., Barrington, N.J.
Hecht Rubber Corp., Jacksonville, Fla.
Nuclear Equip. Chem. Corp., Farmingdale, N.Y.
Standard Glove Co. of N.J., Newark, N.J.
Techni-Tool, Inc., Philadelphia, Pa.
Unibraze Corp, White Plains, N.Y.
VWR Scientific, San Francisco, Cal.

Glues—See Adhesives—Vol 3

Gold-Plating Solutions—See Plating Solutions—Vol 3

Goniometers—See Meters,Goniometer

Governors, Centrifugal—See Vol 2

Graphalloy Products—See Vol 3

Graphic Recording Instruments—See Recorders (As Modified)

Graphite Parts—See Vol 3

Greases-Also See Lubricants—See Vol 3

Grilles, Metal(Plastic—See Vol 3

Grilles, Speaker
Premier Metal Prods. Co., Bronx, N.Y.
Acoustone Corp., Brooklyn, N.Y.
Atlas Sound Div., Parsippany, N.J.
Bud Radio, Inc., Willoughby, Ohio
Components Specialties, Inc., Freeport, N.Y.
Era Acoustics Corp., Moonachie, N.J.
Flock Process Corp., S. Norwalk, Conn.
Fourjay Inds., Dayton, Ohio
Mobil Elctrns., Inc., Anderson, Ind.
Nelson-Hershfield Elctrns., Phoenix, Ariz.
Shigoto Inds., Ltd., New York, N.Y.
Taylor Millwork & Stair Co., Inc., Gardena, Cal.
Templet Ind., Inc., Plainview, N.Y.
Utah Elctrns., Huntington, Ind.

Grommets—See Vol 3

Ground Rods—See Rods & Clamps, Ground

Guides, Circuit Board—See Vol 3

Guns, Electron—See Tube Parts—Vol 2

Guns, Electron Beam (For Vacuum Equip.)
Bendix, Rochester, N.Y.
Cooke Vacuum Prods., S. Norwalk, Conn.
Denton Vacuum, Inc., Cherry Hill, N.J.
Electron Technology, Inc., Kearny, N.J.
Energy Sciences Inc., Burlington, Mass.
Kentrox Inds., Inc., Portland, Ore.
Kentucky Elctrns., Owensboro, Ky.
Materials Resch. Corp., Orangeburg, N.Y.
Norton Co., Newton, Mass.
Nuclide Corp., N. Acton, Mass.
Sloan Technology Corp., Santa Barbara, Calif.
Thomson-CSF Electron Tubes, N.Y., N.Y.
Ultek Div., Palo Alto, Calif.
Vacuum Equip. Div., Newton, Mass.
Varian Assocs., Palo Alto, Cal.
Varian Assocs., Radiation Div., Palo Alto, Cal.
Varian Assocs., Vacuum Div., Palo Alto, Cal.

Guns, Soldering—See Soldering, Guns—Vol 3

Gyrators, Microwave—See Vol 2

Gyro Compasses—See Compasses, Electronic Gyro—Vol 2

Gyro Testers—See Testers, Gyro

Gyros, Directional—See Vol 2

Gyros, Displacement—See Vol 2

Gyros, Integrating—See Vol 2

Gyros, Rate—See Vol 2

Hall Effect Devices—See Generators, Hall; Magnetoresistors,Hall; Multipliers, Hall; Probes, Hall—Vol 2

Hammers—See Vol 3

Handles For Cabinets, Circuit Boards, Racks, etc.—See Vol 3

Handsets, Chestsets & Operator Sets
Electrospace Corp., Westbury..... p 323
Action Systems Co., Meriden, Conn.
Adec, Inc., Newark, N.J.
Alcor, Inc., Ithaca, N.Y.
Audiosears Corp., Stamford, N.Y.
Bogen Div., Paramus, N.J.
Continental Elctrns., Brooklyn, N.Y.
Dyna Magnetic Devices, Inc., Hicksville, N.Y.
ISC/Telephonics Div, Huntington, N.Y.
Lynn Elctrns. Corp., Philadelphia, Pa.
Remler Co., San Francisco, Calif.
Roanwell Corp., New York, N.Y.
Roche, Paul C. Co., Inc., New York, N.Y.
Sharpe Audio Div., Tonawanda, N.Y.
Shigoto Inds., Ltd., New York, N.Y.
Shure Bros., Inc., Evanston, Ill.

Stromberg Carlson Corp., Rochester, N.Y.
Telephone Comps., Inc., Northport, N.Y.
Telephone Dynamics Corp., N. Bellmore, N.Y.
Webster Elec. Co., Inc., Racine, Wisc.

Hardness Indicators—See Indicators, Hardness

Hardware, Antenna—See Clamps; Ground Rods; Mounts; etc.

Hardware—See Bolts; Brackets; Clamps; Fasteners; Terminals;etc.—Vol 3

Harmonic Analyzers—See Analyzers, Harmonic

Harnesses, Wire—See Cable Assemblies—Vol 3

Headers, Hermetic—See Seals, Hermetic-Also See Services, Hermetic Sealing—Vol 3

Headers, Relay & Transformer—See Vol 3

Headers, Transistor & Diode—See Vol 3

Headphones & Headsets

Electrospace Corp., Westbury..... p 323
GC Elctrns., Rockford, Ill.
Primo Co., Ltd., Tokyo, Japan
Rye Inds., Inc., Mamaroneck, N.Y. p 2708
Sennheiser Elctrn. Corp., New York, NY
Smith, Herman H., Inc., Bklyn., N.Y.
Trimm, Inc., Libertyville, Ill..... p 2718
Action Systems Co., Meriden, Conn.
Adec, Inc., Newark, N.J.
AKG, New York, N.Y.
Alcor, Inc., Ithaca, N.Y.
Allied Elctrns. Corp., Chicago, Ill.
American Geloso Elctrns., Inc., New York, N.Y.
Astatic Corp., Conneaut, Ohio
Audiosears Corp., Stamford, N.Y.
Audiotronics, N. Hollywood, Cal.
Bogen Div., Paramus, N.J.
Cannon, C.F. Co., Springwater, N.Y.
Clark, David Co., Worcester, Mass.
Components Specialties, Inc., Freeport, N.Y.
Continental Elctrns., Brooklyn, N.Y.
Duotone Co., Inc., S. Miami, Fla.
Dyna Magnetic Devices, Inc., Hicksville, N.Y.
EV/Game, Inc., Freeport, N.Y.
Electro-Voice, Inc., Buchanan, Mich.
Ercona Corp., Bellmore, N.Y.
Fisher Radio, Long Island City, N.Y.
General Elctrn. Labs., Boston, Mass.
Gotham Audio Corp., New York, N.Y.
Heath Co., Benton Harbor, Mich.
ISC/Telephonics Div, Huntington, N.Y.
Jensen Mfg. Div., Chicago, Ill.
Knowles Elctrns., Inc., Franklin Park, Ill.
Koss Elctrns., Inc., Milwaukee, Wisc.
Multi Media Engrg., Inc., Rockville, Md.
Mura Corp., Jericho, N.Y.
Philmore Mfg. Co., Richmond Hill, N.Y.
Pickering & Co., Inc., Plainview, N.Y.
Puritan-Zep, El Segundo, Cal.
R-Columbia Prods., Inc., Highland Park, Ill.
Radioear Corp., Canonsburg, Pa.
RCA Corp., Camden, N.J.
Roanwell Corp., New York, N.Y.
Roberts Div., Los Angeles, Cal.
Rystl Elctrns. Corp., N. Miami Beach, Fla.
Sampson Elctrns. Prods. Div., Chicago, Ill.
Sharpe Audio Div., Tonawanda, N.Y.
Shigoto Inds., Ltd., New York, N.Y.
Stanford Int'l., San Carlos, Cal.
Stanton Magnetics, Inc., Plainview, N.Y.
Superex Elctrns. Corp., Yonkers, N.Y.
Telephone Comps., Inc., Northport, N.Y.
Telephone Dynamics Corp., N. Bellmore, N.Y.
Telex Comm. Div., Minneapolis, Minn.
3M Co., St. Paul, Minn.

Heads, Erase

Arvin Magnetics, Eden Prairie, Minn. p 309
Gould, Inc., Cleveland, Ohio
Int'l. Electro-Magnetics, Palatine, Ill. p 310,311
Norton Assocs., Inc., Copiague, N.Y. p 312-315
Nortronics, Mpls., Minn.....p 318,319
Applied Magnetics Corp., Goleta, Calif.
Barger Corp., Sunnyvale, Cal.
Bell & Howell Co., Pasadena, Calif.
Chemical Micro Milling Co, Camden, N.J.
Computer Prods. Int'l., Inc., Santa Clara, Calif.
Lipps, Inc., Santa Monica, Calif.
Michigan Magnetics, Vermontville, Mich
Micro Elctrns., Inc., Albuquerque, N.M.
Mura Corp., Jericho, N.Y.
Philmore Mfg. Co., Richmond Hill, N.Y.
Potter Instr. Co., Melville, N.Y.
Precision Instr. Co., Palo Alto, Calif.
RCA Corp., Camden, N.J.
Rystl Elctrns. Corp., N. Miami Beach, Fla.
Shigoto Inds., Ltd., New York, N.Y.
Western Magnetics, Inc., Glendale, Cal.

Heads, Indexing, Rotary

Arvin Magnetics, Eden Prairie, Minn. p 309
Kahle Engrg. Co., Union City, N.J.
Cole Instr., Costa Mesa, Cal.
Custom Sci. Instrs., Inc., Whippany, N.J.
Lipps, Inc., Santa Monica, Calif.
Norelcom Inds., Inc., Farmingdale, N.Y.
Theta Instr. Corp., Fairfield, N.J.

Heads, Magnetic Drum, Memory

Arvin Magnetics, Eden Prairie, Minn. p 309
Gould, Inc., Cleveland, Ohio
Int'l. Electro-Magnetics, Palatine, Ill. p 310,311
Norton Assocs., Inc., Copiague, N.Y. p 312,313
Applied Magnetics Corp., Goleta, Calif.
Barger Corp., Sunnyvale, Cal.
Computer Prods. Int'l., Inc., Santa Clara, Calif.
Electronic Engrs., Inc., Chicago, Ill.
Ferroxcube Corp., Saugerties, N.Y.
General Instr. Corp., Hawthorne, Cal.
Hughes Aircraft Co, Culver City, Cal.
Kenton Engrg. Corp., Skokie, Ill.
Lipps, Inc., Santa Monica, Calif.
Micro Elctrns., Inc., Albuquerque, N.M.
Potter Instr. Co., Melville, N.Y.
World Magnetics, Inc., Traverse City, Mich.

Heads, Recording(Playback, Audio & Stereo

Gould, Inc., Cleveland, Ohio
Int'l. Electro-Magnetics, Palatine, Ill. p 310,311
Norton Assocs., Inc., Copiague, N.Y. p 312-315
Nortronics, Mpls., Minn.....p 318,319
Sankyo Seiki Mfg. Co., Ltd., Tokyo, Japan ..... p 1630
Applied Magnetics Corp., Goleta, Calif.
Barger Corp., Sunnyvale, Cal.
Chemical Micro Milling Co, Camden, N.J.
Computer Prods. Int'l., Inc., Santa Clara, Calif.
EV/Game, Inc., Freeport, N.Y.
Electronic Engrs., Inc., Chicago, Ill.
Ercona Corp., Bellmore, N.Y.
Ferroxcube Corp., Saugerties, N.Y.
Geo Space, Houston, Tex.
Lipps, Inc., Santa Monica, Calif.
Matsushita Comm. Ind'l. Co., Ltd., Yokohama, Japan
Michigan Magnetics, Vermontville, Mich
Micro Elctrns., Inc., Albuquerque, N.M.
Mura Corp., Jericho, N.Y.
Precision Instr. Co., Palo Alto, Calif.
RCA Corp., Camden, N.J.
Shigoto Inds., Ltd., New York, N.Y.
3M Co., St. Paul, Minn.
Video Resch. Corp., Rockville, Md.

Heads Recording(Playback, Computer

Arvin Magnetics, Eden Prairie, Minn. p 309
Gould, Inc., Cleveland, Ohio
Int'l. Electro-Magnetics, Palatine, Ill. p 310,311
Norton Assocs., Inc., Copiague, N.Y. p 312,313
Nortronics, Mpls., Minn.....p 316,317
Sangamo Elec. Co., Pickens, S.C.
Applied Magnetics Corp., Goleta, Calif.
Barger Corp., Sunnyvale, Cal.
Bell & Howell Co., Pasadena, Calif.
Computer Prods. Int'l., Inc., Santa Clara, Calif.
Electronic Engrs., Inc., Chicago, Ill.
Ferroxcube Corp., Saugerties, N.Y.
Honeywell Information Systems, Wellesley Hills, Mass
Hughes Aircraft Co, Culver City, Cal.
Lipps, Inc., Santa Monica, Calif.
Matsushita Comm. Ind'l. Co., Ltd., Yokohama, Japan
Micro Elctrns., Inc., Albuquerque, N.M.
Potter Instr. Co., Melville, N.Y.
Precision Instr. Co., Palo Alto, Calif.
TEAC Corp. of Amer., Santa Monica, Cal
Video Resch. Corp., Rockville, Md.
Western Magnetics, Inc., Glendale, Cal.
World Magnetics, Inc., Traverse City, Mich.

Heads, Recording Disc

Arvin Magnetics, Eden Prairie, Minn. p 309
Int'l. Electro-Magnetics, Palatine, Ill. p 310,311
Nortronics, Mpls., Minn.....p 316,319
Applied Magnetics Corp., Goleta, Calif.
Astatic Corp., Conneaut, Ohio
Barger Corp., Sunnyvale, Cal.
Chemical Micro Milling Co, Camden, N.J.
Computer Prods. Int'l., Inc., Santa Clara, Calif.
Data Prods. Corp., Woodland Hills, Calif.
Ferroxcube Corp., Saugerties, N.Y.
General Instr. Corp., Hawthorne, Cal.
Gotham Audio Corp., New York, N.Y.
Lipps, Inc., Santa Monica, Calif.
Micro Elctrns., Inc., Albuquerque, N.M.

Heads, Video, Recording/Playback

Arvin Magnetics, Eden Prairie, Minn. p 309
Int'l. Electro-Magnetics, Palatine, Ill. p 310,311
Norton Assocs., Inc., Copiague, N.Y.
Nortronics, Mpls., Minn.....p 316,319
Applied Magnetics Corp., Goleta, Calif.
Barger Corp., Sunnyvale, Cal.
Bell & Howell Co., Pasadena, Calif.
Chemical Micro Milling Co, Camden, N.J.
Computer Prods. Int'l., Inc., Santa Clara, Calif.
Ferroxcube Corp., Saugerties, N.Y.
Lipps, Inc., Santa Monica, Calif.
Matsushita Comm. Ind'l. Co., Ltd., Yokohama, Japan
Micro Elctrns., Inc., Albuquerque, N.M.
Multi Media Engrg., Inc., Rockville, Md.
RCA Corp., Camden, N.J.
Video Resch. Corp., Rockville, Md.

Heat Dissipators—Heat Dissipators-See Transistor & Diode Heat Dissipators; Tube Heat Dissipators-Also See Heat Sinks, Soldering—Vol 2

Heat Exchangers & Systems—See Vol 3

Heat Guns, Production—See Vol 3

Heat Shrinkable Elastomers—See Caps, Forms & Tapes, Heat Shrinkable—Vol 3

Heat Shrinkable Plastics—See Caps, Forms & Tapes, Heat Shrinkable-Also See Tubing, Heat Shrinkable—Vol 3

Heat Sinks—See Heat Sinks, Soldering-Also See Transistor & Diode Heat Dissipators; Tube Heat Dissipators—Vol 3

Heat Sinks, Soldering—See Vol 3

Heaters & Accessories, Induction

General Elec. Co., Schenectady, N.Y.
Ajax Magnethermic Corp., Warren, Ohio
Corning Glass Works, Tech. Prods. Div., Corning, N.Y.
Cycle-Dyne, Inc., Jamaica, N.Y.
Delta Elctrn. Control, Costa Mesa, Cal.
Feco, Cleveland, Ohio
Lepel High Frequency Labs., Maspeth, N.Y.
Master Appliance Corp., Racine, Wisc.
Miller, L.C. Co., Monterey Park, Calif.
NuTek Industries, Mountain View, Cal.
Radio Frequency Co., Inc., Medfield, Mass.
Reeve Elctrns., Inc., Chicago, Ill.
Robotron Corp., Detroit, Mich.
Scientific Elec., Inc., Garfield, N.J.
Seven Assocs., Sunnyvale, Calif.
Sunbeam Equip. Corp., Meadville, Pa.
Taylor-Winfield Corp., Warren, Ohio
Tocco Div., Cleveland, Ohio
Westinghouse Elec., Sykesville, Md.
Westinghouse Elec. Corp., Pittsburgh, Pa.
Zephyr Mfg. Co., Inglewood, Calif.

Heaters, Antenna Radome

Andrew Corp., Orland Pk., Ill.
Corvair Diode, New York, N.Y.
Electrofilm, Inc., N. Hollywood, Calif.
Topper Mfg. Co., Inc., Great Neck, N.Y.
Wiegand, Edwin L. Co., Pittsburgh, Pa.

Heaters, Electrical (For Components & Equipment)-Also See Ovens—See Vol 2

Heaters, Infrared (Production)—See Vol 2

Heating Elements—See Vol 2

Hermetic Sealing—See Machines; Seals; Services, Hermetic Sealing

High-Pressure Equipment

Accessory Controls & Equip., Windsor, Conn.
Aeronautical Div, Bryan, Ohio
Auto Control Labs., Los Angeles, Calif.
Bendix Corp., Davenport, Iowa
Benthos, Inc., N. Falmouth, Mass.
Fox Valve Dev. Co., Inc., Hanover, N.J.
Kidde, Walter & Co., Belleville, N.J.
Pall Trinity Micro Corp., Cortland, N.Y.

Hinges—See Fasteners—Vol 3

Holders & Carriers, Chip (Capacitor, IC, LSI)—See Vol 2

Holders & Carriers, IC, LSI (Packaged)—See Vol 2

Holders, Battery—See Retainers, Battery-Also See Connectors, Battery—Vol 3

Holders, Brush—See Brushes & Brush Assemblies—Vol 2

Holders, Chassis (Production Type)—See Vol 3

Holders, Circuit Board (Production Type)—See Vol 3

Holders, Crystal

American Elctrn. Labs., Inc., Lansdale, Pa.
Amphenol Ind'l. Div., Chicago, Ill.
Augat Inc., Attleboro, Mass.
Bliley Electric, Erie, Pa. .....p 1368,1369
EBY, Hugh H. Co., Phila., Pa. ..... p 2620
Elctrn. Molding Corp., Woonsocket, R.I.

Johnson E. F. Co., Waseca, Minn.
Reeves-Hoffman Div., Carlisle, Pa. p 1426
Waveline, Inc., W. Caldwell, N.J.
Accurate Elctrns. Corp., Elyria, Ohio
Braun, H., Tool & Instr. Co., Hawthorne, N.J.
Dittmore-Freimuth Corp., Milwaukee, Wisc.
GTE Sylvania Inc., Warren, Pa.
Jettron Prods., Hanover, N.J.
Keystone Elctrns. Corp., New York, N.Y.
Kling Metal Spinning & Stamping, New York, N.Y.
Maury Microwave Corp., Cucamonga, Calif.
Meca Elctrns., Inc., Denville, N.J.
Methode Elctrns., Inc., Chicago, Ill.
MI-KRO Connector Div., Long Island City, N.Y.
Microphase Corp., Cos Cob, Conn.
Microwave Assocs., Inc., Burlington, Mass.
Microwave Development Labs., Inc., Needham Hgts., Mass.
Robinson-Nugent, New Albany, Ind.
Staver Co., Inc., Bay Shore, N.Y.
TRG Prods., E. Boston, Mass.
Victor Microwave, Inc., Wakefield, Mass.
Waldom Elctrns., Inc., Chicago, Ill.

Holders, Fuse—See Clips & Holders, Fuse; Panels, Fuse—Vol 2

Holders, Lamp—See Sockets, Lamp & Lamp Assemblies—Vol 2

Holders, Tube—See Retainers, Tube—Vol 2

Hole Cutters—See Cutters, Hole—Vol 3

Honeycomb Sheets, Panels, etc.—See Vol 3

Hoods, CRT Viewing—See Viewing Hoods, Cathode-Ray Tube—Vol 3

Horns, Microwave-Also See Antennas, Microwave—See Vol 2

Horns, Speaker

Action Systems Co., Meriden, Conn.
Alcor, Inc., Ithaca, N.Y.
Altec, Anaheim, Calif.
American Geloso Elctrns., Inc., New York, N.Y.
Atlas Sound Div., Parsippany, N.J.
Components Specialties, Inc., Freeport, N.Y.
Du Kane Corp., St. Charles, Ill.
Electro-Voice, Inc., Buchanan, Mich.
Ercona Corp., Bellmore, N.Y.
Executone, Inc., Long Island City, N.Y.
Fedtro, Inc., Rockville Centre, N.Y.
Fourjay Inds., Dayton, Ohio
Jensen Mfg. Div., Chicago, Ill.
Kling Metal Spinning & Stamping, New York, N.Y.
Klipsch & Assocs., Inc., Hope, Ark.
Lansing, James B. Sound, Los Angeles, Cal.
Shigoto Inds., Ltd., New York, N.Y.
University Sound, Anaheim, Cal.

Housings, Circuit Module—See Plug-In Module Enclosures—Vol 3

Housings, Instrument & Meter—See Cabinets; Cases—Vol 3

Housings, Metal—See Cabinets; Cases—Vol 3

Housings, Metal, Small—See Cans—Vol 3

Housings, Photomultiplier Tube—See Photomultiplier Tube Housings—Vol 2

Housings, Speaker—See Enclosures, Speaker

Humidity Indicators—See Indicators, Humidity (Electronic)

Hybrid Junctions, Microwave—See Vol 2

Hydrophones & Accessories

Erie Technological Prods. (EEM), Erie, Pa.
Ithaco, Inc., Ithaca, N.Y. p 1286
Bunker-Ramo Corp., Westlake Village, Cal
Channel Inds., Santa Barbara, Cal.
Chesapeake Instr. Corp., Shadyside, Md.
Dittmore-Freimuth Corp., Milwaukee, Wisc.
Edo Western Corp., Salt Lake City, Utah
Empire Sci., Ind'l. Instr., Garden City, N.Y.
General Instr. Corp., Westwood, Mass.
Geo Space, Houston, Tex.
Honeywell, Aerospace & Def., Minneapolis, Minn.
Instru-Lec Corp., Mt. Vernon, N.Y.
Int'l. Transducer, Goleta, Cal.
InterOcean Systems, San Diego, Cal.
Linden Labs., Inc., State College, Pa.
Mark Prods., Inc., Houston, Tex.
Nold, Walter, Co., Natick, Mass.
NUS Corp., Paramus, N.J.
Sanders Assocs., Inc., Manchester, N.H.
Sparton Southwest, Inc., Albuquerque, N.M.
Straza Inds., El Cajon, Calif.

Hysteresisgraphs

Norman Inds., Chicago, Ill. p 532
Magnetic Sys. & Instrs., Worcester, Mass.
Magnetics Sys. & Instrs., Worcester, Mass.
Thomas & Skinner, Inc., Indianapolis, Ind.

Igniters, Arc Lamp—See Power Supplies, Arc Lamp

Illumination Indicators—See Meters, Light

Image Expanders, Oscilloscope—See Oscilloscope Image Expanders—Vol 2

Impedance Comparators—See Bridges, Impedance

Impedance Converters, Microwave

Alford Mfg. Co., Winchester, Mass.
Greenray Inds., Inc., Mechanicsburg, Pa.
Microwave Cavity Labs., La Grange, Ill.
Aircom, Inc., Union, N.H.
Hughes Aircraft Co, Culver City, Cal.
Hyletronics Corp., Littleton, Mass.
Kistler Instr. Co., Redmond, Wash.
Olektron Corp., Dudley, Mass.
Telonic Inds., Inc., Laguna Beach, Calif.
Zeta Labs., Inc., Mountain View, Calif.

Impregnating Insulating Compounds—See Insulating Compounds—Vol 3

Incremental Magnetic Recorders—See Data Recorders, Computer—Vol 2

Index Assemblies, Switch—See Vol 2

Indicator Lights—See Lights, Dial, Panel, etc.—Vol 2

Indicators, Angle Also See Encoders, Shaft Position

Astrosystems, Lake Success, N.Y. p 332,334,409
Atec, Inc., Houston, Tex. p 411
Automation Dev., Culver City, Cal.
Bowmar Instr. Corp., Ft. Wayne, Ind. p 1312
Computer Instrs., Hempstead, N.Y.
Control Technology Co., L.I.C., N.Y. p 1869
DDC, Hicksville, N.Y. p 347
Del Elctrns. Corp., Mt. Vernon, N.Y.
Dranetz Engrg. Labs., Plainfield, N.J.
Ind'l. Control Co., Farmingdale, N.Y.
Natel Engrg. Co., Canoga Pk., Cal. p 367
Norden Div., Norwalk, Conn.
North Atlantic Inds., Plainview, N.Y. p 369,530
Planet Instr., Ft. Wayne, Ind. p 1340
Solid State Elctrns., Sepulveda, Cal.
Transmagnetics Inc., Farmingdale, N.Y.
Veeder-Root, Hartford, Conn.
Allis, Louis Co., Milwaukee, Wisc.
Ametek/Instrs. & Controls, Feasterville, Pa.
Anocut Engrg. Co., Elk Grove Village, Ill.
Astronautics Corp. of Amer., Milwaukee, Wisc.
Baldwin Elctrns., Little Rock, Ark.
Bendix, S. Montrose, Pa.
Carbonara, Victor E. Inc., Port Washington, N.Y.
Climatronics Corp., Hauppauge, N.Y.
Computer Conversions Corp., East Northport, N.Y.
Conrac Corp., New York, N.Y.
Data Technology Inc., Watertown, Mass.
Edison, T.A., Instr. Div., Ft. Lauderdale, Fla.
Electric Tachometer Corp., Philadelphia, Pa.
Electro-Optical Div., Northampton, Mass.
Elctrns., Ltd., Marion, Iowa
Ferranti Ltd., Hollinwood, Lancs., England
Hartman Sys. Div. A-T-O, Inc., Huntington Sta., N.Y.
H H Controls Co., Arlington, Mass.
Hughes Aircraft Co, Culver City, Cal.
IMC Magnetics Corp., Maywood, Cal.
Innovatek Enterprise, Millerton, N.Y.
Kavlico Elctrns., Chatsworth, Cal.
Larson Aero Dev., Concord, Calif.
Lear Siegler, Inc., Santa Monica, Calif.
Lear Siegler, Grand Rapids, Mich.
Lem Instrument Corp., Farmingdale, N.Y.
Mast Dev. Co., Davenport, Iowa
McClintock Matrixes, Inc., Woodbury, Conn.
Mechanical Engraving Co., Inc., Bronx, N.Y.
Mechanical Technology, Inc., Latham, N.Y.
Metrological Data Corp., Garfield, N.J.
Northern Precision Labs., Inc., Fairfield, N.J.
Orbit Instr. Corp., Syosset, N.Y.
Penn Keystone Corp., Ansonia, Conn.
Sensor Corp., Greenwich, Conn.
Servo Dev. Corp., Hicksville, N.Y.
Singer-General Precision, Inc., Little Falls, N.J.
Teledyne Gurley, Troy, N.Y.
Theta Instr. Corp., Fairfield, N.J.
Transducer Systems, Inc., Willow Grove, Pa.
Trump-Ross Ind'l. Controls, Inc., Billerica, Mass.
Tyco Instr. Div., Waltham, Mass.
United Aircraft Corp., Norwalk, Conn.
West Coast Resch. Corp., Los Angeles, Calif.
Westberg Mfg. Co., Sonoma, Cal.
Weston-Transicoil, Worcester, Pa.

Indicators, Angle-Of-Attack

Astrosystems, Lake Success, N.Y.
Control Technology Co., L.I.C., N.Y.
Dranetz Engrg. Labs., Plainfield, N.J.
Hickok Elect. Instr., Cleveland, Ohio
Solid State Elctrns., Sepulveda, Cal.
Astronautics Corp. of Amer., Milwaukee, Wisc.
Avco Elctrns., Tulsa, Okla.
Bendix, S. Montrose, Pa.
Betzelt GMBH, Trogerstr. 32, W. Germany
Clifton Div., Clifton Hgts., Pa.
Conrac Corp., New York, N.Y.
Edison, T.A., Instr. Div., Ft. Lauderdale, Fla.
Ferranti Ltd., Hollinwood, Lancs., England
Gap Instr. Corp., Hauppauge, N.Y.
Hartman Sys. Div. A-T-O, Inc., Huntington Sta., N.Y.
Hughes Aircraft Co, Culver City, Cal.
Hughes Aircraft Co, Fullerton, Cal.
King Radio Corp., Olathe, Kans.
Kollsman Instr. Corp., Syosset, N.Y.
Larson Aero Dev., Concord, Calif.
Lear Siegler, Inc., Santa Monica, Calif.
Lear Siegler, Grand Rapids, Mich.
Lockheed Aircraft Svce., Special Devices Div., Ontario, Calif.
Mechanical Engraving Co., Inc., Bronx, N.Y.
Parker Instr. Corp., Stamford, Conn.
Penn Keystone Corp., Ansonia, Conn.
Servo Dev. Corp., Hicksville, N.Y.
Sundstrand Data Control, Redmond, Wash.
Symbolic Displays, Inc., Orange, Calif.
West Coast Resch. Corp., Los Angeles, Calif.

Indicators, Annunciator—See Annunciators—Vol 2

Indicators, Antenna Position

Astrosystems, Lake Success, N.Y.
Control Technology Co., L.I.C., N.Y. p 1869
Dranetz Engrg. Labs., Plainfield, N.J. p 1870
Geo Space Sys., Tampa, Fla. p 608
Ind'l. Control Co., Farmingdale, N.Y.
Natel Engrg. Co., Canoga Pk., Cal.
North Atlantic Inds., Plainview, N.Y. p 369
Solid State Elctrns., Sepulveda, Cal.
Veeder-Root, Hartford, Conn.
Bendix, S. Montrose, Pa.
Clifton Div., Clifton Hgts., Pa.
Collins Radio Co., Dallas, Tex.
Computer Conversions Corp., East Northport, N.Y.
Conrac Corp., New York, N.Y.
Cornell-Dubilier Elctrns., Newark, N.J.
Data Technology Inc., Watertown, Mass.
Dynalex, Inc., Burbank, Cal.
Edison, T.A., Instr. Div., Ft. Lauderdale, Fla.
Gap Instr. Corp., Hauppauge, N.Y.
Hartman Sys. Div. A-T-O, Inc., Huntington Sta., N.Y.
Hughes Aircraft Co, Culver City, Cal.
Hughes Aircraft Co, Fullerton, Cal.
Lem Instrument Corp., Farmingdale, N.Y.
Loral Elctrn. Sys., Bronx, N.Y.
Northern Precision Labs., Inc., Fairfield, N.J.
Orbit Instr. Corp., Syosset, N.Y.
Scientific-Atlanta, Inc., Atlanta, Ga.
Servo Corp. America, Hicksville, N.Y.
Servo Dev. Corp., Hicksville, N.Y.
Teledyne Gurley, Troy, N.Y.
Theta Instr. Corp., Fairfield, N.J.
Transducer Systems, Inc., Willow Grove, Pa.
Tri-Ex Tower Corp., Visalia, Calif.
Tyco Instr. Div., Waltham, Mass.
West Coast Resch. Corp., Los Angeles, Calif.
Weston-Transicoil, Worcester, Pa.

Indicators, Attitude

Astrosystems, Lake Success, N.Y.
Control Technology Co., L.I.C., N.Y.
Dranetz Engrg. Labs., Plainfield, N.J.
Hickok Elect. Instr., Cleveland, Ohio
Ind'l. Control Co., Farmingdale, N.Y.
Solid State Elctrns., Sepulveda, Cal.
AMBAC Inds., Garden City, N.Y.
Astronautics Corp. of Amer., Milwaukee, Wisc.
Avco Corp., Cincinnati, Ohio
Avco Elctrns., Tulsa, Okla.
Bendix Aerospace-Elctrns., Teterboro, N.J.
Bendix, S. Montrose, Pa.
Clifton Div., Clifton Hgts., Pa.
Collins Radio Co., Cedar Rapids, Iowa
Collins Radio Co., Dallas, Tex.
Dittmore-Freimuth Corp., Milwaukee, Wisc.
Doric Sci. Corp., San Diego, Calif.
Edison, T.A., Instr. Div., Ft. Lauderdale, Fla.
Electro-Pacific, Inc., Goleta, Calif.
Ferranti Ltd., Hollinwood, Lancs., England
H H Controls Co., Arlington, Mass.
Honeywell, Aerospace & Def., Minneapolis, Minn.
Hughes Aircraft Co, Culver City, Cal.
Humphrey, Inc., San Diego, Calif.
ISC/Telephonics Div, Huntington, N.Y.
Kaiser Aerospace & Elctrns., Palo Alto, Calif.
Larson Aero Dev., Concord, Calif.
Lear Siegler, Inc., Santa Monica, Calif.
Lear Siegler, Grand Rapids, Mich.
Lewis Engrg. Co., Naugatuck, Conn.
Loral Elctrn. Sys., Bronx, N.Y.
Mechanical Engraving Co., Inc., Bronx, N.Y.

Northern Precision Labs., Inc., Fairfield, N.J.
Orbit Instr. Corp., Syosset, N.Y.
Phaostron Instr. & Elctrn. Co., So. Pasadena, Cal.
Rodale Elctrns., Inc., Garden City, N.Y.
Servo Dev. Corp., Hicksville, N.Y.
Theta Instr. Corp., Fairfield, N.J.
3M Co., St. Paul, Minn.
Tyco Instr. Div., Waltham, Mass.
USM Corp., Wakefield, Mass.
Weston Instruments, Inc., Newark, N.J.

Indicators, Azimuth

Astrosystems, Lake Success, N.Y.
Control Technology Co., L.I.C., N.Y. p 1869
Dranetz Engrg. Labs., Plainfield, N.J.
Geo Space Sys., Tampa, Fla. ..... p 608
Hickok Elect. Instr., Cleveland, Ohio
Ind'l. Control Co., Farmingdale, N.Y.
Metric Sys., Ft. Walton Beach, Fla.p 358
Natel Engrg. Co., Canoga Pk., Cal.
North Atlantic Inds., Plainview, N.Y.
Solid State Elctrns., Sepulveda, Cal.
Veeder-Root, Hartford, Conn.
AMBAC Inds., Garden City, N.Y.
Astronautics Corp. of Amer., Milwaukee, Wisc.
Bendix Aerospace-Elctrns., Teterboro, N.J.
Bendix, S. Montrose, Pa.
Clifton Div., Clifton Hgts., Pa.
Collins Radio Co., Cedar Rapids, Iowa
Collins Radio Co., Dallas, Tex.
Computer Conversions Corp., East Northport, N.Y.
Data Technology Inc., Watertown, Mass.
Dittmore-Freimuth Corp., Milwaukee, Wisc.
Edison, T.A., Instr. Div., Ft. Lauderdale, Fla.
Ferranti Ltd., Hollinwood, Lancs., England
Gap Instr. Corp., Hauppauge, N.Y.
Hartman Sys. Div. A-T-O, Inc., Huntington Sta., N.Y.
Humphrey, Inc., San Diego, Calif.
ISC/Telephonics Div, Huntington, N.Y.
King Radio Corp., Olathe, Kans.
Kollsman Instr. Corp., Syosset, N.Y.
Larson Aero Dev., Concord, Calif.
Lear Siegler, Inc., Santa Monica, Calif.
Lear Siegler, Grand Rapids, Mich.
Loral Elctrn. Sys., Bronx, N.Y.
Mechanical Engraving Co., Inc., Bronx, N.Y.
Meteorology Research, Inc., Altadena, Calif.
Narco Avionics, Ft. Washington, Pa.
Northern Precision Labs., Inc., Fairfield, N.J.
Orbit Instr. Corp., Syosset, N.Y.
Robertson Instr., Azusa, Cal.
Rodale Elctrns., Inc., Garden City, N.Y.
Scientific-Atlanta, Inc., Atlanta, Ga.
Servo Corp. America, Hicksville, N.Y.
Servo Dev. Corp., Hicksville, N.Y.
Theta Instr. Corp., Fairfield, N.J.
Tyco Instr. Div., Waltham, Mass.
USM Corp., Wakefield, Mass.
Waldom Elctrns., Inc., Chicago, Ill.
Weston-Transicoil, Worcester, Pa.

Indicators, Capacitor Leakage —See Testers, Capacitor

Indicators, Circuit Condition, On(Off, etc. (Electromechanical)— See Vol 2

Indicators, Computer Type— See Lights; Dials—Vol 2

Indicators, Data Display—See Lights; Dials-Also See Readouts & Displays—Vol 2

Indicators, Density

Ohio Semitronics, Columbus, Ohio
Dolan-Jenner Inds., Inc., Melrose, Mass.
Kay-Ray, Inc., Palatine, Ill.
National Sonics, Farmingdale, N.Y.
NUS Corp., Paramus, N.J.

Indicators, Dielectric Constant

Beckman Instrs., Cedar Grove, N.J. p 415
Dranetz Engrg. Labs., Plainfield, N.J.
Marconi Instrs., Englewood, N.J.
Simpson Elec. Co., Chicago, Ill.
Aladdin Controls, Nashville, Tenn.
Chemalloy Elctrns., Santee, Cal.
Davidson Elctrn. Dev. Co., Erie, Pa.
Delsen Testing Corp., Glendale, Calif.
Device Seals, Inc., Sun Valley, Calif.
Emerson & Cuming, Inc., Canton, Mass.
Kahl Scientific Instr. Corp., El Cajon, Calif.
Microwave Instrs. Co., Corona del Mar, Calif.
Orbit Instr. Corp., Syosset, N.Y.
3M Co., St. Paul, Minn.

Indicators, Distance, Line-Of-Sight

AMBAC Inds., Garden City, N.Y.
Astronautics Corp. of Amer., Milwaukee, Wisc.
Bendix, S. Montrose, Pa.
Bionic Instrs., Inc., Bala Cynwyd, Pa.
Clifton Div., Clifton Hgts., Pa.
Collins Radio Co., Dallas, Tex.
Edison, T.A., Instr. Div., Ft. Lauderdale, Fla.
Ferranti Ltd., Hollinwood, Lancs., England
Hartman Sys. Div. A-T-O, Inc., Huntington Sta., N.Y.
Hughes Aircraft Co, Culver City, Cal.
King Radio Corp., Olathe, Kans.
Northern Precision Labs., Inc., Fairfield, N.J.

Indicators, Distortion—See Analyzers, A-F

Indicators, Elapsed-Time

A. D. Data Sys., Inc., Rochester, N.Y.
Austron, Inc., Austin, Tex.
Biddle, James G., Plymouth Meeting, Pa.
Bissett-Berman, Los Angeles, Cal.
Bowmar Instr. Corp., Ft. Wayne, Ind.
Curtis Instrs., Inc., Mt. Kisco, N.Y. p 427
Freed Transformer Co., Bklyn., N.Y. p 483
General Elec. Co., Schenectady, N.Y. p 484
General Time Corp., Torrington, Conn. p 1321
Geo Space Sys., Tampa, Fla. ..... p 350
Gibbs Mfg. & Resch., Janesville, Wisc. p 1395
Haydon, A. W. Co., Waterbury, Conn. p 1597
HICO (Horizons Int'l.), Redwood City, Cal..... p 1616
J-B-T Instrs., Inc., New Haven, Conn. p 1929
Kessler-Ellis Prods., Atlantic Highlands, N.J. ..... p 1336
Modutec, Inc., Norwalk, Conn. ..... p 527
(NES) Nationwide Elctrn. Sys., Itasca, Ill..... p 365
Pennwood Numechron, Pittsburgh, Pa. p 372
Planet Instr., Ft. Wayne, Ind. ..... p 1340
PPM, Inc., Bedford, Ohio
Precision Timer, Westbrook, Conn. p 1342
Simpson Elec. Co., Chicago, Ill..... p 556
Sticht, Herman H. Co., Inc., New York, N.Y.
Systron-Donner Concord Instr. Div., Concord, Cal.
Veeder-Root, Hartford, Conn.
A & D Electrical Instrs., Glendale, N.Y.
A & M Instrument, Inc., Great Neck, N.Y.
Allis, Louis Co., Milwaukee, Wisc.
Amstro Corp., Fairfield, N.J.
Arnoux Corp., Santa Barbara, Cal
Automatic Timing & Controls, Inc., King of Prussia, Pa.
Bergen Labs., Inc., Paterson, N.J.
Bulova Watch Co., Timer Lab., Flushing, N.Y.
Conrac Corp., New York, N.Y.
Cramer Div., Old Saybrook, Conn.
Datatron, Inc., Santa Ana, Cal
Dynapar Corp., Gurnee, Ill.
Edison, T.A., Instr. Div., Ft. Lauderdale, Fla.
Electric Tachometer Corp., Philadelphia, Pa.
Electrical Instr. Svc., Inc., Mt. Vernon, N.Y.
Engler Instr. Corp., Jersey City, N.J.
ENM Co., Chicago, Ill.
Epic, Inc., New York, N.Y.
Haydon Switch & Instr., Waterbury, Conn.
Hughes Aircraft Co, Culver City, Cal.
Ideal Precision Meter Co., Inc., Brooklyn, N.Y.
Intercontinental Elctrns., E. Rochester, N.Y.
Jewell Electrical Instrs., Manchester, N.H.
KDI Adtrol, Inc., Broomall, Pa.
Lab-Line Instrs., Inc., Melrose Park, Ill.
Lear Siegler, Inc., Santa Monica, Calif.
Lear Siegler, Grand Rapids, Mich.
Morey Corp, Downers Grove, Ill.
Nuclear Equip. Chem. Corp., Farmingdale, N.Y.
Precision Sci. Co., Chicago, Ill.
Rawco Instrs., Inc., Ft. Worth, Tex.
Raymond Controls Corp., Middletown, Conn.
Robertson Instr., Azusa, Cal.
Servo Dev. Corp., Hicksville, N.Y.
Soltec Corp., No. Hollywood, Cal.
Symbolic Displays, Inc., Orange, Calif.
USM Corp., Wakefield, Mass.

Indicators, Electromechanical —See Indicators, Circuit Condition, On / Off—Vol 2

Indicators, Film Thickness

Ind'l. Control Co., Farmingdale, N.Y.
Jonard Inds. Corp., Bronx, N.Y.
Ade Corp., Watertown, Mass.
American Elctrn. Controls Co., Barrington, N.J.
Ann Arbor Div., Ann Arbor, Mich.
Anritsu Electric Co., Ltd., Tokyo, Japan
Applied Control Co., Fairfield, N.J.
Automatic Timing & Controls, Inc., King of Prussia, Pa.
Bendix, Dayton, Ohio
Bicron Elctrns. Co., Canaan, Conn.
Davidson Elctrn. Dev. Co., Erie, Pa.
Dice, J.W. Co., Englewood, N.J.
Dynamic Data Corp., Columbus, Ohio
Edwards High Vacuum, Grand Island, N.Y.
Empire Sci., Ind'l. Elctrn. Gage, Garden City, N.Y.
Granville-Phillips Co., Boulder, Colo.
Hacker Instrs., Inc., W. Caldwell, N.J.
Industrial Nucleonics, Columbus, Ohio
Ind'l. Winding Mach., River Edge, N.J.
Larson Aero Dev., Concord, Calif.
Lion Precision Div., Newton, Mass.
Materials Resch. Corp., Orangeburg, N.Y.
Mechanical Technology, Inc., Latham, N.Y.
Minnetech Labs., Inc., Minneapolis, Minn.
Norton Co., Newton, Mass.
Nuclear Resch. Corp., Southampton, Pa.
Philips Elctrn. Instrs., Mt. Vernon, N.Y.
RIL Elctrns., Inc., Southampton, Pa.
Schoeffel Instr. Corp., Westwood, N.J.
Scientronics, Barrington, N.J.
Sloan Technology Corp., Santa Barbara, Calif.
Sunshine Sci. Instrs., Inc., Philadelphia, Pa.
3M Co., St. Paul, Minn.
Transducer Systems, Inc., Willow Grove, Pa.
Ultek Div., Palo Alto, Calif.
Unit Process Assemblies, Woodside, N.Y.
Varian Assocs., Palo Alto, Cal.
Zeiss, Carl, Inc., New York, N.Y.

Indicators, Fire—See Fire Detection & Fighting Equipment—Vol 2

Indicators, Fluorescent, Switch Mounting—See Vol 2

Indicators, Fluid Conductivity

Beckman Instrs., Cedar Grove, N.J. p 414
Dranetz Engrg. Labs., Plainfield, N.J.
Aladdin Controls, Nashville, Tenn.
Amstro Corp., Fairfield, N.J.
Bailey Meter Co., Wickliffe, Ohio
Bionic Instrs., Inc., Bala Cynwyd, Pa.
Chemalloy Elctrns., Santee, Cal.
Controlotron Corp., Farmingdale, N.Y.
Davidson Elctrn. Dev. Co., Erie, Pa.
Electronic Control Corp., Detroit, Mich.
Kahl Scientific Instr. Corp., El Cajon, Calif.
Lab-Line Instrs., Inc., Melrose Park, Ill.
Laboratory Data Control, Riviera Beach, Fla.
Leeds & Northrup Corp., No. Wales, Pa.
McNab, Inc., New York, N.Y.
National Sonics, Farmingdale, N.Y.
Schneider Instr. Co., Cincinnati, Ohio
Taylor Instr. Process Control Div., Rochester, N.Y.
3M Co., St. Paul, Minn.
VWR Scientific, San Francisco, Cal.
Vytell Corp., Arlington Hgts., Ill.
Weston Instruments, Inc., Newark, N.J.
Westronics, Inc., Ft. Worth, Tex.
Yellow Springs Instr. Co., Inc., Yellow Springs, Ohio

Indicators, Fluid Flow—See Meters, Fluid Flow

Indicators, Frequency—See Meters, Frequency

Indicators, Ground Detector

Associated Resch., Chicago, Ill.
Biddle, James G., Plymouth Meeting, Pa.
Anderson, W.E., Inc., Kansas City, Mo.
Coil Co. of Amer., Northvale, N.J.
General Dynamics, San Diego, Cal.
Hallmark Standards, Inc., Mt. Vernon, N.Y.
Hughes Aircraft Co, Culver City, Cal.
Lark Elctrns., Inc., New York, N.Y.
Mennen-Greatbatch Elctrns., Inc., Clarence, N.Y.
Peschel Instrs., Cape Coral, Fla.
Phaostron Instr. & Elctrn. Co., So. Pasadena, Cal.
Sunshine Sci. Instrs., Inc., Philadelphia, Pa.
Tempo Instr., Plainview, N.Y.

Indicators, Hardness

Bell, F.W., Inc., Columbus, Ohio.... p 418
Ametek/Testing Equip. Sys., Lausdale, Pa.
Barber-Colman Co., Electro-Mechanical Prods. Div., Rockford, Ill.
Branson Instruments Co., Stamford, Conn.
DoAll Co., Des Plaines, Ill.
Epic, Inc., New York, N.Y.
Hacker Instrs., Inc., W. Caldwell, N.J.
Irwin Labs., Inc., Los Angeles, Calif.
Magnaflux Corp., Chicago, Ill.
Opto-Metric Tools, Rockleigh, N.J.
Pacific Transducer Corp., Los Angeles, Calif.
Sensor Corp., Greenwich, Conn.
Sunshine Sci. Instrs., Inc., Philadelphia, Pa.
Zeiss, Carl, Inc., New York, N.Y.

Indicators, Humidity (Electronic)

Bendix Environmtl. Sci., Baltimore, Md.
Simpson Elec. Co., Chicago, Ill.
Victoreen Instr., Cleveland, Ohio
Abbeon, Inc., Jamaica, N.Y.
AMBAC Inds., Garden City, N.Y.
American Instr. Co., Silver Spring, Md.
A.O.I.P., 75/Paris 12eme, France
Atkins Technical, Inc., Gainesville, Fla.
Bacharach Instr. Co., Pittsburgh, Pa.
Beckman Instrs., (AISSD), Fullerton, Cal.
Beckman Instrs., Process Instrs., Fullerton, Cal.
Bell & Howell Co., Pasadena, Calif.
Bycoski, Casmir T., Inc., Hartford, Conn.
Cambridge Sys., EG&G Inc., Waltham, Mass.
Climatronics Corp., Hauppauge, N.Y.
Davidson Elctrn. Dev. Co., Erie, Pa.
Doric Sci. Corp., San Diego, Calif.
H-B Instr. Co., Phila., Pa.
Honeywell, Apparatus Controls, Mpls., Minn.
Hotpack Corp., Phila., Pa.
Hughes Aircraft Co, Culver City, Cal.
Hygrodynamics, Inc., Silver Spring, Md.
Kahl Scientific Instr. Corp., El Cajon, Calif.
Lab-Line Instrs., Inc., Melrose Park, Ill.
Reeve Elctrns., Inc., Chicago, Ill.
Taylor Instr. Process Control Div., Rochester, N.Y.
Techni-Tool, Inc., Philadelphia, Pa.
VWR Scientific, San Francisco, Cal.
Warren Comps. Corp., Warren, Pa.
Westronics, Inc., Ft. Worth, Tex.
Yellow Springs Instr. Co., Inc., Yellow Springs, Ohio

Indicators, Illumination—See Meters, Light

Indicators, Instrument, Flag, Pointer, Etc.

Allard Instr. Corp., Westbury, NY p 1435
Daco Instr. Co., Inc., Trumbull, Conn. p 1444
HICO (Horizons Int'l.), Redwood City, Cal
Ackerman Engravers, Inc., Long Island City, N.Y.
Clifton Div., Clifton Hgts., Pa.
Edison, T.A., Instr. Div., Ft. Lauderdale, Fla.
Hickok Indicating Sys. Inc., Gardena, Cal.
Ideal Precision Meter Co., Inc., Brooklyn, N.Y.
IMC Magnetics Corp., Maywood, Cal.
Int'l. Instrs., Orange, Conn.
Jewell Electrical Instrs., Manchester, N.H.
Larson Aero Dev., Concord, Calif.
Lewis Engrg. Co., Naugatuck, Conn.
Miniature Elctrn. Comps. Corp., Holbrook, Mass.
Novatronics, Inc., Pompano Beach, Fla.
Phaostron Instr. & Elctrn. Co., So. Pasadena, Cal.
Servo Dev. Corp., Hicksville, N.Y.
Weston-Transicoil, Worcester, Pa.

Indicators, Level Position

Control Technology Co., L.I.C., N.Y.
Ade Corp., Watertown, Mass.
Aladdin Controls, Nashville, Tenn.
Ametek/Instrs. & Controls, Feasterville, Pa.
Astronautics Corp. of Amer., Milwaukee, Wisc.
Bendix Corp., Davenport, Iowa
Conrac Corp., New York, N.Y.
Controlotron Corp., Farmingdale, N.Y.
Dynapar Corp., Gurnee, Ill.
Electro-Pacific, Inc., Goleta, Calif.
Gap Instr. Corp., Hauppauge, N.Y.
Hughes Aircraft Co, Culver City, Cal.
Kay-Ray, Inc., Palatine, Ill.
Larson Aero Dev., Concord, Calif.
Leupold & Stevens, Inc., Beaverton, Ore.
Sensor Corp., Greenwich, Conn.
Theta Instr. Corp., Fairfield, N.J.
Transducer Controls Corp., Covina, Calif.
Transducer Systems, Inc., Willow Grove, Pa.
Westronics, Inc., Ft. Worth, Tex.

Indicators, Linear Displacement

Computer Instrs., Hempstead, N.Y.
Control Technology Co., L.I.C., N.Y.
Remex Elctrns., Santa Ana, Cal.
Schaevitz Engrg., Pennsauken, N.J. p 1988
United Detector Tech., Santa Monica, Cal.
Veeder-Root, Hartford, Conn.
Ade Corp., Watertown, Mass.
Ametek/Instrs. & Controls, Feasterville, Pa.
Anocut Engrg. Co., Elk Grove Village, Ill.
Applied Control Co., Fairfield, N.J.
Automatic Control Elctrns. Co., San Antonio, Tex.
Automatic Timing & Controls, Inc., King of Prussia, Pa.
Bell & Howell Co., Pasadena, Calif.
Collins, G.L. Corp., Long Beach, Calif.
Davidson Elctrn. Dev. Co., Erie, Pa.
Decker Corp., Bala-Cynwyd, Pa.
Doric Sci. Corp., San Diego, Calif.
Dynamic Data Corp., Columbus, Ohio
Dynapar Corp., Gurnee, Ill.
Electro-Optical Div., Northampton, Mass.
Electro Prods. Labs., Power Supply, Chicago, Ill.
Electro Prods. Labs., Transducer Div., Chgo., Ill.
Electronic Design Labs., Inc., Phila., Pa.
Gems Div., Farmington, Conn.
Hughes Aircraft Co, Culver City, Cal.
Humphrey, Inc., San Diego, Calif.
IKL, Inc., Newport Beach, Calif.
IMPACT-O-GRAPH Div., Bedford, Ohio
Kavlico Elctrns., Chatsworth, Cal.
Larson Aero Dev., Concord, Calif.
Lear Siegler, Inc., Santa Monica, Calif.
Link Div., Binghamton, N.Y.
Lion Precision Div., Newton, Mass.
Mann, David W. Co., Burlington, Mass.
Mechanical Technology, Inc., Latham, N.Y.
Micro-Line, Jamestown, N.Y.
Minnetech Labs., Inc., Minneapolis, Minn.
Optron Corp., Woodbridge, Conn.
Polyphase Instr. Co., Bridgeport, Pa.
Rank Precision Inds., W. Nyack, N.Y.
Robinson-Halpern Co., W. Conshohocken, Pa.
Scientific-Atlanta, Inc., Atlanta, Ga.
Spectral Dynamics Corp. San Diego, San Diego, Cal.
Starrett, L.S. Co., Athol, Mass.
Sunshine Sci. Instrs., Inc., Philadelphia, Pa.
Taylor Instr. Process Control Div., Rochester, N.Y.
Teledyne Gurley, Troy, N.Y.
Theta Instr. Corp., Fairfield, N.J.
Transducer Controls Corp., Covina, Calif.
Tyco Instr. Div., Waltham, Mass.
West Coast Resch. Corp., Los Angeles, Calif.
Westronics, Inc., Ft. Worth, Tex.
Zehntel, Inc., Berkeley, Calif.

Indicators, Liquid Level—See Vol 2

Indicators, Magnetic Field

Bell, F.W., Inc., Columbus, Ohio.... p 418
Electro-Mechanics Co., Austin, Tex. p 452
Hewlett-Packard, Palo Alto, Cal.
ISC Magnetics Div., Huntington, N.Y.
Ohio Semitronics, Columbus, Ohio p 533
RFL Inds., Instr. Div., Boonton, N.J. p 554
Simpson Elec. Co., Chicago, Ill.
Advanced Kinetics, Costa Mesa, Calif.
Ann Arbor Div., Ann Arbor, Mich.
Annis, R.B. Co., Indianapolis, Ind.
Automation Inds., Danbury, Conn.
Barringer Research, Ltd., Rexdale, Ont., Can.
Davidson Elctrn. Dev. Co., Erie, Pa.
High Voltage Engrg. Corp., Burlington, Mass.
Irwin Labs., Inc., Los Angeles, Calif.
Magnaflux Corp., Chicago, Ill.
Magnetic Sys. & Instrs., Worcester, Mass.
Magnetics Sys. & Instrs., Worcester, Mass.
McClintock Matrixes, Inc., Woodbury, Conn.
Thomas & Skinner, Inc., Indianapolis, Ind.
Varian Assocs., Palo Alto, Cal.

Indicators, Material Thickness

Jonard Inds. Corp., Bronx, N.Y.
Schaevitz Engrg., Pennsauken, N.J.
Addison Div., Mountainside, N.J.
Ade Corp., Watertown, Mass.
American Elctrn. Controls Co., Barrington, N.J.
Ametek/Instrs. & Controls, Feasterville, Pa.
Anritsu Electric Co., Ltd., Tokyo, Japan
Automatic Timing & Controls, Inc., King of Prussia, Pa.
Bendix, Dayton, Ohio
Bicron Elctrns. Co., Canaan, Conn.
Bionic Instrs., Inc., Bala Cynwyd, Pa.
Branson Instruments Co., Stamford, Conn.
Custom Sci. Instrs., Inc., Whippany, N.J.
Decker Corp., Bala-Cynwyd, Pa.
Electron-Machine Corp., Umatilla, Fla.
Empire Sci., Ind'l. Elctrn. Gage, Garden City, N.Y.
Hyde Park Elctrns., Inc., Dayton, Ohio
Ind'l. Gauging & Control, Norwalk, Conn.
Kelk, George Ltd., Don Mills, Ont., Canada
Krautkramer Ultrasonics, Inc., Stratford, Conn.
Link Div., Binghamton, N.Y.
Lion Precision Div., Newton, Mass.
Magnaflux Corp., Chicago, Ill.
Mechanical Technology, Inc., Latham, N.Y.
Microwave Instrs. Co., Corona del Mar, Calif.
Minnetech Labs., Inc., Minneapolis, Minn.
Nuclear Resch. Corp., Southampton, Pa.
Opto-Metric Tools, Rockleigh, N.J.
Optron Corp., Woodbridge, Conn.
Rank Precision Inds., W. Nyack, N.Y.
Robertson Instr., Azusa, Cal.
Scientronics, Barrington, N.J.
Sensor Corp., Greenwich, Conn.
Sloan Technology Corp., Santa Barbara, Calif.
Starrett, L.S. Co., Athol, Mass.
Sunshine Sci. Instrs., Inc., Philadelphia, Pa.
Transducer Systems, Inc., Willow Grove, Pa.
Unit Process Assemblies, Woodside, N.Y.
Vacuum Equip. Div., Newton, Mass.
Varian Assocs., Vacuum Div., Palo Alto, Cal.
Weston Instrs., Inc., Archbald, Pa.
Westronics, Inc., Ft. Worth, Tex.

Indicators, Modulation

Solid State Elctrns., Sepulveda, Cal.
Collins Radio Co., Dallas, Tex.
Heath Co., Benton Harbor, Mich.
Hughes Aircraft Co, Culver City, Cal.
Lampkin Labs., Inc., Bradenton, Fla.
Video Resch. Corp., Rockville, Md.

Indicators, Moisture (Electronic)

Beckman Instrs., Cedar Grove, N.J.
Gould, Inc., Cleveland, Ohio
Simpson Elec. Co., Chicago, Ill.
Atkins Technical, Inc., Gainesville, Fla.
Automatic Control Elctrns. Co., San Antonio, Tex.
Beckman Instrs., (AISSD), Fullerton, Cal.
Beckman Instrs., Process Instrs., Fullerton, Cal.
Bell & Howell Co., Pasadena, Calif.
Bionic Instrs., Inc., Bala Cynwyd, Pa.
Cambridge Sys., EG&G Inc., Waltham, Mass.
Chemalloy Elctrns., Santee, Cal.
Davidson Elctrn. Dev. Co., Erie, Pa.
E.I. DuPont DeNemours & Co., Wilmington, Del.
Honeywell, Apparatus Controls, Mpls., Minn.
Hughes Aircraft Co, Culver City, Cal.
Hygrodynamics, Inc., Silver Spring, Md.
Industrial Nucleonics, Columbus, Ohio
Kahl Scientific Instr. Corp., El Cajon, Calif.
Kay-Ray, Inc., Palatine, Ill.
Lab-Line Instrs., Inc., Melrose Park, Ill.
Mann-Russell Elctrns., Inc., Tacoma, Wash.
Microwave Instrs. Co., Corona del Mar, Calif.
Moisture Register Co., Alhambra, Calif.
Nuclear Resch. Corp., Southampton, Pa.
Photobell Co., Inc., New York, N.Y.
Rank Precision Inds., W. Nyack, N.Y.
Reeve Elctrns., Inc., Chicago, Ill.
RIL Elctrns., Inc., Southampton, Pa.
Strandberg Engrg. Labs., Inc., Greensboro, N.C.
Taylor Instr. Process Control Div., Rochester, N.Y.
Varian Assocs., Palo Alto, Cal.
Vytell Corp., Arlington Hgts., Ill.
Westberg Mfg. Co., Sonoma, Cal.
Westronics, Inc., Ft. Worth, Tex.

Indicators, Motor Load

Diversified Elctrns., Evansville, Ind
Ametek/Instrs. & Controls, Feasterville, Pa.
Coil Co. of Amer., Northvale, N.J.
MEKontrol Inc., Northboro, Mass.
Sensor Corp., Greenwich, Conn.
Sunshine Sci. Instrs., Inc., Philadelphia, Pa.

Indicators, Noise-Figure—See Meters, Noise-Figure

Indicators, Null

Biddle, James G., Plymouth Meeting, Pa.
Boonton Elctrns., Parsippany, N.J.
Control Technology Co., L.I.C., N.Y.
Dixson Inc., Grand Junction, Colo.
Dytronics Co., Columbus, Ohio
Electro-Numerics, Santa Clara, Cal.
Electro Sci. Inds., Portland, Ore.
Electronic Dev. Corp., Boston, Mass.
Fluke, John Mfg. Co., Inc., Seattle, Wash.
Freed Transformer Co., Bklyn., N.Y.
Geo Space Sys., Tampa, Fla. ..... p 608
Hewlett-Packard, Palo Alto, Cal.
Ind'l. Control Co., Farmingdale, N.Y.
Julie Research Lab., New York, N.Y. p 502
North Atlantic Inds., Plainview, N.Y.
North Hills Elctrns., Inc., Glen Cove, N.Y.
Penn Airborne Prods., Southampton, Pa. ..... p 534
Shallcross, Selma, N.C.
Simpson Elec. Co., Chicago, Ill.
Trio Labs, Inc., Plainview, N.Y.
United Detector Tech., Santa Monica, Cal.
Weinschel Engrg. Co., Gaithersburg, Md.
A & M Instrument, Inc., Great Neck, N.Y.
Ammon Instrs., Inc., Manchester, N.H.
A.O.I.P., 75/Paris 12eme, France
Astronics, Inc., Dallas, Tex.
AUL Instrs., Inc., Flushng, N.Y.
Barber-Colman Co., Electro-Mechanical Prods. Div., Rockford, Ill.
Beckman Instrs., (AISSD), Fullerton, Cal.
Bristol Div, Waterbury, Conn
Carbonara, Victor E. Inc., Port Washington, N.Y.
Coleman Instrs., Maywood, Ill.
Collins Radio Co., Dallas, Tex.
Design Prods. Corp., Troy, Mich.
Doric Sci. Corp., San Diego, Calif.
Electrical Instr. Svc., Inc., Mt. Vernon, N.Y.
Filmohm Div., Long Island City, N.Y.
General Microwave Corp., Farmingdale, N.Y.
General Radio Co., Concord, Mass.
Guildline Instrs., Inc., Larchmont, N.Y.
Hallmark Standards, Inc., Mt. Vernon, N.Y.
Howell Instrs., Inc., Ft. Worth, Tex.
Jewell Electrical Instrs., Manchester, N.H.
Joliet Control Corp., Joliet, Ill.
Keithley Instrs., Inc., Cleveland, Ohio
MB Elctrns/Textron Co., New Haven, Conn.
Mechanical Technology, Inc., Latham, N.Y.
Medistor Instr. Co., Seattle, Wash.
Mini-Circuits Lab., Brooklyn, N.Y.
Mura Corp., Jericho, N.Y.
Neill Engrg. Co., Akron, Ohio
Novatronics, Inc., Pompano Beach, Fla.
Princeton Applied Resch. Corp., Princeton, N.J.
Rohde & Schwarz Sls., Passaic, N.J.
Sanders Assocs., Nashua, N.H.
Shigoto Inds., Ltd., New York, N.Y.
Stock Drive Prods., New Hyde Pk., N.Y.
Theta Instr. Corp., Fairfield, N.J.
Transducer Systems, Inc., Willow Grove, Pa.
Weston Instruments, Inc., Newark, N.J.
Westronics, Inc., Ft. Worth, Tex.

Indicators, Numeric Readout—See Readouts—Vol 2

Indicators, Oxygen(Ozone

AMBAC Inds., Garden City, N.Y.
Bacharach Instr. Co., Mt. View, Calif.
Beckman Instrs., Advanced Tech., Fullerton, Cal.
Beckman Instrs., (AISSD), Fullerton, Cal.
Beckman Instrs., Process Instrs., Fullerton, Cal.
Bendix Corp., Davenport, Iowa
Gas Analysis Sys., Inc., Basking Ridge, N.J.
Hickok Indicating Sys. Inc., Gardena, Cal.
Mast Dev. Co., Davenport, Iowa
Parker Instr. Corp., Stamford, Conn.
Precision Sci. Co., Chicago, Ill.
Schneider Instr. Co., Cincinnati, Ohio
Technology/Versatronics, Yellow Springs, Ohio
VWR Scientific, San Francisco, Cal.
Westinghouse Elec., Pittsburgh, Pa.
Yellow Springs Instr. Co., Inc., Yellow Springs, Ohio

Indicators, Phase

Associated Resch., Chicago, Ill.
Austron, Inc., Austin, Tex.
Biddle, James G., Plymouth Meeting, Pa.
Control Elctrns. Co., Inc., Farmingdale, N.Y.
Diversified Elctrns., Evansville, Ind
Dranetz Engrg. Labs., Plainfield, N.J. p 438
Dytronics Co., Columbus, Ohio .... p 441
Hewlett-Packard, Palo Alto, Cal.
Ind'l. Test Equip., Port Washington, N.Y. p 497

North Atlantic Inds., Plainview, N.Y. p 369
North Hills Elctrns., Inc., Glen Cove, N.Y. ..... p 1339
Solid State Elctrns., Sepulveda, Cal.
Universal Ad-Yu Elctrns., Inc., Passaic, N.J. .....p 579,2752
Weinschel Engrg. Co., Gaithersburg, Md. ..... p 1571
A & M Instrument, Inc., Great Neck, N.Y.
Amprobe Instr., Lynbrook, N.Y.
Avtron Mfg., Inc., Cleveland, Ohio
BAC Elctrns., Pennsauken, N.J.
Bowmar/Ali, Inc., Acton, Mass.
Brunswick Instrs., New Brunswick, N.J.
Canadian Research Institute, Don Mills, Ont., Canada
Climatronics Corp., Hauppauge, N.Y.
Collins Radio Co., Dallas, Tex.
Computer Conversions Corp., East Northport, N.Y.
Eastern Specialty Co., Philadelphia, Pa.
Hi-Tek Corp., Santa Ana, Calif.
Knopp, Inc., Oakland, Calif.
Lark Elctrns., Inc., New York, N.Y.
Merrimac Resch. & Dev., Inc., West Caldwell, N.J.
Rantec Div., Calabasas, Calif.
Sage Labs. Inc., Natick, Mass.
Scientific-Atlanta, Inc., Atlanta, Ga.
Spectral Dynamics Corp. San Diego, San Diego, Cal.
Sunshine Sci. Instrs., Inc., Philadelphia, Pa.
Theta Instr. Corp., Fairfield, N.J.
Walters, W.A., Inc., Chicago, Ill.

Indicators, Positioning—See Vol 2

Indicators, Power Level

Beckman Instrs., Cedar Grove, N.J.
Bird Elctrn., Cleveland, Ohio..... p 421
Dranetz Engrg. Labs., Plainfield, N.J.
Electro Impulse, Inc., Red Bank, N.J.
Hewlett-Packard, Palo Alto, Cal.
Ind'l. Test Equip., Port Washington, N.Y.
Kratos Instrument Div., Pasadena, Cal
Scientific Columbus, Columbus, Ohio
Simpson Elec. Co., Chicago, Ill.
Weinschel Engrg. Co., Gaithersburg, Md. ..... p 1571
Bristol Div, Waterbury, Conn
Elcom Sys., Deer Pk., N.Y.
Falcon Div., Wilmington, Mass.
Gems Div., Farmington, Conn.
General Microwave Corp., Farmingdale, N.Y.
General Radio Co., Concord, Mass.
General Thermodynamics Corp., Wilmington, Mass.
Halmar Elctrns., Inc., Columbus, Ohio
Heath Co., Benton Harbor, Mich.
Instrument Labs. Corp., Chicago, Ill.
Narda Microwave Corp., Plainview, N.Y.
Parker Instr. Corp., Stamford, Conn.
Reeve Elctrns., Inc., Chicago, Ill.
Weston Instruments, Inc., Newark, N.J.

Indicators, Pressure—See Gauges, Pressure

Indicators, Proximity—See Vol 2

Indicators, Pulse Rise Time

Tektronix, Inc., Beaverton, Ore.
Channel Inds., Santa Barbara, Cal.
Hughes Aircraft Co, Culver City, Cal.
Industrial Inventions, Inc., Monmouth Jct., N.J.
TEC, Inc., Eden Prairie, Minn.

Indicators, Radiation-Also See Counters, Geiger; Counters, Scintillation

Electro/Data, Inc., Garland, Tex.
General Elec. Co., Schenectady, N.Y.
Victoreen Instr., Cleveland, Ohio
AMBAC Inds., Garden City, N.Y.
Bailey Instrs., Inc., Saddle Brook, N.J.
Beckman Instrs., (AISSD), Fullerton, Cal.
Eberline Instr. Corp., Santa Fe, N.M.
Harshaw Chem. Co., Cleveland, Ohio
Hughes Aircraft Co, Culver City, Cal.
Hughes Aircraft Co, Malibu, Cal.
Kahl Scientific Instr. Corp., El Cajon, Calif.
Landsverk Electrometer Co., Glendale, Cal.
Narda Microwave Corp., Plainview, N.Y.
Nuclear-Chicago, Des Plaines, Ill.
Nuclear Corp. Amer., Denville, N.J.
Nuclear Equip. Chem. Corp., Farmingdale, N.Y.
Nuclear Resch. Corp., Southampton, Pa.
Packard Instrument Co., Inc., Downers Grove, Ill.
Rank Precision Inds., W. Nyack, N.Y.
Soltec Corp., No. Hollywood, Cal.
Universal Transistor Prods., Copiague, N.Y.
Westinghouse Elec., Elmira, N.Y.

Indicators, R-F—See Meters, Frequency

Indicators, Rotary Shaft Position—See Encoders, Shaft Position

Indicators, Servo—See Vol 2

Indicators, Shaft Speed—See Tachometers, Electronic—Vol 2

Indicators, Shorted Turn—See Testers, Coil

Indicators, Smoke & Combustion (Electronic)-Also See Fire Detection & Fighting Equipment

Autronics Corp., Pasadena, Calif.
Dynarad, Inc., Norwood, Mass.
General Elec. Co., Schenectady, N.Y.
Meloy Laboratories, Springfield, Va.
AMBAC Inds., Garden City, N.Y.
American Elec. Cable Co., Holyoke, Mass.
A.R.P. Inds., Inc., Huntington, N.Y.
Bacharach Instr. Co., Pittsburgh, Pa.
Beckman Instrs., Process Instrs., Fullerton, Cal.
De-Tec-Tronic Corp., Chicago, Ill.
Dolan-Jenner Inds., Inc., Melrose, Mass.
Edwards Co. Inc., Norwalk, Conn.
Electronic Control Corp., Detroit, Mich.
Heath Co., Benton Harbor, Mich.
Kidde, Walter & Co., Belleville, N.J.
N.Y. Testing Labs., Inc., Westbury, N.Y.
Photobell Co., Inc., New York, N.Y.
Photomation, Inc., Mountain View, Calif.
Sunshine Sci. Instrs., Inc., Philadelphia, Pa.
Worner Elctrn. Devices, Rankin, Ill.

Indicators, Sound Level—See Meters, Audio Level

Indicators, Specific Gravity—See Vol 2

Indicators, Strain (For Use With Strain Gauges)

Astrosystems, Lake Success, N.Y.
Electro-Numerics, Santa Clara, Cal.
Hickok Elect. Instr., Cleveland, Ohio
Ithaco, Inc., Ithaca, N.Y.
Matrix Corp., Beech Grove, Ind. .. p 361
PPM, Inc., Bedford, Ohio ..... p 535
Simpson Elec. Co., Chicago, Ill.
Tektronix, Inc., Beaverton, Ore.
Applied Control Co., Fairfield, N.J.
Automation Inds., Los Angeles, Cal.
Avco Corp., Cincinnati, Ohio
Bell & Howell Co., Pasadena, Calif.
Belleville Elctrns. Co., Belleville, Mich.
Binary Elctrns. of Cal., Anaheim, Calif.
BLH Elctrns., Inc., Waltham, Mass.
Bristol Div, Waterbury, Conn
Celtic Inds., Inc., Van Nuys, Cal.
Doric Sci. Corp., San Diego, Calif.
Elctrns., Ltd., Marion, Iowa
Gap Instr. Corp., Hauppauge, N.Y.
Houston Scientific Inds., Inc., Houston, Tex
Innovatek Enterprise, Millerton, N.Y.
Interface, Inc., Scottsdale, Ariz.
Kenney Engrg. Corp., Monrovia, Cal.
Micro-Strain, Inc., Spring City, Pa.
Microdot Inc., S. Pasadena, Calif.
Minnetech Labs., Inc., Minneapolis, Minn.
Rosemount, Minneapolis, Minn.
Sensotec, Inc., Columbus, Ohio
Statham Instrs., Inc., Oxnard, Cal.
Strainsert Co., Bryn Mawr, Pa.
Taylor Instr. Process Control Div., Rochester, N.Y.
Thwing-Albert Instr. Co., Philadelphia, Pa.
Transducer Controls Corp., Covina, Calif.
Varian Aerograph, Walnut Creek, Calif.
Vishay Instrs., Malvern, Pa.
Waters Instrs., Inc., Rochester, Minn
West Coast Resch. Corp., Los Angeles, Calif.
Westronics, Inc., Ft. Worth, Tex.
Wood, C.N. Mfg. Co., Newtown, Pa.

Indicators, Surface Roughness

Ade Corp., Watertown, Mass.
Bausch & Lomb, Rochester, N.Y.
Decker Corp., Bala-Cynwyd, Pa.
DoAll Co., Des Plaines, Ill.
Ehrenreich Photo-Optical Industries Inc., Garden City, N.Y.
Gould, Inc., El Monte, Calif.
Marduth Prods., Hinckley, Ohio
Mechanical Technology, Inc., Latham, N.Y.
Omega Engrg., Inc., Stamford, Conn.
Rank Precision Inds., W. Nyack, N.Y.
Sloan Technology Corp., Santa Barbara, Calif.
Transducer Systems, Inc., Willow Grove, Pa.
Zeiss, Carl, Inc., New York, N.Y.

Indicators, Telemetering—See Analyzers, Telemetric Data

Indicators, Temperature—See Meters, Temperature

Indicators, Time Delay Measurement

Bissett-Berman, Los Angeles, Cal.
Haydon, A. W. Co., Waterbury, Conn. p 1597
HICO (Horizons Int'l.), Redwood City, Cal
Pennwood Numechron, Pittsburgh, Pa.
PPM, Inc., Bedford, Ohio
Precision Timer, Westbrook, Conn.
Systron-Donner Concord Instr. Div., Concord, Cal.
Tektronix, Inc., Beaverton, Ore.
Universal Ad-Yu Elctrns., Inc., Passaic, N.J. ..... p 579
Amstro Corp., Fairfield, N.J.
Channel Inds., Santa Barbara, Cal.
Controlcraft Corp., West Chicago, Ill.
Haydon Switch & Instr., Waterbury, Conn.
Hughes Aircraft Co, Culver City, Cal.
Rantec Div., Calabasas, Calif.
Robertson Instr., Azusa, Cal.
Sunshine Sci. Instrs., Inc., Philadelphia, Pa.
Wiltron Co., Palo Alto, Calif.

Indicators, Torque

Electro-Numerics, Santa Clara, Cal.
Jonard Inds. Corp., Bronx, N.Y.
Matrix Corp., Beech Grove, Ind.
Ametek/Instrs. & Controls, Feasterville, Pa.
Barnes & Reinecke, Inc., Chicago, Ill.
Bendix, S. Montrose, Pa.
Bergen Labs., Inc., Paterson, N.J.
BLH Elctrns., Inc., Waltham, Mass.
Chatillon John & Sons, Kew Gardens, N.Y.
Decker Corp., Bala-Cynwyd, Pa.
Dillon, W.C. & Co., Van Nuys 340, Calif.
Doric Sci. Corp., San Diego, Calif.
Dynamic Precision Controls, Hagerstown, Ind.
Edison, T.A., Instr. Div., Ft. Lauderdale, Fla.
Elctrns., Ltd., Marion, Iowa
Falcon Div., Wilmington, Mass.
General Thermodynamics Corp., Wilmington, Mass.
Himmelstein, S. & Co., Elk Grove Village, Ill.
Instru-Lec Corp., Mt. Vernon, N.Y.
Interface, Inc., Scottsdale, Ariz.
Kavlico Elctrns., Chatsworth, Cal.
Kenney Engrg. Corp., Monrovia, Cal.
Lebow Assocs., Inc., Troy, Mich.
McNab, Inc., New York, N.Y.
Milbar, Chagrin Falls, Ohio
Parker Instr. Corp., Stamford, Conn.
Power Instrs., Skokie, Ill.
Raymond Engrg., Inc., Middletown, Conn.
Reliance Elec. Co., Cleveland, Ohio
Snap-On Tools Corp., Kenosha, Wisc.
Taylor Instr. Process Control Div., Rochester, N.Y.
Techni-Tool, Inc., Philadelphia, Pa.
Transducer Controls Corp., Covina, Calif.
Transducer Systems, Inc., Willow Grove, Pa.
Transducers, Inc., Santa Fe Springs, Calif.
Tyco Instr. Div., Waltham, Mass.
Vibrac Corp., Chelmsford, Mass.
Waters Mfg., Inc., Wayland, Mass.
West Coast Resch. Corp., Los Angeles, Calif.
Westronics, Inc., Ft. Worth, Tex.
Williams J.H. & Co., Buffalo, N.Y.
Wood, C.N. Mfg. Co., Newtown, Pa.

Indicators, Transient Voltage

Daco Instr. Co., Inc., Trumbull, Conn. p 1444
Data-Control Systems, Danbury, Conn.
Dranetz Engrg. Labs., Plainfield, N.J. p 437
Electro-Numerics, Santa Clara, Cal.
Ross Engrg. Corp., Campbell, Cal.
Simpson Elec. Co., Chicago, Ill.
A & M Instrument, Inc., Great Neck, N.Y.
Eastern Delta Corp., Fair Lawn, N.J.
Engineering Assocs., Dayton, Ohio

Indicators, Vacuum-Also See Gauges, Vacuum

Schauer Mfg. Corp., Cincinnati, Ohio
Abbeon, Inc., Jamaica, N.Y.
Andonian Assocs., Inc., Waltham, Mass.
Bailey Meter Co., Wickliffe, Ohio
Barber-Colman Co., Industrial Instrs. Div., Rockford, Ill.
Bendix, Rochester, N.Y.
Bristol Div, Waterbury, Conn
Central Scientific Co., Chicago, Ill.
Cole-Parmer Instr. Co., Chicago, Ill.
Cooke Vacuum Prods., S. Norwalk, Conn.
Denton Vacuum, Inc., Cherry Hill, N.J.
Edwards High Vacuum, Oakville, Ont., Can.
Edwards High Vacuum, Grand Island, N.Y.
Elctrns., Ltd., Marion, Iowa
Fischer & Porter Co., Warminster, Pa.
Fredericks Co., Huntingdon Valley, Pa.
Granville-Phillips Co., Boulder, Colo.
Hastings-Raydist, Hampton, Va.
High Voltage Engrg. Corp., Burlington, Mass.
Hill, E. Vernon, Inc., San Francisco, Calif.
Kinney Vacuum Co., Boston, Mass.
Kollsman Instr. Corp., Syosset, N.Y.
MKS Instrs., Inc., Burlington, Mass.
Norton Co., Newton, Mass.
Taylor Instr. Process Control Div., Rochester, N.Y.
Techni-Tool, Inc., Philadelphia, Pa.
Texas Instruments, Inc., Houston, Tex.
Torr Labs., Los Angeles, Cal.
Ultek Div., Palo Alto, Calif.
Vactronic Lab. Equip., Inc., E. Northport, N.Y.
Vacuum Equip. Div., Newton, Mass.
Vacuum Inds., Inc., Somerville, Mass.
Varian Assocs., Palo Alto, Cal.
Varian Assocs., Vacuum Div., Palo Alto, Cal.
Veeco Instrs., Inc., Plainview, N.Y.
VirTis Co., Inc., Gardiner, N.Y.
Wallace & Tiernan Div., Belleville, N.J.
Weksler Instrs. Corp., Freeport, N.Y.
Westronics, Inc., Ft. Worth, Tex.

Indicators, Viscosity—See Vol 2

Indicators, VSWR—See Meters, Standing Wave Ratio

Indicators, Weight—See Scales, Production Weight

Indicators, Wind Direction (Electronic)

Astrosystems, Lake Success, N.Y.
Bendix Environmtl. Sci., Baltimore, Md.
(NES) Nationwide Elctrn. Sys., Itasca, Ill.
Teledyne Geotech, Dallas, Tex.
Betzelt GMBH, Trogerstr. 32, W. Germany
Cambridge Sys., EG&G Inc., Waltham, Mass.
Cardion Elctrns., Woodbury, N.Y.
CGS/Datametrics, Watertown, Mass.
Climatronics Corp., Hauppauge, N.Y.

Hartman Sys. Div. A-T-O, Inc., Huntington Sta., N.Y.
Kahl Scientific Instr. Corp., El Cajon, Calif.
Meteorology Research, Inc., Altadena, Calif.
Robertson Instr., Azusa, Cal.
Taylor Instr. Process Control Div., Rochester, N.Y.
West Coast Resch. Corp., Los Angeles, Calif.
Westberg Mfg. Co., Sonoma, Cal.
Westronics, Inc., Ft. Worth, Tex.

Indicators, Wind Speed (Electronic)

Astrosystems, Lake Success, N.Y.
Bendix Environmtl. Sci., Baltimore, Md.
Hickok Elect. Instr., Cleveland, Ohio
(NES) Nationwide Elctrn. Sys., Itasca, Ill.
Teledyne Geotech, Dallas, Tex.
Betzelt GMBH, Trogerstr. 32, W. Germany
Cambridge Sys., EG&G Inc., Waltham, Mass.
Cardion Elctrns., Woodbury, N.Y.
CGS/Datametrics, Watertown, Mass.
Channel Inds., Santa Barbara, Cal.
Climatronics Corp., Hauppauge, N.Y.
Hartman Sys. Div. A-T-O, Inc., Huntington Sta., N.Y.
Hastings-Raydist, Hampton, Va.
Kahl Scientific Instr. Corp., El Cajon, Calif.
Meteorology Research, Inc., Altadena, Calif.
Robertson Instr., Azusa, Cal.
Stark Elctrn. Instrs., Ltd., Ajax, Ont., Canada
Taylor Instr. Process Control Div., Rochester, N.Y.
Texas Instruments, Dallas, Tex.
Thermo Sys., Inc., St. Paul, Minn.
West Coast Resch. Corp., Los Angeles, Calif.
Westberg Mfg. Co., Sonoma, Cal.
Westronics, Inc., Ft. Worth, Tex.

Inductance Comparators—See Bridges, Inductance

Inductance Standards—See Standards, Inductance

Induction Heating Equipment—See Heaters & Accessories, Induction

Induction Potentiometers—See Resolvers, Synchro—Vol 2

Inductors—See Coils—Vol 3

Infrared Equipment—See Comn. Systems; Detectors; Lamps; Spectrometers; etc. (As Modified By Infrared)

Inks For Thick Film Microcircuits—See Vol 2

Inks, Marking—See Vol 3

Insertion Loss Measurement Systems

Alford Mfg. Co., Winchester, Mass.
Dranetz Engrg. Labs., Plainfield, N.J.
Hewlett-Packard, Palo Alto, Cal.
Systron-Donner Kruse Elctrns. Sub., Mountain View, Cal.
Weinschel Engrg. Co., Gaithersburg, Md.
Automation Dynamics, Northvale, N.J.
Blonder-Tongue Labs., Inc., Old Bridge, N.J.
Emerson & Cuming, Inc., Canton, Mass.
General Microwave Corp., Farmingdale, N.Y.
General Radio Co., Concord, Mass.
Maury Microwave Corp., Cucamonga, Calif.
Narda Microwave Corp., Plainview, N.Y.
Olektron Corp., Dudley, Mass.
Rohde & Schwarz Sls., Passaic, N.J.
Solar Elctrns. Co., Hollywood, Calif.
Wandel & Goltermann, E. Hanover, N.J.
Wiltron Co., Palo Alto, Calif.

Inserts—See Bushings—Vol 3

Inspection Lighting & Equipment—See Fiber Optic Inspection Equipment; Lamps, Magnifying; Comparators, Optical; Ultraviolet Lighting Equipment

Instrument Cases—See Cabinets; Cases, Instrument—Vol 3

Instrument Parts, Precision—See Bearings; Gears; Springs; etc.—Vol 2

Instruments, Elect. Measuring—See Analyzers; Bridges; Comparators; Meters; etc.

Instruments, Graphic Recording—See Recorders, Graphic

Insulating Compounds, Acrylic—See Vol 3

Insulating Compounds, Asphalt & Pitch—See Vol 3

Insulating Compounds, Coil Dope—See Vol 3

Insulating Compounds, Enamel—See Vol 3

Insulating Compounds, Epoxy—See Vol 3

Insulating Coumpounds, Lacquer—See Vol 3

Insulating Compounds, Silicone—See Vol 3

Insulating Compounds, Varnish—See Vol 3

Insulating Compounds, Wax—See Vol 3

Insulation Materials, Adhesive—See Vol 3

Insulation Materials, Asbestos—See Vol 3

Insulation Materials, Ceramic—See Vol 3

Insulation Materials, Fabric—See Vol 3

Insulation Materials, Felt—See Felt—Vol 3

Insulation Materials, Fiber—See Vol 3

Insulation Materials, Film—See Vol 3

Insulation Materials, Foam—See Vol 3

Insulation Materials, Glass Bonded Mica—See Vol 3

Insulation Materials, Glass-Fiber Impregnated—See Vol 3

Insulation Materials, Mica (Natural & Synthetic)—See Vol 3

Insulation Materials, Mylar—See Vol 3

Insulation Materials, Nylon—See Vol 3

Insulation Materials, Paper—See Vol 3

Insulation Materials, Phenolic—See Vol 3

Insulation Materials, Plastic (Misc.)—See Vol 3

Insulation Materials, Polyethylene—See Vol 3

Insulation Materials, Polystyrene—See Vol 3

Insulation Materials, Powdered Metal Oxide—See Vol 3

Insulation Materials, Rubber (All Types)—See Vol 3

Insulation Materials, Steatite—See Insulation Parts, Ceramic—Vol 3

Insulation Materials, TFE—See Vol 3

Insulation Materials, Vinyl—See Vol 3

Insulation Parts, Ceramic—See Vol 3

Insulation Parts, Glass—See Vol 3

Insulation Parts, Glass Bonded Mica—See Vol 3

Insulation Parts, Glass Fiber—See Vol 3

Insulation Parts, Insulating Sleeves—See Tubing—Vol 3

Insulation Parts, Mica (Natural & Synthetic)—See Vol 3

Insulation Parts, Paper—See Vol 3

Insulation Parts, Plastic—See Vol 3

Insulation Parts, Quartz—See Vol 3

Insulation Parts, Sapphire—See Vol 3

Insulation Parts, Silicone Rubber—See Vol 3

Insulation Parts, Steatite—See Insulation Parts, Ceramic—Vol 3

Insulators—See Insulation Parts; Insulators—Vol 3

Insulators, Antenna & Spring Assemblies—See Vol 3

Insulators, Antenna Tower—See Insulators, Antenna—Vol 3

Insulators, Bushing (Metallized)—See Bushings—Vol 2

Insulators, Test & Battery Clip—See Vol 3

Integrated Circuit Packaging Systems—See Vol 2

Integrated Circuits—See Circuits, Integrated—Vol 2

Integrators, Electro-Mechanical

Automation Dev., Culver City, Cal.
Control Technology Co., L.I.C., N.Y.
Eastern Air Devices, Inc., Dover, N.H.
Ind'l. Control Co., Farmingdale, N.Y.
Magnetic Technology, Canoga Pk., Cal. p 1634
Norden Div., Norwalk, Conn.
Planet Instr., Ft. Wayne, Ind. ..... p 1340
Precision Timer, Westbrook, Conn.
Vernitron, Torrance, Cal. ..... p 1634
Vernitron Corp., Deer Pk., N.Y. .. p 1634
A & M Instrument, Inc., Great Neck, N.Y.
Acromag, Inc., Wixom, Mich.
American Elctrns., Inc., Fullerton, Cal.
Analog General Corp., Oceanside, N.Y.
Beckman Instrs., Process Instrs., Fullerton, Cal.
Bristol Div, Waterbury, Conn
Collins Radio Co., Dallas, Tex.
Fischer & Porter Co., Warminster, Pa.
Foxboro Co., Foxboro, Mass.
Honeywell, Aerospace & Def., Minneapolis, Minn.
Honeywell, Ft. Washington, Pa.
Hughes Aircraft Co, Culver City, Cal.
Hughes Aircraft Co, Fullerton, Cal.
Laboratory Data Control, Riviera Beach, Fla.
MPC Prods. Corp., Chicago, Ill.
Taylor Instr. Process Control Div., Rochester, N.Y.
Technology/Versatronics, Yellow Springs, Ohio
United Aircraft Corp., Norwalk, Conn.
Varian Aerograph, Walnut Creek, Calif.
Weston-Transicoil, Worcester, Pa.

Integrators, Electronic

Austron, Inc., Austin, Tex.
Automated Meas., Oakland, Calif. p 447
Bissett-Berman, Los Angeles, Cal.
Control Technology Co., L.I.C., N.Y.
Curtis Instrs., Inc., Mt. Kisco, N.Y. p 427
Data Technology, Palo Alto, Cal.
Datascan, Inc., Clifton, N.J. ..... p 428
DDC, Hicksville, N.Y.
E-H Resch. Labs., Inc., Oakland, Cal. p 447
Elcor Prods. Welex Elctrns., Silver Spring, Md. ..... p 701
Elctrn. Assocs., W. Long Branch, N.J.
Gould, Inc., Cleveland, Ohio
Hewlett-Packard, Palo Alto, Cal.
Honeywell, Denver, Colo.
Hybrid Sys. Corp., Burlington, Mass.
Intronics, Inc., Newton, Mass.
Ithaco, Inc., Ithaca, N.Y.
Magnetic Technology, Canoga Pk., Cal. p 1634
Matrix Corp., Beech Grove, Ind.
Norden Div., Norwalk, Conn.
North Hills Elctrns., Inc., Glen Cove, N.Y. ..... p 1339
Precision Monolithics, Santa Clara, Cal.
RO Assocs., Menlo Pk., Cal.
Solid State Elctrns., Sepulveda, Cal.
Teledyne Philbrick, Dedham, Mass.
Veeder-Root, Hartford, Conn.
Vernitron, Torrance, Cal. ..... p 1634
Vernitron Corp., Deer Pk., N.Y. .. p 1634
Victoreen Instr., Cleveland, Ohio
A & M Instrument, Inc., Great Neck, N.Y.
Acromag, Inc., Wixom, Mich.
Advanced Kinetics, Costa Mesa, Calif.
AMBAC Inds., Garden City, N.Y.
B & W Elctrn. Resch. Labs., Dallas, Tex.
Barber-Colman Co., Industrial Instrs. Div., Rockford, Ill.
Beckman Instrs., Process Instrs., Fullerton, Cal.
Biocom, Inc., Culver City, Cal.
Bionic Instrs., Inc., Bala Cynwyd, Pa.
Bowmar/Ali, Inc., Acton, Mass.
Burr-Brown Resch. Corp., Tucson, Ariz.
Collins Radio Co., Dallas, Tex.
Computer Dynamics, Torrington, Conn.
Conrac Corp., New York, N.Y.
Doric Sci. Corp., San Diego, Calif.
Fairchild Semiconductor, Mountain View, Calif.
Fischer & Porter Co., Warminster, Pa.
Foxboro Co., Foxboro, Mass.
GPS Instr. Co., Framingham, Mass.
Halmar Elctrns., Inc., Columbus, Ohio
Honeywell, Aerospace & Def., Minneapolis, Minn.
Hughes Aircraft Co, Culver City, Cal.
Infrared Inds., Inc., Santa Barbara, Cal.
Innovatek Enterprise, Millerton, N.Y.
Integrated Controls, San Diego, Cal.
International Light, Newburyport, Mass.
Kistler Instr. Co., Redmond, Wash.
Kollmorgen-Color Sys. Div., Attleboro, Mass.
Laboratory Data Control, Riviera Beach, Fla.
Lear Siegler, Inc., Santa Monica, Calif.
Lecroy Resch. Sys. Corp., West Nyack, N.Y.
Magnetic Sys. & Instrs., Worcester, Mass.
Magnetics Sys. & Instrs., Worcester, Mass.

MB Elctrns/Textron Co., New Haven, Conn.
Mennen-Greatbatch Elctrns., Inc., Clarence, N.Y.
Moore Inds., Van Nuys, Cal.
Motorola Instr. & Control, Phoenix, Ariz.
Nester/Faust Mfg. Corp., Newark, Dela.
Nuclear-Chicago, Des Plaines, Ill.
Philco-Ford Corp., Washington, D.C.
Princeton Applied Resch. Corp., Princeton, N.J.
Robertshaw Controls Co., Anaheim, Cal.
Schoeffel Instr. Corp., Westwood, N.J.
Scientific-Atlanta, Inc., Atlanta, Ga.
Signal Analysis Inds. Corp., Hauppauge, N.Y.
Spectral Dynamics Corp. San Diego, San Diego, Cal.
Taylor Instr. Process Control Div., Rochester, N.Y.
Technical Instrs., Inc., No. Haven, Conn.
Transidyne-General Corp., Ann Arbor, Mich.
United Aircraft Corp., Norwalk, Conn.
Varian Aerograph, Walnut Creek, Calif.
Zeltex, Inc., Concord, Calif.

Integrators, Mechanical

Norden Div., Norwalk, Conn.
Planet Instr., Ft. Wayne, Ind. ..... p 1340
American Elctrns., Inc., Fullerton, Cal.
Beckman Instrs., Process Instrs., Fullerton, Cal.
Bristol Div, Waterbury, Conn
Collins Radio Co., Dallas, Tex.
Foxboro Co., Foxboro, Mass.
Hughes Aircraft Co, Culver City, Cal.
Kingmann-White, Inc., Placentia, Calif.
United Aircraft Corp., Norwalk, Conn.

Integrators, Optical

Norden Div., Norwalk, Conn.
Aerospace Controls Corp., Gardena, Cal.
Goodyear Aerospace Corp., Akron, Ohio
Hughes Aircraft Co, Culver City, Cal.
Kollsman Instr. Corp., Syosset, N.Y.
Plessey Elctrns. Corp., Farmingdale, N.Y.
United Aircraft Corp., Norwalk, Conn.

Intensifiers, Image—See Vol 2

Intercommunication Systems (Industrial)

Alco Elctrn. Prods., Lawrence, Mass.
Data-Control Systems, Danbury, Conn.
Johnson E. F. Co., Waseca, Minn.
Melcor Elctrns. Corp., Farmingdale, N.Y.
R L C Elctrns., Inc., Mt. Kisco, N.Y.
ACR Elctrns. Div., Carle Place, N.Y.
Action Systems Co., Meriden, Conn.
Adec, Inc., Newark, N.J.
Alcor, Inc., Ithaca, N.Y.
Altec, Anaheim, Calif.
Artisan Elctrns. Corp., Parsippany, N.J.
Audio Equip. Co., Inc., Pt. Washington, N.Y.
Audio Instr. Co., Union City, N.J.
B-W Mfrs., Inc., Kokomo, Ind.
Bell P/A Prods. Corp., Columbus, Ohio
Bennett Laboratories, Inc., Emeryville, Calif.
Bliss Elctrn. Corp., Sussex, N.J.
Bogen Div., Paramus, N.J.
Clark, David Co., Worcester, Mass.
Collins Radio Co., Dallas, Tex.
Components Specialties, Inc., Freeport, N.Y.
Concord Elctrns., Los Angeles, Cal.
Continental Elctrns., Brooklyn, N.Y.
Dittmore-Freimuth Corp., Milwaukee, Wisc.
Du Kane Corp., St. Charles, Ill.
Encom Prods. Co., Inc., Oxford, Pa.
Executone, Inc., Long Island City, N.Y.
Fanon Elctrns., Hillside, N.J.
Farrall Instr. Co., Grand Island, Neb.
Fasco Inds., Inc., Rochester, N.Y.
Fedtro, Inc., Rockville Centre, N.Y.
Fisher-Berkeley Corp., Emeryville, Calif.
Flush Wall Radio Co., Clearwater, Fla.
Gai-Tronics Corp., Reading, Pa
Henschel Corp., Amesbury, Mass.
Hermes Elctrns., Dartmouth N.S., Can.
Jerrold Elctrns. Corp., Philadelphia, Pa.
Lear Siegler, Inc., Santa Monica, Calif.
Matsushita Comm. Ind'l. Co., Ltd., Yokohama, Japan
Miles Reproducer Co., Inc., New York, N.Y.
Multi Media Engrg., Inc., Rockville, Md.
Nelson-Hershfield Elctrns., Phoenix, Ariz.
Neptune Elctrns. Co., New York, N.Y.
Pace Div., Harbor City, Calif.
Paraplegics Mfg., Bensenville, Ill.
Parcoe, Inc., Cleveland, Ohio
Philco-Ford Corp., Washington, D.C.
Private Tele-Comms., Inc., Chicago, Ill.
RCA Corp., Camden, N.J.
Remler Co., San Francisco, Calif.
Schindlers, Los Angeles, Cal.
Sharpe Audio Div., Tonawanda, N.Y.
Smith-Meeker Engrg. Co., New York, N.Y.
Spivey, James S., Inc., Washington, D.C.
Talk-A-Phone Co., Chicago, Ill.
Telectro Sys. Corp., Corona, N.Y.
Teletype Corp., Skokie, Ill.
Touchmaster Labs., Hollywood, Calif.
Ultra Audio Prods., Beverly Hills, Calif.
Viewlex, Holbrook, N.Y.
Virginia Elctrns. Co., Inc., Falls Church, Va.
Webster Elec. Co., Inc., Racine, Wisc.
Western Microwave Labs., Los Gatos, Cal.
Whittaker Corp., Los Angeles, Cal.
Worner Elctrn. Devices, Rankin, Ill.

Interferometer Systems

Advanced Kinetics, Costa Mesa, Calif.
AIL, Div. Cutler-Hammer, Inc., Deer Park, N.Y.
Arco Systems Inc., Palo Alto, Cal
Beckman Instrs., (AISSD), Fullerton, Cal.
Commander Labs., Inc., Escondido, Calif.
DoAll Co., Des Plaines, Ill.
Ealing Corp., Cambridge, Mass.
Electro-Optical Div., Northampton, Mass.
Electro Optics Assocs., Palo Alto, Calif.
Emerson & Cuming, Inc., Canton, Mass.
Gaertner Scientific Corp., Chicago, Ill.
Hacker Instrs., Inc., W. Caldwell, N.J.
Hughes Aircraft Co, Culver City, Cal.
Mann, David W. Co., Burlington, Mass.
MCS Corp., Monrovia, Calif.
Olympus Corp. America, New Hyde Park, N.Y.
Optomechanisms, Inc., Plainview, N.Y.
Schoeffel Instr. Corp., Westwood, N.J.
Systron-Donner Microwave Div., Van Nuys, Cal.
Varian Assocs., Palo Alto, Cal.
Varian Assocs., Vacuum Div., Palo Alto, Cal.
Westinghouse Elec. Corp., Pittsburgh, Pa.
Zeiss, Carl, Inc., New York, N.Y.

Interlocks—See Connectors, Interlock—Vol 3

Intermodulation Analyzers—See Analyzers, Intermodulation

Interrogator Equipment—See Receivers; Transmitters; etc.

Intervalometers—See Timers —Vol 2

Inverters, D-C To A-C, D-C To D-C

Aaron-Davis Co., Los Angeles,, Cal. p 616
Abbott Transistor Labs., L.A., Cal. p 618
ADC Prods., Minneapolis, Minn.
Advanced High Voltage Co., Inc., Northridge, Cal.
Almond Instrs. Co., Covina, Cal.... p 329
American Time Products, Woodside, N.Y. ..... p 660
Amp Inc., Elizabethtown, Pa.
Amp Inc., Harrisburg, Pa.
Arnold Magnetics, Culver City, Cal. p 648,649
Astro-Space Labs., Huntsville, Ala
ATR Elctrns., Inc., St. Paul, Minn. p 652
Austron, Inc., Austin, Tex. ..... p 653
Autronics Corp., Pasadena, Calif. p 1311
Avtel Corp., Covina, Cal.
Bulova Watch Elctrns. Div. Amer. Time Prods., Woodside, N.Y. ..... p 660
Bulova Watch Co., Servo Prods. Elctrns. Div., Woodside, N.Y.
CEA, Monrovia, Cal. ..... p 673
Clare, C.P. & Co., Chicago, Ill.
CML-Macarr, Inc., Edison, N.J. p 664,665
Del Elctrns. Corp., Mt. Vernon, N.Y. p 680
Dynamic Instr. Corp., Plainview, N.Y. p 681
EEMCO Div., Los Angeles, Cal. .. p 1590
Electronic Resch. Assocs., Cedar Grove, N.J. ..... p 709
Flite-Tronics Co., Inc., Burbank, Cal. p 714
Fork Standards, W. Chicago, Ill. .. p 718
Freed Transformer Co., Bklyn., N.Y. p 2952,2953
Frequency Control, Inc., Austin, Tex.
GC Elctrns., Rockford, Ill.
General Elec. Co., Schenectady, N.Y.
Ind'l. Test Equip., Port Washington, N.Y.
Interelectronics Corp., Congers, N.Y. p 735
International Rectifier, El Segundo, Cal.
ITT Jennings, Div. Int'l. Telephone & Telegraph Corp., San Jose, Cal.
Johnson E. F. Co., Waseca, Minn.
La Marche Mfg. Co., Des Plaines, Ill. p 774
Mauratron, Inc., Dallas, Tex.
Melcor Elctrns. Corp., Farmingdale, N.Y.
Microtran Co., Valley Stream, N.Y.
Mid-Eastern Inds., Scotch Plains, N.J.
Natel Engrg. Co., Canoga Pk., Cal.
Neshaminy Transformer, Furlong, Pa.
North Elec. Co., Galion, Ohio
Nova Electric Mfg. Co., Nutley, N.J. p 828
Powertec, Chatsworth, Cal.
Precision Timer, Westbrook, Conn.
Quindar Elctrns., Inc., Springfield, N.J.
RO Assocs., Menlo Pk., Cal.
Rotron, Inc., Woodstock, N.Y. .... p 2805
Sierra Sys., Mountain View, Cal. .. p 872
Spellman High Voltage Elctrns. Corp., Bronx, N.Y.
Stevens-Arnold, Inc., So. Boston, Mass.
Technipower, Ridgefield, Conn.
Tecnetics, Inc., Boulder, Colo. p 882,883
Thunder Int'l. Corp., Middletown, Conn.
Todd Prods., Farmingdale, N.Y.
Topaz Elctrns., San Diego, Cal. p 898-903
Torotel, Inc., Grandview, Mo.
Transmagnetics Inc., Farmingdale, N.Y.
Triac Elctrn. Sys., N.Y., N.Y.
Trio Labs, Inc., Plainview, N.Y.
Unitron, Garland, Tex..... p 937
Vega Precision Labs., Vienna, Va.
Wagner Elec. Corp., Livingston, N.J.
Wanlass Div., Fort Washington, Pa.
ACR Elctrns. Div., Carle Place, N.Y.
Advanced Energy Conversion, Menlo Pk., Cal.
Aerospace Avionics, Inc., Bohemia, N.Y.
Allis, Louis Co., Milwaukee, Wisc.
Allis Louis Co., Greendale, Wisc.
AMBAC Inds., Garden City, N.Y.
AMF Electrosystems Div., Vandalia, Ohio
Analog Devices, Inc., Norwood, Mass.
Analogic, Wakefield, Mass.
Armec Corp., Huntington Sta., N.Y.
Aviation Instrument Mfg. Corp., Houston, Tex
Barden Co., Div. Interdyne Co., Los Angeles, Cal.
Basler Elec. Co., Highland, Ill.
Behlman Engrg. Corp., Santa Barbara, Cal.
Bendix, Eatontown, N.J.
Bertan Assocs., Inc., Plainview, N.Y.
Betzelt GMBH, Trogerstr. 32, W. Germany
B.H. Inds., Los Angeles, Cal.
Bludworth Marine Div., Linden, N.J.
Bogue Elec. Mfg. Co., Paterson, N.J.
Borg-Warner Controls, Santa Ana, Cal.
Bose Corp., Natick, Mass.
Bourns, Inc., Riverside, Calif.
Bristol Div, Waterbury, Conn
Burr-Brown Resch. Corp., Tucson, Ariz.
Cal-Power Corp., El Segundo, Calif.
Carter Motor Co., Chicago, Ill.
Century Coil Corp., Chicago, Ill.
Collins Electronics, Inc., Stevensville, Md.
Collins Radio Co., Dallas, Tex.
Components Corp., Denville, N.J.
Computer Diode, Fair Lawn, N.J.
Constant Voltage Co., Chicago, Ill.
Continental Elec., Newark, N.J.
Controlotron Corp., Farmingdale, N.Y.
Cornell-Dubilier Elctrns., Newark, N.J.
Crestronics, Crestline, Cal.
Cyberex Inc., Willoughby, Ohio
Delta Elctrn. Control, Costa Mesa, Cal.
Delta Products, Inc., Grand Junction, Colo.
Dual-Lite Co., Newtown, Conn.
Dyna Technology Inc., Sioux City, Iowa
E-Tronics, Van Nuys, Cal.
Edison, T.A., Instr. Div., Ft. Lauderdale, Fla.
Electric Machinery Mfg. Co., Minneapolis, Minn.
Electro Windings & Comps., Kenilworth, N.J.
Electronic Design Labs., Inc., Phila., Pa.
Elctrn. Resources Div., Los Angeles, Cal.
Elgin Elctrns., Waterford, Pa.
EMP Elctrns., Inc., Phoenix, Ariz.
Engrg. Svcs., Madison, N.J.
Exide Power Sys. Div., Philadelphia, Pa.
Fairlane Electronics, Inc., Long Valley, N.J.
Fincor Div., York, Pa.
Forbes & Wagner, Inc., Silver Creek, N.Y.
General Lab. Assocs., Norwich, N.Y.
Geo Space, Houston, Tex.
Glentronics, Glendora, Cal.
Gould Inc., Trenton, NJ
Grafix, Inc., Albuquerque, N.M.
Grand Transformers, Grand Haven, Mich.
Gulton Inds., Hawthorne, Calif.
Heath Co., Benton Harbor, Mich.
HGA Elctrns., Mt. Vernon, N.Y.
Hughes Aircraft Co, Culver City, Cal.
Humphrey, Inc., San Diego, Calif.
Hyperion Inds. Corp., Watertown, Mass.
Ideal Elec. & Mfg. Co., Mansfield, Ohio
Integrated Controls, San Diego, Cal.
ITI Electronics, Inc., Clifton, N.J.
ITT Aerospace, San Fernando, Cal.
K West, Westminster, Calif.
Lear Siegler, Inc., Santa Monica, Calif.
Lear Siegler, Anaheim, Cal.
Linear Alpha, Inc., Evanston, Ill.
Linear Sys., Inc., Watsonville, Calif.
Ling Elctrns., Anaheim, Calif.
Luminator Div., Plano, Tex.
Mag-Con Engrg. Co., St. Paul, Minn.
Magnetico, Inc., E. Northport, N.Y.
Mil Elctrns. Inc., Hudson, N.H.
Modular Devices, Inc., Gardena, Calif.
Neutronic Corp., Bridgeton, Mo.
Nuclear Corp. Amer., Denville, N.J.
Oeco Corp., Portland, Ore.
ONAN Div., Mipls., Minn.
Pacific Electro Dynamics, Bellevue, Wash
Palomar Engrs., Escondido, Cal.
Peerless Elec. Prods., Anaheim, Cal.
Peschel Instrs., Cape Coral, Fla.
Philco-Ford Corp., Washington, D.C.
Pioneer Magnetics, Santa Monica, Cal.
Power Applications, Inc., Bayside, N.Y.
Power Control Corp., Pittsburgh, Pa.
Power Conversion Prods. Inc., Crystal Lake, Ill.
Powercube Corp, Waltham, Mass.
Preferred Electronics, Inc., Westfield, Mass.
Ratelco, Inc., Seattle, Wash.
Reliance Elec. Co., Cleveland, Ohio
Rho Engrg. Co., Los Angeles, Calif
Riverbank Labs., Geneva, Ill.
Robicon Corp., Pittsburgh, Pa
Sanders Assocs., Nashua, N.H.
SBD Systems, Inc., Amityville, N.Y.
Servo Dev. Corp., Hicksville, N.Y.
Shane Inds., Sunny Vale, Cal.
Shigoto Inds., Ltd., New York, N.Y.
SKG Assocs., Inc., Boston, Mass.
Skurka Engrg. Co., Los Angeles, Calif.
Sola Elec. Div., Elk Grove Village, Ill.
Solidstate Controls, Inc., Columbus, Ohio
Spatron Inc, Alhambra, Calif.
Stanford Applied Engrg., Santa Clara, Cal.
Stored Energy Systems, Mountain View, Calif.
Systems Elctrns., Cleveland, Ohio
Task Corp., Anaheim, Calif.
Teledyne Inet, Gardena, Cal.
Teledyne Kinetics, Solana Beach, Cal.
Terado Corp., St. Paul, Minn.
Ther Elec. & Mach. Works, Chicago, Ill.
Torotron, Mt. Vernon, N.Y.
Trepac Corp. America, Englewood, N.J.
Triad-Utrad, Huntington, Ind.
Universal Transistor Prods., Copiague, N.Y.
Varo, Inc., Texas Div., Garland, Tex.
Voltex Co., Inc., Farmingdale, N.Y.
Ward Leonard, Mt. Vernon, N.Y.
Warren Communications, Littleton, Mass.
Westinghouse Elec. Corp., Pittsburgh, Pa.

Westinghouse Elec., Buffalo, N. Y.
Workman Elctrn. Prods., Inc., Sarasota, Fla.

Ion Traps
Nuclear Corp. Amer., Denville, N.J.
TDK Elctrns. Corp., Long Island City, N.Y.
Varian Assocs., Radiation Div., Palo Alto, Cal.

Ionization Chambers—See Chambers, Ionization

Irons, Soldering—See Soldering Irons—Vol 3

Isolators, D-C Signal
CEA, Monrovia, Cal.
Ectron Corp., San Diego, Cal.
Hewlett-Packard, Palo Alto, Cal.
Hybrid Sys. Corp., Burlington, Mass.
Solid State Elctrns., Sepulveda, Cal.
p 954
Stevens-Arnold, Inc., So. Boston, Mass.
Acromag, Inc., Wixom, Mich.
Halmar Elctrns., Inc., Columbus, Ohio
HEI, Inc., Chaska, Minn.
Hughes Aircraft Co, Culver City, Cal.
Incor Instr., Plainview, N.Y.
Integrated Controls, San Diego, Cal.
Iso-Switch Corp., Costa Mesa, Cal.
Isotech Inc., Westford, Mass.
Mil Elctrns. Inc., Hudson, N.H.
Moore Inds., Van Nuys, Cal.
Newport Labs., Inc., Santa Ana, Cal.
Solar Elctrns. Co., Hollywood, Calif.
TDK Elctrns. Corp., Long Island City, N.Y.
Weston Instrs., Inc., Archbald, Pa.

Isolators, Line
CEA, Monrovia, Cal. ..... p 673
Elgar Corp., San Diego, Cal.
Elin Div., San Diego, Cal.
Georator Corp., Manassas, Va. .... p 723
Stevens-Arnold, Inc., So. Boston, Mass.
Topaz Elctrns., San Diego, Cal.
California Instrs. Co., San Diego, Cal.
Hughes Aircraft Co, Culver City, Cal.
Iso-Switch Corp., Costa Mesa, Cal.

Isolators, Microwave (All Types)—See Vol 2

Isotopes, Radioactive—See Sources, Radioactive

Jack Adapters (All Types)—See Vol 3

Jack Covers—See Vol 3

Jack Panel Assemblies & Accessories—See Panels, Jack—Vol 3

Jack (All Types)-Also See Connectors—See Vol 3

Jewels, Instrument Bearing—See Bearings & Assemblies, Jewel—Vol 3

Jigs And Fixtures, Chassis & Circuit Board
Panduit Corp., Tinley Pk., Ill.
Vero Electronics, Inc., Hauppauge, N.Y.
Anchor Specialty Mfg., Teterboro, N.J.
Basic Ceramics Inc., Hawthorne, N.J.
Cambridge Thermionic, Cambridge, Mass
Carbone Corp., Boonton, N.J.
Desman Elctrns., Rochester, N.Y.
Dittmore-Freimuth Corp., Milwaukee, Wisc.
Duramic Prods., Inc., Palisades Park, N.J.
Fansteel Inc., N Chicago, Ill.
Hedquist Mach. & Tool, Mountain View, Cal.
Ind'l. Tools, Ojai, Cal.
Jettron Prods., Hanover, N.J.
Kawecki Berylco Inds., Inc., New York, N.Y.
MacDonald & Co., Glendale, Calif.
Maryland Lava Co., Bel Air, Md.
Matrix Engineering Corp., Gardena, Calif.
Mid-West Metal Prods., Kansas City, Kans.
Norelcom Inds., Inc., Farmingdale, N.Y.
PIC Design Corp., Ridgefield,, Conn.
Podgor, Joseph Co., Pennsauken, N.J.
Podgor, Joseph E. Co., Inc., Phila., Pa.
Pylon Co., Inc., Attleboro, Mass.
Radiation Sys., Inc., McLean, Va.
Semi Alloys, Inc., Mt. Vernon, N.Y.
Techni-Tool, Inc., Philadelphia, Pa.

Joint Compounds, Semiconductor—See Coatings, Heat Conductive—Vol 3

Joints, Ball & Socket—See Vol 3

Joints, Rotary, Microwave—See Vol 2

Jumpers, Bonding—See Vol 3

Jumpers, Circuit Board—See Vol 3

Jumpers, Wire, Terminated—See Cords, Patch—Vol 3

Junction Boxes—See Boxes, Junction & Wall Plate—Vol 3

Junctions, Hybrid, Microwave—See Hybrid Junctions, Microwave

Keyboards, Alpha-Numeric
Alco Elctrn. Prods., Lawrence, Mass.
Amphenol Switch Div., Broadview, Ill.
p 1888
Cherry Electrical Prods., Waukegan, Ill
p 1899
Geo Space Sys., Tampa, Fla.
Hathaway Comps., Denver, Colo.
Licon Div., Chicago, Ill..... p 357
Maxi-Switch Co., Minneapolis, Minn.
p 1941
Raytheon Co., Quincy, Mass. ..... p 2005
Wild Rover Corp., Closter, N.J.
Aydin Data Systems, Ft. Washington, Pa
Chomerics, Inc., Woburn, Mass.
Clare-Pendar Co., Post Falls, Idaho
Colorado Instrs., Inc., Broomfield, Colo.
Computronics Engrg., Los Angeles, Calif.
Datanetics Corp., Redondo Beach, Cal
Digitronics Corp., Albertson, N.Y.
Elec-Trol, Inc., Saugus, Cal.
Facit-Odhner, Inc., Secaucus, N.J.
Flex Key Corp., Waltham, Mass.
Four-Phase Sys, Cupertino, Cal
Friden Div., San Leandro, Calif.
Hughes Aircraft Co, Culver City, Cal.
Keystone Micro Scan., Boston, Mass.
Lear Siegler, Inc., Santa Monica, Calif.
Mechanical Enterprises, Alexandria, Va.
Micro Switch, Freeport, Ill.
Milli-Switch Corp., Gladwyne, Pa.
Nucleonic Prods., Canoga Pk, Cal.
O E M Prods., Carlstadt, N.J.
Shepard Div., Richmond Hill, N.Y.
TEC, Inc., Eden Prairie, Minn.
Teletype Corp., Skokie, Ill.

Keyboards, Decimal
Alco Elctrn. Prods., Lawrence, Mass.
Amphenol Switch Div., Broadview, Ill.
p 1888
Cherry Electrical Prods., Waukegan, Ill
p 1899
Maxi-Switch Co., Minneapolis, Minn.
p 1941
Raytheon Co., Quincy, Mass. ..... p 2005
Wild Rover Corp., Closter, N.J.
Chomerics, Inc., Woburn, Mass.
Clare-Pendar Co., Post Falls, Idaho
Computronics Engrg., Los Angeles, Calif.
Datanetics Corp., Redondo Beach, Cal
Elec-Trol, Inc., Saugus, Cal.
Flex Key Corp., Waltham, Mass.
Four-Phase Sys, Cupertino, Cal
GTE Automatic Elec., Northlake, Ill.
Keystone Micro Scan., Boston, Mass.
Mechanical Enterprises, Alexandria, Va.
Milli-Switch Corp., Gladwyne, Pa.
Nucleonic Prods., Canoga Pk, Cal.
TEC, Inc., Eden Prairie, Minn.

Keyers & Couplers
Dynamics Instr. Co., Monterey Pk., Cal.
Multitech Data Prods., Monterey Pk., Cal.
(NES) Nationwide Elctrn. Sys., Itasca, Ill.
Collins Radio Co., Dallas, Tex.
Computronics Engrg., Los Angeles, Calif.
Design Elements, Columbus, Ohio
Electrocom Inds., So. Bend, Indiana
Iso-Switch Corp., Costa Mesa, Cal.
ITI Electronics, Inc., Clifton, N.J.
McElroy Elctrns. Corp., Shirley, Mass.
Novatronics, Inc., Pompano Beach, Fla.
Palomar Engrs., Escondido, Cal.
Philips Elctrns. Inds., Ltd., Toronto 17, Can.
Singer - Tele-Signal, Woodbury, N.Y.
Trepac Corp. America, Englewood, N.J.

Keys, Telegraph
Johnson E. F. Co., Waseca, Minn.
Computronics Engrg., Los Angeles, Calif.
Dittmore-Freimuth Corp., Milwaukee, Wisc.
McElroy Elctrns. Corp., Shirley, Mass.
Philmore Mfg. Co., Richmond Hill, N.Y.
Winslow Tele-Tronics, Inc., Eatontown, N.J.

Kits, Antenna (For Engineers)
Daburn Elctrns. & Cable Corp., Bronx, N.Y.
Saxton Prods., Congers, N.Y.
Hughes Aircraft Co, Culver City, Cal.
Hughes Aircraft Co, Fullerton, Cal.
Loral Elctrn. Sys., Bronx, N.Y.

Kits, Breadboarding (For Engineers)—See Vol 2

Kits, Cable-End Sealing—See Vol 3

Kits, Computer
Digital Equip. Corp., Maynard, Mass.
Metric Sys., Ft. Walton Beach, Fla.
Cambridge Thermionic, Cambridge, Mass
Center For Technical Development, Louisville, Ohio
Ealing Corp., Cambridge, Mass.
Heath Co., Benton Harbor, Mich.
Hughes Aircraft Co, Culver City, Cal.
Hughes Aircraft Co, Fullerton, Cal.

Kits, Marking (Dial, Instrument, Equipment, etc.)—See Vol 2

Kits, Potentiometer—See Vol 3

Kits, Power Supply
Lambda Elctrns., Melville, N.Y.
Universal Elctrns. Co., Irvine, Cal. p 939
BECO Solid State Systems, Salem, Va.
BF Elctrns., Solana Beach, Calif.
Center For Technical Development, Louisville, Ohio
Eico Electronic Instrument Co., Inc., Brooklyn, N.Y.
Goldsman, Inc., Philadelphia, Pa.
Green Rectifier Corp., Fair Lawn, N.J.
Heath Co., Benton Harbor, Mich.
Hughes Aircraft Co, Culver City, Cal.
Keystone Elctrns. Corp., New York, N.Y.
Neptune Elctrns. Co., New York, N.Y.

Kits, Printed Circuit—See Vol 2

Kits, Programming Board—See Vol 3

Kits, Pump
Miller-Stephenson Chem. Co., Inc., Danbury, Conn.

Kits, Receiver
Heath Co., Benton Harbor, Mich.

Kits, Shielding—See Vol 3

Kits, Switch Assembling—See Vol 2

Kits, Terminal—See Vol 3

Kits, Test Equipment
Jonard Inds. Corp., Bronx, N.Y.
Schauer Mfg. Corp., Cincinnati, Ohio
BECO Solid State Systems, Salem, Va.
Broadview Inds. Corp., Hempstead, N.Y.
Communications Tech. Corp., Los Angeles, Cal.
Develco, Inc., Norwalk, Conn.
Digitech Data Inds., Inc., Ridgefield, Conn.
Eico Electronic Instrument Co., Inc., Brooklyn, N.Y.
Electronic Meas. Corp., New York, N.Y.
Goldsman, Inc., Philadelphia, Pa.
Heath Co., Benton Harbor, Mich.
Hughes Aircraft Co, Culver City, Cal.
Keystone Elctrns. Corp., New York, N.Y.
Lehigh Valley Elctrn., Inc., Fogelsville, Pa.
Lockheed Aircraft Svce., Special Devices Div., Ontario, Calif.
Magnaflux Corp., Chicago, Ill.
Microlab/FXR, Livingston, N.J.
Shannon Luminous Mat'ls., Hollywood, Cal.
States Co., Hartford, Conn.
Telonic Inds., Inc., Laguna Beach, Calif.
U.S. Testing Co., Inc., Hoboken, N.J.
Viz Mfg. Co., Philadelphia, Pa.

Kits, Training Aid—See Vol 3

Kits, Transistor Mounting—See Pads, Transistor Mounting—Vol 2

Knives & Knife Sets—See Vol 3

Knobs—See Vol 2

Klystrons, Solid State, Microwave—See Vol 2

Klystrons, Tube—See Tubes, Klystron—Vol 2

Labels, Pressure-Sensitive—See Vol 3

Labels, Temperature Indicating—See Vol 2

Laboratories, Mobile & Field
Data-Control Systems, Danbury, Conn.
Parabam, Inc., Compton, Cal.
Advance Inds., Sioux City, Iowa
Aeronautical Div, Bryan, Ohio
Ajusto Equip. Co., Bowling Green, Ohio
Automation Inds., Los Angeles, Cal.
Beckman Instrs., (AISSD), Fullerton, Cal.
Beckman Instrs., Process Instrs., Fullerton, Cal.
Craig Sys. Corp., Lawrence, Mass.
Duriron Co., Inc., Dayton, Ohio
Goodyear Aerospace Corp., Akron, Ohio
Hughes Aircraft Co, Culver City, Cal.
Lindsay Structure, Evansville, Ind.
Ling Elctrns., Anaheim, Calif.
Lockheed Aircraft Svce., Special Devices Div., Ontario, Calif.
Meteorology Research, Inc., Altadena, Calif.
Microwave Div, Nashua, N.H.
PRD Elctrns., Inc., Westbury, N.Y.
Rohde & Schwarz Sls., Passaic, N.J.
Sturdilite Sci. Furniture Sys., Plainwell, Mich
TACO Div., Sherburne, N.Y.
Wyle Labs., El Segundo, Calif.

Laboratories, Testing—See Services, Electrical Measurement; Services Environmental Testing—Vol 3

Laboratory Furniture—See Benches, Consoles, Stools, Tables (Lab and Shop)—Vol 3

Lacing, Cable—See Cords & Tapes, Lacing—Vol 3

Lacquer—See Insulating Compounds, Lacquer—Vol 3

Laminar Flow Work Stations—See Work Stations

Laminates, Metal Clad—See Vol 3

Laminates, Plastic Impregnated (Unclad)—See Vol 3

Laminations, Magnetic Recording Head—See Vol 3

Laminations, Transformer & Inductor—See Vol 3

Lamp Adapters—See Vol 2

Lamp Holders—See Sockets, Lamp & Lamp Assemblies—Vol 2

Lamp Pullers—See Pullers, Lamp—Vol 3

Lamps, Dial & Pilot, Incandescent—See Vol 2

Lamps, Electroluminescent—See Panels, Electroluminescent—Vol 2

Lamps, Exciter, Photographic—See Vol 2

Lamps, Flashtube—See Vol 2

Lamps, Glow—See Lamps, Neon—Vol 2

Lamps, Infrared—See Vol 2

Lamps, Luminescent—See Vol 2

Lamps, Magnifying

Circon Corp., Goleta, Cal.
Drake Mfg., Harwood Hgts., Ill.
Acme Lite Products Co., Congers, N.Y.
Black Light Prods., Chicago, Ill.
Cole-Parmer Instr. Co., Chicago, Ill.
Dolan-Jenner Inds., Inc., Melrose, Mass.
EdnaLite Corp., Peekskill, N.Y.
Fostoria-Fannon, Inc., Fostoria, Ohio
General Hardware Mfg. Co., New York, N.Y.
Glidelite Inds., Inc., Hackensack, N.J.
Hammel, Riglander & Co., New York, N.Y.
Janel, Inc., Stirling, N.J.
Keuffel & Esser Co., Morristown, N.J.
MacDonald & Co., Glendale, Calif.
Power Instrs., Skokie, Ill.
Swing-O-Lite, Inc., Hackensack, N.J.
Techni-Tool, Inc., Philadelphia, Pa.
VWR Scientific, San Francisco, Cal.

Lamps, Mercury Vapor—See Vol 2

Lamps, Miniature & Subminiature—See Vol 2

Lamps, Neon—See Vol 2

Lamps, Projection—See Vol 2

Lamps, Solid State—See Vol 2

Lamps, Stroboscopic—See Vol 2

Lamps, Tungsten Halogen—See Vol 2

Lamps, Ultraviolet—See Vol 2

Lamps, Xexon—See Vol 2

Laser Energy Monitors—See Monitors, Laser Energy

Laser Q Switches—See Vol 2

Lasers, Gas

Nippon Electric/NEC America, N.Y., N.Y.
RCA Elctrns. Comps., Harrison, N.J.
Advanced Kinetics, Costa Mesa, Calif.
Bausch & Lomb, Rochester, N.Y.
Ealing Corp., Cambridge, Mass.
Edmund Scientific Co., Barrington, N.J.
Electro Optics Assocs., Palo Alto, Calif.
Ferranti Ltd., Hollinwood, Lancs., England
Gaertner Scientific Corp., Chicago, Ill.
GTE Sylvania Inc., Elctrn. Sys. Gp., Waltham, Mass.
Hadron Inc., Westbury, N.Y.
Honeywell, Aerospace & Def., Minneapolis, Minn.
Hughes Aircraft Co, Culver City, Cal.
Hughes Aircraft Co., Torrance, Cal.
Hughes Aircraft Co, Malibu, Cal.
Infrared Inds., Inc., Santa Barbara, Cal.
Korad Mat'ls. Sys. Div., Santa Monica, Cal.
Molectron Corp., Sunnyvale, Cal.
National Beryllia Corp., Haskell, N.J.
Optics Technology, Palo Alto, Calif.
Philco-Ford Corp., Washington, D.C.
Photon Sources, Inc., Ann Arbor, Mich.
Raytheon Co., Waltham, Mass.
Resalab Inc., Advanced Development Lab., Los Angeles, Cal.
Sanders Assocs., Nashua, N.H.
Siemens Corp., Comps. Div., Iselin, N.J.
Siemens Corp., Comm. Eq. Div., Iselin, N.J.
Spectra-Physics, Inc., Mountain View, Calif.
Syncor Prods. Co., Inc., Malden, Mass.
Thermal Amer. Fused Quartz, Montville, N.J.
Thomson-CSF Electron Tubes, N.Y., N.Y.
Thomson-CSF Inc., New York, N.Y.
TRW Instrs., El Segundo, Cal.
Westinghouse Elec. Corp., Pittsburgh, Pa.

Lasers, Solid-State

Nippon Electric/NEC America, N.Y., N.Y.
Crystal Optics Resch., Inc., Ann Arbor, Mich.
Electro Powerpacs Corp., Cambridge, Mass.
Electrophysics Corp., Nutley, N.J.
GTE Sylvania Inc., Elctrn. Sys. Gp., Waltham, Mass.
Hadron Inc., Westbury, N.Y.
Honeywell, Aerospace & Def., Minneapolis, Minn.
Hughes Aircraft Co, Culver City, Cal.
Hughes Aircraft Co., Torrance, Cal.
Hughes Aircraft Co, Malibu, Cal.
Korad Mat'ls. Sys. Div., Santa Monica, Cal.
Laser Technology, Inc., N. Hollywood, Calif.
Monsanto-Elctrn. Spec. Prods., Cupertino, Cal.
Owens-Illinois, Consumer & Tech. Prods., Toledo, Ohio
Quantronix Corp., Smithtown, N.Y.
Raytheon Co., Waltham, Mass.
RCA Govt. & Comm. Sys., Moorestown, N.J.
RCA Solid State Div., Somerville, N.J.
Resalab Inc., Advanced Development Lab., Los Angeles, Cal.
Sanders Assocs., Nashua, N.H.
Siemens Corp., Comps. Div., Iselin, N.J.
Siemens Corp., Comm. Eq. Div., Iselin, N.J.
Texas Instruments, Inc., Dallas, Tex.
TRW Instrs., El Segundo, Cal.
Westinghouse Elec. Corp., Pittsburgh, Pa.

Lead Assemblies & Receptacles, High Voltage-Also See Connectors; Cable Assemblies—See Vol 3

Leads, Test—See Test Leads

Lens Caps, Indicator Light—See Caps, Lens, Indicator Light—Vol 2

Lenses, Inspection—See Magnifying Glasses, Inspection

Lenses, Optical & Camera—See Vol 2

Lenses, R-F

Cardion Communications, Woodbury, N.Y.
Chu Assocs., Inc., Littleton, Mass.
Custom Materials, Inc., Chelmsford, Mass.
EdnaLite Corp., Peekskill, N.Y.
Emerson & Cuming, Inc., Canton, Mass.
Exotic Materials, Inc., Costa Mesa, Cal.
Jones, A.D. Optical Works, Burlington, Mass.
MCS Corp., Monrovia, Calif.
Photo Tech. Prods., Garden City, N.Y.
Republic Lens Co., Inc., Bronx, N.Y.
Teledyne Micronetics, San Diego, Calif.
Valpey Corp., Holliston, Mass.

Lenses, Readout & Display—See Vol 2

Light Sources, Isotope Excited—See Sources, Light

Lighting Equipment, Emergency

ATR Elctrns., Inc., St. Paul, Minn. p 652
North Elec. Co., Galion, Ohio
Power Inc., Burnsville, Minn.
ACR Elctrns. Div., Carle Place, N.Y.
Action Systems Co., Meriden, Conn.
American Atomics Corp., Tucson, Ariz.
Automatic Switch Co., Florham Park, N.J.
C.B.C. Inds., Inc., Ft. Washington, Pa.
Dual-Lite Co., Newtown, Conn.
Eastron Corp., Haverhill, Mass.
Electro Powerpacs Corp., Cambridge, Mass.
Electronic Batteries, Inc., Brooklyn, N.Y.
Fermont Div., Bridgeport, Conn.
Glar-Ban Corp., Buffalo, N.Y.
Gulton Inds., Hawthorne, Calif.
Hobby & Brown Elctrn., Rockville Centre, N.Y.
Kidde, Walter & Co., Belleville, N.J.
Luminator Div., Plano, Tex.
Pyle-National Co., Chgo., Ill.
Ray-O-Vac Co., Madison, Wisc.
Rowe L. L. Co., Boston, Mass.
Soderberg Mfg. Co., Inc., Alhambra, Cal.
Standard Elec. Time Corp., Springfield, Mass.
Strong Elec. Corp., Toledo, Ohio
Teledyne Inet, Gardena, Cal.
Titan Tool Supply Co., Inc., Buffalo, N.Y.
Tri-Ex Tower Corp., Visalia, Calif.

Lighting Equipment, Studio

Christie Elec., Los Angeles, Cal. .. p 675
International Rectifier, El Segundo, Cal.
Burke & James, Inc., Chicago, Ill.
Century Strand, Inc., Clifton, N.J.
Decor Elctrns. Corp., Austin, Tex.
Gordon Alan Entprs., N. Hollywood, Cal.
Multi Media Engrg., Inc., Rockville, Md.
Quartz Radiation Corp., Fairfield, N.J.
RCA Corp., Camden, N.J.
Strong Elec. Corp., Toledo, Ohio
Superior Elec., Bristol, Conn.
Terado Corp., St. Paul, Minn.
Ultra Audio Prods., Beverly Hills, Calif.
Waber Elctrns., Inc., Philadelphia, Pa.

Lighting Equipment, Tower

Christie Elec., Los Angeles, Cal.
Assembly Elctrns. Ltd., Niagara Falls, Can.
Black Light Corp. Amer., San Gabriel, Cal.
Camusat Gueguen Telecom. Int'l., White Plains, N.Y.
Electro-Optical Systems, Pasadena, Cal.
Hughey & Phillips, Inc., Burbank, Cal.
Kemlite Labs., Inc., Chicago, Ill.
Rohn Mfg. Co., Peoria, Ill.
Rowe L. L. Co., Boston, Mass.
Tri-Ex Tower Corp., Visalia, Calif.

Lightning Arresters—See Arresters, Lightning—Vol 2

Lights, Arc—See Vol 2

Lights, Dial, Panel, Pilot, & Accessories—See Vol 2

Lights, Edge Lighting, Panel—See Vol 2

Lights, Indicator—See Lights, Dial, Panel, etc-Also See Readouts & Readout Devices—Vol 2

Lights, Infrared—See Vol 2

Lights, Inspection—See Lamps, Magnifying

Lights, Neon, Test—See Lights, Press-To-Test—Vol 2

Lights, Oil-Tight—See Vol 2

Lights, Placard—See Lights, Dial, Panel, Pilot & Accessories—Vol 2

Lights, Press-To-Test—See Vol 2

Lights, Stroboscopic Source—See Vol 2

Lights, Ultraviolet—See Vol 2

Limit Stops, Mechanical—See Vol 3

Limiters, Current—See Vol 2

Limiters, Microwave—See Vol 2

Limiters, Noise

Collins Radio Co., Dallas, Tex.
Defense Elctrns., Inc., Rockville, Md.
McElroy Elctrns. Corp., Shirley, Mass.

Limiters, Pulse

Trio Labs, Inc., Plainview, N.Y.
Eastern Delta Corp., Fair Lawn, N.J.
Green Elec. Corp., Fair Lawn, N.J.
Kingmann-White, Inc., Placentia, Calif.
Loral Elctrn. Sys., Bronx, N.Y.
Optical Elctrns., Tucson, Ariz.
Special Microwave Devices Oper., Waltham, Mass.
Transystems Elctrn. Co., Fort Lee, N.J.

Limiters, Surge—See Vol 2

Line Fault Locators—See Locators, Cable & Line Fault

Line Stretchers, Microwave—See Microwave Line Stretchers

Linear Displacement Indicators—See Indicators, Linear Displacement

Liners, Tube Shield—See Shields, Tube—Vol 2

Lines, Slotted—See Slotted Lines, Microwave

Links, Antenna

Nippon Electric/NEC America, N.Y., N.Y.
Aerospace Resch. Inc., Boston, Mass.
Alloys Unlimited, Inc., Encino, Calif.
Collins Radio Co., Dallas, Tex.
Elctrn. Resources Div., Los Angeles, Cal.
Hughes Aircraft Co, Culver City, Cal.
Hughes Aircraft Co, Fullerton, Cal.
Microwave Development Labs., Inc., Needham Hgts., Mass.
Norelcom Inds., Inc., Farmingdale, N.Y.
Prodelin, Inc., Hightstown, N.J.

Links, Relay

Nippon Electric/NEC America, N.Y., N.Y.
RHG Elctrns. Lab., Farmingdale, N.Y. p 1562
Anritsu Electric Co., Ltd., Tokyo, Japan
Camusat Gueguen Telecom. Int'l., White Plains, N.Y.
Collins Radio Co., Dallas, Tex.
Ferranti Ltd., Hollinwood, Lancs., England
Hughes Aircraft Co, Culver City, Cal.
Hughes Aircraft Co, Fullerton, Cal.
Int'l. Microwave, Cos Cob, Conn.
Iso-Switch Corp., Costa Mesa, Cal.
Microwave Assocs., Inc., Burlington, Mass.
Microwave Development Labs., Inc., Needham Hgts., Mass.
Monitor Sys., Inc., Ft. Washington, Pa.
Raytheon Data Systems Co., Norwood, Mass.
RCA Govt. & Comm. Sys., Moorestown, N.J.
Rodelco, Deer Park, N.Y.
Trepac Corp. America, Englewood, N.J.
Varian Assocs., Palo Alto, Cal.

Liquid Converters, Cryogenic—See Cryogenic Liquid Converters

Liquid Crystals—See Crystals, Liquid, Temperature Indicating—Vol 2

Liquid-Level Indicators—See Indicators, Liquid-Level—Vol 2

Load Cells—See Cells, Load—Vol 2

Loads, Dummy—See Dummy Loads—Vol 3

Loads, Electronic, Variable-Also See Dummy Loads

Bendix, Franklin, Ind.
Kepco, Inc., Flushing, N.Y. ..... **p 762**
Electronautics, Littleton, Mass.
Ferranti Ltd., Hollinwood, Lancs., England
Hughes Aircraft Co, Culver City, Cal.
Kings Elctrns., Tuckahoe, N.Y.
Rex Rheostat & Co., Roosevelt, N.Y.
Varian Assocs., Palo Alto, Cal.

Locators, Cable & Line Fault

American Nucleonics Corp., Woodland Hills, Cal
Associated Resch., Chicago, Ill. .. **p 404**
Beckman Instrs., Cedar Grove, N.J. **p 414**
Biddle, James G., Plymouth Meeting, Pa.
Dynarad, Inc., Norwood, Mass.
Hewlett-Packard, Palo Alto, Cal.
Hipotronics, Inc., Brewster, N.Y.
Shallcross, Selma, N.C. ..... **p 555**
Slaughter Co., Ardmore, Okla. ..... **p 558**
Tektronix, Inc., Beaverton, Ore.
Texscan Corp., Indianapolis, Ind.
Addison Div., Mountainside, N.J.
Anritsu Electric Co., Ltd., Tokyo, Japan
Clinton Instr. Co., Clinton, Conn.
Communications Tech. Corp., Los Angeles, Cal.
Delcon Div., Mt. View, Calif.
Electro-Alarm Safety Devices, Fresno, Calif.
Ferranti Elec., Inc., Plainview, N.Y.
Ferranti Ltd., Hollinwood, Lancs., England
FRL, Inc., Belmont, Cal.
Goldak Co., Inc., Glendale, Calif.
Guildline Instrs., Inc., Larchmont, N.Y.
Hughes Aircraft Co, Culver City, Cal.
Ind'l. Winding Mach., River Edge, N.J.
Instrument Labs. Corp., Chicago, Ill.
Lab Electro-Acoustique, 92-Rueil, Malmaison, France
Lear Siegler, Inc., Santa Monica, Calif.
Leeds & Northrup Corp., No. Wales, Pa.
Northeast Elctrns. Corp., Concord, N.H.
Paraplegics Mfg., Bensenville, Ill.
Peschel Instrs., Cape Coral, Fla.
Petty Geophysical Engrg., San Antonio, Tex.
Philco-Ford Corp., Washington, D.C.
Railway Comm., Raytown, Mo.
Rohde & Schwarz Sls., Passaic, N.J.
Servo Corp. America, Hicksville, N.Y.
Siemens Corp., Comm. Eq. Div., Iselin, N.J.
Superior Continental Corp., Hickory, N.C.
Taft Electrosystems, Inc., Metuchen, N. J.
Telesciences, Moorestown, N.J.
Tempo Instr., Plainview, N.Y.
Wiltron Co., Palo Alto, Calif.

Locators, Metal—See Vol 3

Locators, Open-Short

Associated Resch., Chicago, Ill. .. **p 404**
Beckman Instrs., Cedar Grove, N.J. **p 414**
Dynarad, Inc., Norwood, Mass. .... **p 439**
Hewlett-Packard, Palo Alto, Cal.
Hipotronics, Inc., Brewster, N.Y.
Intronics, Inc., Newton, Mass.
Slaughter Co., Ardmore, Okla. ..... **p 558**
Tektronix, Inc., Beaverton, Ore.
Addison Div., Mountainside, N.J.
Clinton Instr. Co., Clinton, Conn.
Cramer Div., Old Saybrook, Conn.
Delcon Div., Mt. View, Calif.
Goldak Co., Inc., Glendale, Calif.
Instrument Labs. Corp., Chicago, Ill.
Peschel Instrs., Cape Coral, Fla.
Tempo Instr., Plainview, N.Y.

Locators, Pipe & Cable—See Locators, Metal—Vol 3

Locks, Dial & Shaft—See Vol 2

Logic Circuits—See Cards, Logic Circuits, Integrated Modules, Logic

Loudspeakers—See Speakers

Louvers, Vents, & Windows (For Equipment)—See Cabinets & Accessories, Metal—Vol 3

Lsi Circuits—See Circuits, Large Scale Integration—Vol 2

Lubricants-Also See Greases—See Vol 3

Lugs—See Terminals, Lug—Vol 3

Luminescent Chemicals—See Chemicals, Luminescent—Vol 3

Luminous Paints—See Paints, Luminous—Vol 3

LVDT—See Transducers, Displacement—Vol 2

Machines, Axial Lead Straightening, Automatic

Barnes Corp., Lansdowne, Pa.
Macronetics, Inc., E. Palo Alto, Cal.
Universal Instrs., Binghamton, N.Y.

Machines, Balancing—See Balancing Equipment

Machines, Blueprint—See Blueprint Machines—Vol 3

Machines, Chemical Milling

Allis-Chalmers, Milwaukee, Wisc.
Chemcut Corp., State College, Pa.
Dynachem Corp., Santa Fe Springs, Cal.
Etchomatic, Inc., Waltham, Mass.
Sanders Assocs., GPL P.C. Prod. Equip., Manchester, N.H.

Machines, Cleaning-Also See Cleaners, Ultrasonic; Machines, Vapor-Degreasing

Advanced Patent Technology, Inc., Las Vegas, Nev.
Aubin, A.E. Co., Glastonbury, Conn.
Baron-Blakeslee, Inc., Chicago, Ill.
Cobehn, Inc., Fairfield, N.J.
Commander Labs., Inc., Escondido, Calif.
Cyclo-Tronics, Inc., Chicago, Ill.
DoAll Co., Des Plaines, Ill.
Dynasonics Corp., Pipestone, Minn.
Electrovert, Inc., Mt. Vernon, N.Y.
Etchomatic, Inc., Waltham, Mass.
Gagne Assocs., Inc., Binghamton, N.Y.
Industrial Washing Mach., Matawan, N.J.
Inland Mfg. Co., Omaha, Neb.
Kepro Cir. Sys., Inc., St. Louis, Mo.
L & R Mfg. Co., Kearny, N.J.
Lewis Corp., Woodbury, Conn.
Macronetics, Inc., E. Palo Alto, Cal.
Marcal Electro-Sonics, Burkank, Calif.
Neumade Prods. Corp., Scarsdale, N.Y.
Nuclear Equip. Chem. Corp., Farmingdale, N.Y.
Oakite Prods., Inc., Berkeley Hgts., N.J.
Phoenix Materials Corp., Kittanning, Pa.
Sanders Assocs., GPL P.C. Prod. Equip., Manchester, N.H.
Sara Scientific Co., San Francisco, Calif.
Technic, Inc., Providence, R.I.
Tronic Corp., Belmont, Calif.
Wells Elctrns., Inc., So. Bend, Ind.
Wells Elctrns., Inc., Weltek Div., So. Bend, Ind.
Wheelabrator Corp., Mishawaka, Ind.

Machines, Coil-Winding

Arnold Magnetics, Culver City, Cal.
Kahle Engrg. Co., Union City, N.J.
Amacoil Machinery, New Rochelle, N.Y.
Coil Winding Equip. Co., Inc., Oyster Bay, N.Y.
Elden Mfg. Corp., Chicago, Ill.
Eubanks Engrg., Monrovia, Calif.
Gorman Machine Corp., Costa Mesa, Cal.
Granite State Machine Co., Inc., Manchester, N.H.
Halm Instr. Co., Inc., Glen Head, N.Y.
Ind'l. Winding Mach., River Edge, N.J.
Leesona Corp., Danbury, Conn.
Mechanical Technology, Inc., Latham, N.Y.
Perkins Machine & Gear, W. Springfield, Mass.
Possis Mach., Minneapolis, Minn.
REA Magnet Wire Co., Ft. Wayne, Ind.
Solatron Enterprises, Inglewood, Calif.
Techni-Tool, Inc., Philadelphia, Pa.
Universal Mfg. Co., Inc., Irvington, N.J.
Wolfson, P.J. Co., New Rochelle, N.Y.

Machines, Coil-Winding, Toroidal

Arnold Magnetics, Culver City, Cal. **p 651**
Coil Winding Equip. Co., Inc., Oyster Bay, N.Y.
Elden Mfg. Corp., Chicago, Ill.
Gorman Machine Corp., Costa Mesa, Cal.
Harder, Donald C. Co., Inc., San Diego, Calif.
Ind'l. Winding Mach., River Edge, N.J.
Leesona Corp., Danbury, Conn.
Rex Rheostat & Co., Roosevelt, N.Y.
Torin Corp., Torrington, Conn.
Universal Mfg. Co., Inc., Irvington, N.J.
Wolfson, P.J. Co., New Rochelle, N.Y.

Machines, Component Handling & Feeding

Barnes Corp., Lansdowne, Pa.
Beckman Instrs., Cedar Grove, N.J.
Boonton Elctrns., Parsippany, N.J.
Elco, Willow Grove, Pa.
Kahle Engrg. Co., Union City, N.J. **p 947**
Aidlin Automation, Inc., Brooklyn, N.Y.
Anchor Specialty Mfg., Teterboro, N.J.
Automation Devices, Inc., Fairview, Pa.
Barnes & Reinecke, Inc., Chicago, Ill.
Black & Webster, Inc., Waltham, Mass.
C.E.M. Co., Inc., Danielson, Conn.
Connectrol Corp., New York, N Y
Daymarc Corp., Waltham, Mass.
Exact Weight Scale Co., Columbus, Ohio
Eyelet Tool Co., Inc., Cambridge, Mass.
Federal Mach. Co., Inc., Jersey City, N.J.
Freudenberg, B., Inc., New York, N.Y.
Halm Instr. Co., Inc., Glen Head, N.Y.
Headway Research, Inc., Garland, Tex.
Honeywell, Aerospace & Def., Minneapolis, Minn.
IPT Corp., Mountain View, Cal.
Laser Technology, Inc., N. Hollywood, Calif.
Mechanical Technology, Inc., Latham, N.Y.
Midwest Automatic, Inc., Des Moines, Iowa
Possis Mach., Minneapolis, Minn.
Ragen Precision Inds., Inc., N. Arlington, N.J.
Solatron Enterprises, Inglewood, Calif.
Universal-Automatic Corp., Des Plaines, Ill.
Universal Instrs., Binghamton, N.Y.

Machines, Component Inserting

Berg Elctrns., Inc., New Cumberland, Pa. ..... **p 2592**
Elco, Willow Grove, Pa. ..... **p 2625**
Kahle Engrg. Co., Union City, N.J. **p 947**
Aidlin Automation, Inc., Brooklyn, N.Y.
Barnes & Reinecke, Inc., Chicago, Ill.
C.E.M. Co., Inc., Danielson, Conn.
Eyelet Tool Co., Inc., Cambridge, Mass.
Federal Mach. Co., Inc., Jersey City, N.J.
Honeywell, Aerospace & Def., Minneapolis, Minn.
Mechanical Technology, Inc., Latham, N.Y.
Midwest Automatic, Inc., Des Moines, Iowa
Penn Engrg. & Mfg. Corp., Doylestown, Pa.
Ragen Precision Inds., Inc., N. Arlington, N.J.
Superior Elec., Bristol, Conn.
Universal Instrs., Binghamton, N.Y.
U.S. Terminals, Inc., Cincinnati, Ohio

Machines, Component Lead Cleaning

Aubin, A.E. Co., Glastonbury, Conn.
Eraser Co., Syracuse, N.Y.
MacDonald & Co., Glendale, Calif.

Machines, Crimping—See Tools, Crimping—Vol 3

Machines, Crystal Manufacturing

Kahle Engrg. Co., Union City, N.J.
Avco Felker Corp., Torrance, Calif.
Laser Technology, Inc., N. Hollywood, Calif.
Lindberg Hevi-Duty, Chicago, Ill.
Materials Resch. Corp., Orangeburg, N.Y.
Research Instr. Co., Westbury, N.Y.
Taylor-Winfield Corp., Warren, Ohio
Universal Shellac & Supply Co., Inc., Hicksville, NY
Vacuum Equip. Div., Newton, Mass.

Machines, Cutting

Kahle Engrg. Co., Union City, N.J.
Sprague Elec. Co., No. Adams, Mass.
American Instr. Co., Silver Spring, Md.
Automatic Die Cutting Mach. Co., New York, N.Y.
Avco Felker Corp., Torrance, Calif.
Bendix, Dayton, Ohio
Black & Decker Mfg. Co., The, Towson, Md.
Di-Acro, Lake City, Minn.
DoAll Co., Des Plaines, Ill.
Eraser Co., Syracuse, N.Y.
Foredom Elec. Co., Bethel, Conn.
Foster & Allen, Inc., Chatham, N.J.
Hobbs Mfg. Co., Worcester, Mass.
Materials Resch. Corp., Orangeburg, N.Y.
Mechanization Assocs., Mt. View, Calif.
Miller-Stephenson Chem. Co., Inc., Danbury, Conn.
Porter, H.K., Inc., Somerville, Mass.
Tempress Inds., Inc., Los Gatos, Calif.
Vacuum Equip. Div., Newton, Mass.
VWR Scientific, San Francisco, Cal.
Western Elctrn. Prods. Co., San Clemente, Cal.
Wybar Elctrns., Inc., Syracuse, N.Y.

Machines, Deflashing

Aidlin Automation, Inc., Brooklyn, N.Y.
Aubin, A.E. Co., Glastonbury, Conn.
Eraser Co., Syracuse, N.Y.
Hull Corp., Hatboro, Pa.
Wells Elctrns., Inc., So. Bend, Ind.
Wheelabrator Corp., Mishawaka, Ind.
Wybar Elctrns., Inc., Syracuse, N.Y.

Machines, Degreasing, Vapor—See Machines, Vapor-Degreasing

Machines, Drying

Despatch Oven Co., Minneapolis, Minn.
Fostoria-Fannon, Inc., Fostoria, Ohio
Harshaw Chem. Co., Cleveland, Ohio
Hull Corp., Hatboro, Pa.
L & R Mfg. Co., Kearny, N.J.
Reeve Elctrns., Inc., Chicago, Ill.
Sanders Assocs., GPL P.C. Prod. Equip., Manchester, N.H.
Techni-Tool, Inc., Philadelphia, Pa.

Machines, Electrical Discharge

Energy Sciences Inc., Burlington, Mass.

Machines, Encapsulating

Kahle Engrg. Co., Union City, N.J.
Adams & Assoc., Inc., Hollywood, Cal.
Conforming Matrix Corp., Toledo, Ohio
Hardman Inc., Belleville, N.J.
Hull Corp., Hatboro, Pa.
Janel, Inc., Stirling, N.J.
Joy Mfg. Co., New Phila., Ohio
Kenics Corp., Danvers, Mass.
Norelcom Inds., Inc., Farmingdale, N.Y.
Pennwalt Corp., Phila., Pa.
Possis Mach., Minneapolis, Minn.
Red Point Corp., Burbank, Calif.
Research Instr. Co., Westbury, N.Y.
Taylor-Winfield Corp., Warren, Ohio
3M Co., St. Paul, Minn.
Tra-Con, Inc., Medford, Mass.
Warren Comps. Corp., Warren, Pa.

Machines, Engraving & Profiling—See Engraving & Profiling Equipment

Machines, Etching, Printed Circuits

Virginia Panel Corp., Waynesboro, Va.
Chemcut Corp., State College, Pa.

Cyclo-Tronics, Inc., Chicago, Ill.
Etchomatic, Inc., Waltham, Mass.
Kepro Cir. Sys., Inc., St. Louis, Mo.
Materials Resch. Corp., Orangeburg, N.Y.
NuTek Industries, Mountain View, Cal.
Sanders Assocs., GPL P.C. Prod. Equip., Manchester, N.H.
Superior Elec., Bristol, Conn.

Machines, Eyelet Installing

Berg Elctrns., Inc., New Cumberland, Pa.
Aidlin Automation, Inc., Brooklyn, N.Y.
Eyelet Tool Co., Inc., Cambridge, Mass.
Kepro Cir. Sys., Inc., St. Louis, Mo.
Lear Siegler, Inc., Santa Monica, Calif.
Litton Inds., Van Nuys, Calif.
Malco Mfg. Co., Chicago, Ill.
Segal, Edward, Inc., New York, N.Y.
Sjoberg, C. & Son, Inc., Cranston, R.I.
Stimpson Co., Inc., Bayport, N.Y.
Superior Elec., Bristol, Conn.
USM Corp., Shelton, Conn.

Machines, Helixing Lathe

Halm Instr. Co., Inc., Glen Head, N.Y.

Machines, Hermetic Sealing

Kahle Engrg. Co., Union City, N.J. p 947
Conforming Matrix Corp., Toledo, Ohio
Research Instr. Co., Westbury, N.Y.
Taylor-Winfield Corp., Warren, Ohio

Machines, Hot-Stamping

Ackerman Gould Co., Inc., Oceanside, N.Y.
Acromark Co., Berkeley Hts, N.J.
Aidlin Automation, Inc., Brooklyn, N.Y.
Apex Machine Co., Ft. Lauderdale, Fla.
Automatic Die Cutting Mach. Co., New York, N.Y.
Kingsley Mach. Co., Hollywood, Calif.
Manger Elec. Co., Inc., Stamford, Conn.
Markem Corp., Keene, N.H.
Matthews, Jas & Co., Pittsburgh, Pa.
Noble & Westbrook, E. Hartford, Conn.

Machines, Impregnating

Hardman Inc., Belleville, N.J.
Hull Corp., Hatboro, Pa.
Loctite Corp., Newington, Conn.
National Vacuum Platers, Inc., Philadelphia, Pa.
Pennwalt Corp., Phila., Pa.
Possis Mach., Minneapolis, Minn.
Red Point Corp., Burbank, Calif.
Universal Mfg. Co., Inc., Irvington, N.J.

Machines, Induction Heating (Electronic)

Cober Elctrns., Inc., Stamford, Conn. p 601
Cycle-Dyne, Inc., Jamaica, N.Y.
Granville-Phillips Co., Boulder, Colo.
Reeve Elctrns., Inc., Chicago, Ill.
Taylor-Winfield Corp., Warren, Ohio
Tocco Div., Cleveland, Ohio

Machines, Lead Cutting & Forming

Barnes Corp., Lansdowne, Pa.
Kahle Engrg. Co., Union City, N.J.
Bruno-New York Inds. Corp., New York, N.Y.
D-Vel Resch. Labs., Inc., Bedford Hills, N.Y.
Eraser Co., Syracuse, N.Y.
Harwil Co., Santa Monica, Calif.
James Elctrn. Tool Co., Palo Alto, Calif.
Macronetics, Inc., E. Palo Alto, Cal.
Manger Elec. Co., Inc., Stamford, Conn.
Mechanical Technology, Inc., Latham, N.Y.
Pico Crimping Tools Co., Santa Fe Springs, Calif.
Sanders Assocs., GPL P.C. Prod. Equip., Manchester, N.H.
Tech. Devices Co., Culver City, Calif.
Trish Energetics, Harvard, Mass.
Western Elctrn. Prods. Co., San Clemente, Cal.
Wybar Elctrns., Inc., Syracuse, N.Y.

Machines, Marking & Numbering

Aero Devices, Inc., Totowa, N.J.
Ackerman Gould Co., Inc., Oceanside, N.Y.
Acromark Co., Berkeley Hts, N.J.
Apex Machine Co., Ft. Lauderdale, Fla.
Avery Prods. Graphics Div., Santa Ana, Calif
Black & Webster, Inc., Waltham, Mass.
Bostitch, E. Greenwich, R.I.
Brady, W.H. Co., Milwaukee, Wisc.
Dennison Mfg., Framingham, Mass.
Eastern Marking Mach. Corp., Island Pk., N.Y.
Formulabs Ind'l. Inks, Escondido, Cal.
Gillies, Duncan M. Co., Inc., W. Boylston, Mass.
Halm Instr. Co., Inc., Glen Head, N.Y.
Hermes Plastics, Inc., New York, N.Y.
Independent Ink, Inc., Gardena, 90248
Kingsley Mach. Co., Hollywood, Calif.
Manger Elec. Co., Inc., Stamford, Conn.
Markem Corp., Keene, N.H.
Matthews, Jas & Co., Pittsburgh, Pa.
Metalphoto Corp., Cleveland, Ohio
New Hermes Engraving Mach. Corp., New York, N.Y.
Noble & Westbrook, E. Hartford, Conn.
Popper & Sons, Inc., New York, N.Y.
Preis, H.P. Engraving Mach. Co., Hillside, N.J.
Pryor Marking Prods., Chicago, Ill.
Solatron Enterprises, Inglewood, Calif.
Star Enterprises-Div., Lowell, Mass.
Universal Instrs., Binghamton, N.Y.

Machines, Mask Alignment & Exposure

Sprague Elec. Co., No. Adams, Mass.
Chemcut Corp., State College, Pa.
Conforming Matrix Corp., Toledo, Ohio
High Vacuum Equip. Corp., Hingham, Mass.
Hugle Inds., Sunnyvale, Cal.
IPT Corp., Mountain View, Cal.
Micro Tech. Mfg., Inc., Worcester, Mass.
Micro-Line, Jamestown, N.Y.
Opto-Metric Tools, Rockleigh, N.J.

Machines, Material Handling (Electronic Control)

Barnes & Reinecke, Inc., Chicago, Ill.
Barrett Elctrns. Corp., Northbrook, Ill.
Everett/Charles, Inc., Pomona, Cal.
Exact Weight Scale Co., Columbus, Ohio
Harshaw Chem. Co., Cleveland, Ohio
Lewis G. B. Co, Watertown, Wisc
Mechanical Technology, Inc., Latham, N.Y.
Noble Elctrns., Inc., Carpinteria, Calif.
PMC Designing, Cincinnati,, Ohio
Possis Mach., Minneapolis, Minn.
Ragen Precision Inds., Inc., N. Arlington, N.J.
Sensor Corp., Greenwich, Conn.
Wells Elctrns., Inc., Weltek Div., So. Bend, Ind.

Machines, Metallizing, Vacuum—See Deposition Equipment, Vacuum

Machines, Measuring

Gould, Inc., Cleveland, Ohio
Addison Div., Mountainside, N.J.
Ade Corp., Watertown, Mass.
Commander Labs., Inc., Escondido, Calif.
Ehrenreich Photo-Optical Industries Inc., Garden City, N.Y.
Farrand Controls, Inc., Valhalla, N.Y.
Freudenberg, B., Inc., New York, N.Y.
Gaertner Scientific Corp., Chicago, Ill.
Hykon Mfg. Co., Alliance, Ohio
IKL, Inc., Newport Beach, Calif.
Mechanical Technology, Inc., Latham, N.Y.
Micro-Line, Jamestown, N.Y.
Olympus Corp. America, New Hyde Park, N.Y.
Opto-Metric Tools, Rockleigh, N.J.
Optomechanisms, Inc., Plainview, N.Y.
Potter Instr. Co., Melville, N.Y.
Solatron Enterprises, Inglewood, Calif.
Titan Tool Supply Co., Inc., Buffalo, N.Y.
Traid Corp., Glendale, Cal.
Transducer Controls Corp., Covina, Calif.
Unitron Instr. Co., Newton Highlands, Mass.

Machines, Parts Cleaning—See Machines, Cleaning

Machines, Plastic Molding

Adams & Assoc., Inc., Hollywood, Cal.
Alden Sys. Co., Inc., Westboro, Mass.
Automatic Die Cutting Mach. Co., New York, N.Y.
Custom Sci. Instrs., Inc., Whippany, N.J.
Di-Acro, Lake City, Minn.
H-P-M Div., Mt. Gilead, Ohio
Hull Corp., Hatboro, Pa.
K-Tech., Inc., Framingham, Mass.
Newbury Inds., Inc., Newbury, Ohio
Orbit, Inc, Deming, N.M.
Pennwalt Corp., Phila., Pa.
Pentronix, Div., Lincoln Pk., Mich.
Plastics Mach. Div., New Britain, Conn.
Wabash Metal Prods., Wabash, Ind.
Warren Comps. Corp., Warren, Pa.
Wolfson, P.J. Co., New Rochelle, N.Y.

Machines, Plating

Opad Elec. Co., Inc., New York, N.Y.
Aubin, A.E. Co., Glastonbury, Conn.
Darrah Elec. Co., Inc., Cleveland, Ohio
Electrovert, Inc., Mt. Vernon, N.Y.
Harshaw Chem. Co., Cleveland, Ohio
LEA Mfg. Co., Waterbury, Conn
M & T Chemicals Inc., Rahway, N.J.
Metaplast Electrochemicals, Bronx, N.Y.
Sel-Rex Corp., Nutley, N.J.
Selectrons, Ltd., New York, N.Y.
Technic, Inc., Providence, R.I.
3M Co., St. Paul, Minn.
Wolfson, P.J. Co., New Rochelle, N.Y.

Machines, Polishing & Buffing —See Vol 3

Machines, Printed Circuit Drilling & Punching

Dimensional Control Machinery Co., Salem, Ohio
Dumore Co., Racine, Wisc.
Etchomatic, Inc., Waltham, Mass.
Excellon Inds., Torrance, Calif.
Gardner-Denver Co., Quincy, Ill.
Kepro Cir. Sys., Inc., St. Louis, Mo.
Lear Siegler, Inc., Santa Monica, Calif.
Lear Siegler, Anaheim, Cal.
Mico Instr. Co., Cambridge, Mass.
New Hermes Engraving Mach. Corp., New York, N.Y.
Optomechanisms, Inc., Plainview, N.Y.
Servo Prods. Co., Altadena, Cal.
Superior Elec., Bristol, Conn.
Universal-Automatic Corp., Des Plaines, Ill.
Universal Instrs., Binghamton, N.Y.
Wabash Metal Prods., Wabash, Ind.

Machines, Punching

Allen, Alva Inds., Clinton, Mo.
Black & Webster, Inc., Waltham, Mass.
Blum, Julius & Co., Inc., Carlstadt, N.J.
Gagne Assocs., Inc., Binghamton, N.Y.
General Hardware Mfg. Co., New York, N.Y.
Trish Energetics, Harvard, Mass.

Machines, Reel Packaging

Universal Instrs., Binghamton, N.Y.

Machines, Resistance Also See Resistance Adjusting Equipment For Hybrid Microcircuits

A. D. Data Sys., Inc., Rochester, N.Y.
Kahle Engrg. Co., Union City, N.J.
Hughes Aircraft Co., Torrance, Cal.
Neutronic Corp., Bridgeton, Mo.
Research Instr. Co., Westbury, N.Y.

Machines, Riveting

Aidlin Automation, Inc., Brooklyn, N.Y.
Black & Webster, Inc., Waltham, Mass.
Cherry Rivet Div., Santa Ana, Calif.
Chicago Rivet & Mach. Co., Bellwood, Ill.
Conrac Corp., New York, N.Y.
Eyelet Tool Co., Inc., Cambridge, Mass.
Gardner-Denver Co., Quincy, Ill.
High Speed Hammer Co., Inc., Rochester, N.Y.
Milford Rivet & Mach., Milford, Conn.
Stimpson Co., Inc., Bayport, N.Y.
Trish Energetics, Harvard, Mass.
Universal-Automatic Corp., Des Plaines, Ill.
USM Corp., Shelton, Conn.
Wolfson, P.J. Co., New Rochelle, N.Y.

Machines & Accessories, Semiconductor Manufacturing

Kahle Engrg. Co., Union City, N.J. p 947
Sprague Elec. Co., No. Adams, Mass.
Applied Materials Tech., Inc., Santa Clara, Cal
Dixie Diamond Tool, Miami, Fla.
Ewald Instrs. Corp., Kent, Conn.
HLC Mfg. Co., Inc., Willow Grove, Pa.
HLS, Inc., Santa Clara, Cal.
Hoffman, P.R. Co. Div., Carlisle, Pa.
Hugle Inds., Sunnyvale, Cal.
Hull Corp., Hatboro, Pa.
IPT Corp., Mountain View, Cal.
Laser Technology, Inc., N. Hollywood, Calif.
Laurier Assocs., Westford, Mass.
Lepel High Frequency Labs., Maspeth, N.Y.
Macronetics, Inc., E. Palo Alto, Cal.
Mechanical Technology, Inc., Latham, N.Y.
Mechanization Assocs., Mt. View, Calif.
Micro Tech. Mfg., Inc., Worcester, Mass.
Norton Co., Worcester, Mass.
NuTek Industries, Mountain View, Cal.
Pentronix, Div., Lincoln Pk., Mich.
Phoenix Materials Corp., Kittanning, Pa.
Quantronix Corp., Smithtown, N.Y.
Research Instr. Co., Westbury, N.Y.
Semimetals, Inc., Westbury, N.Y.
Tekform Prods. Co., Anaheim, Cal.
Tempress Inds., Inc., Los Gatos, Calif.
Universal Instrs., Binghamton, N.Y.
Universal Shellac & Supply Co., Inc., Hicksville, NY
Wentworth Labs, Inc., Broadfield, Conn.

Machines, Shock Testing—See Testers, Shock

Machines, Sleeve Cutting

Ackerman Gould Co., Inc., Oceanside, N.Y.
Automatic Die Cutting Mach. Co., New York, N.Y.
Eraser Co., Syracuse, N.Y.
Foster & Allen, Inc., Chatham, N.J.
Hedquist Mach. & Tool, Mountain View, Cal.
Kingsley Mach. Co., Hollywood, Calif.
MacDonald & Co., Glendale, Calif.
Western Elctrn. Prods. Co., San Clemente, Cal.
Wybar Elctrns., Inc., Syracuse, N.Y.

Machines, Solderability Testing

Multicore Sls. Corp., Westbury, N.Y. p 2942
Lear Siegler, Inc., Santa Monica, Calif.
Lear Siegler, Anaheim, Cal.
Mechanization Assocs., Mt. View, Calif.

Machines, Soldering—See Soldering Equip.

Machines, Sorting

Barnes Corp., Lansdowne, Pa.
Beckman Instrs., Cedar Grove, N.J.
Boonton Elctrns., Parsippany, N.J.
Aidlin Automation, Inc., Brooklyn, N.Y.
Automated Packaging Sys., Twinsburg, Ohio
Bendix, Dayton, Ohio
Daymarc Corp., Waltham, Mass.
Freudenberg, B., Inc., New York, N.Y.
Accu-Sort Sys., Inc., Phila., Pa.
IPT Corp., Mountain View, Cal.
Lundy Elctrns. & Sys., Inc., Glen Head, N.Y.
Magnaflux Corp., Chicago, Ill.
Mechanical Technology, Inc., Latham, N.Y.
Photobell Co., Inc., New York, N.Y.
Sensor Corp., Greenwich, Conn.
Universal Instrs., Binghamton, N.Y.

Machines, Spinner, Photo-Resist

Headway Research, Inc., Garland, Tex.
Macronetics, Inc., E. Palo Alto, Cal.
Micro Tech. Mfg., Inc., Worcester, Mass.

Machines, Swaging

Vector Elctrn. Co., Inc., Sylmar, Cal.
Advanced Kinetics, Costa Mesa, Calif.
Aidlin Automation, Inc., Brooklyn, N.Y.

Black & Webster, Inc., Waltham, Mass.
Crimpco Engrg., Cangoga Park, Calif.
D-Cemco, Inc., Burbank, Calif.
Eyelet Tool Co., Inc., Cambridge, Mass.
High Speed Hammer Co., Inc., Rochester, N.Y.
Penn Engrg. & Mfg. Corp., Doylestown, Pa.
Torrington Co., Torrington, Conn.
Trish Energetics, Harvard, Mass.

Machines, Tape Winding

Almond Instrs. Co., Covina, Cal.... p 329
Kahle Engrg. Co., Union City, N.J.
Cycle Equip. Co., Los Gatos, Calif.
Echo Science Corp., Pasadena, Cal.
Hedquist Mach. & Tool, Mountain View, Cal.
Ind'l. Winding Mach., River Edge, N.J.
3M Co., St. Paul, Minn.
Universal Mfg. Co., Inc., Irvington, N.J.
Wolfson, P.J. Co., New Rochelle, N.Y.

Machines, Tape Winding, Toroidal

Ind'l. Winding Mach., River Edge, N.J.
Rex Rheostat & Co., Roosevelt, N.Y.
Universal Mfg. Co., Inc., Irvington, N.J.
Wolfson, P.J. Co., New Rochelle, N.Y.

Machines, Terminal Installing

Amp Inc., Harrisburg, Pa.
Berg Elctrns., Inc., New Cumberland, Pa. ..... p 2592
Elco, Willow Grove, Pa. ..... p 2625
Kahle Engrg. Co., Union City, N.J. p 947
Smith, Herman H., Inc., Bklyn., N.Y.
Vector Elctrn. Co., Inc., Sylmar, Cal.
Aidlin Automation, Inc., Brooklyn, N.Y.
American Pamcor, Inc., Paoli, Pa
Ark-Les Switch Corp., Watertown, Mass.
Black & Webster, Inc., Waltham, Mass.
Connectrol Corp., New York, N Y
Electric Terminal Corp., Warwick, R.I.
Eyelet Tool Co., Inc., Cambridge, Mass.
Halm Instr. Co., Inc., Glen Head, N.Y.
Malco Mfg. Co., Chicago, Ill.
Molex Prods. Co., Downers Grove, Ill.
Segal, Edward, Inc., New York, N.Y.
Sjoberg, C. & Son, Inc., Cranston, R.I.
Universal Instrs., Binghamton, N.Y.
Waldom Elctrns., Inc., Chicago, Ill.

Machines, Transistor Assembling

Kahle Engrg. Co., Union City, N.J. p 947
Sprague Elec. Co., No. Adams, Mass.
IPT Corp., Mountain View, Cal.
Laurier Assocs., Westford, Mass.
Micro Tech. Mfg., Inc., Worcester, Mass.
Tempress Inds., Inc., Los Gatos, Calif.
Unitek Corp., Monrovia, Calif.
Wentworth Labs, Inc., Broadfield, Conn.

Machines, Ultrasonic Bonding

Advanced Patent Technology, Inc., Las Vegas, Nev.
Aperco Co., East Meadow, N.Y.
Branson Sonic Power, Danbury, Conn
Delta Sonics, Hawthorne, Cal
Hugle Inds., Sunnyvale, Cal.
Laurier Assocs., Westford, Mass.
Lindberg Hevi-Duty, Chicago, Ill.
Mechanical Technology, Inc., Latham, N.Y.
Sonobond Corp., West Chester, Pa.
Unitek Corp., Monrovia, Calif.
Wentworth Labs, Inc., Broadfield, Conn.

Machines, Vapor-Degreasing-Also See Cleaners, Ultrasonic

Advanced Patent Technology, Inc., Las Vegas, Nev.
Baron-Blakeslee, Inc., Chicago, Ill.
Bendix Corp., Davenport, Iowa
Cyclo-Tronics, Inc., Chicago, Ill.
Delta Sonics, Hawthorne, Cal
Dynasonics Corp., Pipestone, Minn.
Gagne Assocs., Inc., Binghamton, N.Y.
Headway Research, Inc., Garland, Tex.
Lewis Corp., Woodbury, Conn.
London Chemical Co., Bensenville, Ill.
Phillips Mfg. Co., Chicago, Ill.
Phoenix Materials Corp., Kittanning, Pa.
Richardson Co., Des Plaines, Ill.
Sara Scientific Co., San Francisco, Calif.
Techni-Tool, Inc., Philadelphia, Pa.
Tronic Corp., Belmont, Calif.
Wheelabrator Corp., Mishawaka, Ind.

Machines, Vibration Fatigue Testing—See Vibration Test Systems

Machines, Wafer Alignment—See Machines, Mask Alignment & Exposure

Machines, Whiteprint—See Whiteprint Machines—Vol 3

Machines, Wire Marking, Hand & Automatic—See Wire Marking Machines

Machines, Wire Measuring & Cutting—See Wire Measuring & Cutting Machines

Machines, Wire Wrapping-Also See Wire Wrapping Tools

American Pamcor, Inc., Paoli, Pa
Connectrol Corp., New York, N Y
Geartronics Corp., N. Billerica, Mass.
Hughes Aircraft Co., Ind'l. Prods. Div., Oceanside, Cal.
Hughes Aircraft Co., Ind'l. Prods. Div./Ind'l. Auto, Oceanside, Cal.
Laser Technology, Inc., N. Hollywood, Calif.
Superior Elec., Bristol, Conn.
Universal Instrs., Binghamton, N.Y.

Macroscopic Equip.—See Magnifying Glasses, Inspection

Magnetic Analyzers—See Analyzers, Magnetic

Magnetic Core Testers—See Testers, Magnetic Core

Magnetic Disc Storage Systems

Digital Equip. Corp., Maynard, Mass.
Ampex Corp., Redwood City, Calif.
Applied Magnetics Corp., Goleta, Calif.
Barger Corp., Sunnyvale, Cal.
California Computer Prods., Anaheim, Cal
Data Disc Inc., Computer Prods., Sunnyvale, Cal.
Data Disc, Video Div., Sunnyvale, Cal.
Data Recording Sys., Sunnyvale, Cal.
Digital Dev. Corp., San Diego, Calif.
Environmental Container Sys., Union City, Calif.
Friden Div., San Leandro, Calif.
General Instr. Corp., Hawthorne, Cal.
Honeywell Information Systems, Wellesley Hills, Mass
Houston Scientific Inds., Inc., Houston, Tex
Hughes Aircraft Co, Culver City, Cal.
Hughes Aircraft Co, Fullerton, Cal.
Mac Panel Co., High Pt., N.C.
Memorex Corp., Santa Clara, Cal.
Neumade Prods. Corp., Scarsdale, N.Y.
RCA Govt. & Comm. Sys., Moorestown, N.J.
3M Co., St. Paul, Minn.
Xerox Data Sys., El Segundo, Cal

Magnetic Field Indicators—See Indicators, Magnetic Field

Magnetic Foil—See Foil, Magnetic—Vol 3

Magnetic Iron Oxides—See Vol 3

Magnetic Recording Tape—See Tapes, Recording, Magnetic

Magnetic Shields & Materials—See Shields, Magnetic—Vol 3

Magnetic Tape Recorders—See Recorders, Magnetic Tape-Also See Data Recorders

Magnetizers

Arnold Engrg. Co., Marengo, Ill.
Bell, F.W., Inc., Columbus, Ohio.... p 418
General Elec. Co., Schenectady, N.Y.
ISC Magnetics Div., Huntington, N.Y.
Ogallala Elctrns., Ogallala, Neb.
RFL Inds., Instr. Div., Boonton, N.J. p 554
Advanced Kinetics, Costa Mesa, Calif.
Annis, R.B. Co., Indianapolis, Ind.
Barnes & Reinecke, Inc., Chicago, Ill.
Coil Co. of Amer., Northvale, N.J.
Crucible Steel Corp., Pittsburgh, Pa.
Dura Magnetics, Inc., Sylvania, Ohio
Elctrn. Brazing Co., Hackensack, N.J.
Indiana Gen'l.-Process Equip., Cudahy, Wisc.
Magnaflux Corp., Chicago, Ill.
Magnetic Sys. & Instrs., Worcester, Mass.
Magnetics Sys. & Instrs., Worcester, Mass.
Permag Corp., Jamaica, N.Y.
Permanent Magnet Co., Inc., Indianapolis, Ind.
Thomas & Skinner, Inc., Indianapolis, Ind.

Magnetometers

California Elctrn. Mfg. Co., Alamo, Calif.
Electro-Mechanics Co., Austin, Tex. p 452
Hewlett-Packard, Palo Alto, Cal.
ISC Magnetics Div., Huntington, N.Y.
Ohio Semitronics, Columbus, Ohiop 533
RFL Inds., Instr. Div., Boonton, N.J. p 554
Advanced Kinetics, Costa Mesa, Calif.
Ann Arbor Div., Ann Arbor, Mich.
Annis, R.B. Co., Indianapolis, Ind.
A.O.I.P., 75/Paris 12eme, France
Automation Inds., Danbury, Conn.
Barringer Research, Ltd., Rexdale, Ont., Can.
GeoMetrics, Palo Alto, Cal.
Honeywell, Aerospace & Def., Minneapolis, Minn.
Infinetics, Inc., Wilmington, Del.
Irwin Labs., Inc., Los Angeles, Calif.
Magnetic Sys. & Instrs., Worcester, Mass.
Magnetics Sys. & Instrs., Worcester, Mass.
Princeton Applied Resch. Corp., Princeton, N.J.
Rank Precision Inds., W. Nyack, N.Y.
Schonstedt Instr. Co., Reston, Va.
Sharpe Audio Div., Tonawanda, N.Y.
Varian Assocs., Palo Alto, Cal.
Varian Assocs., Analytical Instr., Palo Alto, Cal.

Magnetoresistors, Hall—See Vol 2

Magnetron Testers—See Testers, Magnetron

Magnetrons—See Tubes, Magnetron—Vol 2

Magnets, Electromagnetic—See Vol 3

Magnets, Focusing—See Magnets, Permanent—Vol 3

Magnets (Lab Type)—See Vol 3

Magnets, Permanent—See Vol 3

Magnets, Superconducting—See Vol 3

Magnifying Glasses, Inspection-Also See Lamps, Magnifying

Circon Corp., Goleta, Cal.
Jonard Inds. Corp., Bronx, N.Y.
A. J. Abrams Co., Westport, Conn.
AGFA-Gevaert, Inc., Teterboro, N.J.
Bausch & Lomb, Rochester, N.Y.
Buhl Optical Co., Pittsburgh, Pa.
Corkpak Co., Inc., New Rochelle, N.Y.
Corning Glass Works, Tech. Prods. Div., Corning, N.Y.
Dell Optics Co., Inc., N. Bergen, N.J.
DoAll Co., Des Plaines, Ill.
Edmund Scientific Co., Barrington, N.J.
EdnaLite Corp., Peekskill, N.Y.
Ercona Corp., Bellmore, N.Y.
Esco Products, Oak Ridge, NJ
General Hardware Mfg. Co., New York, N.Y.
General Sci. Equip., Phila., Pa.
Glidelite Inds., Inc., Hackensack, N.J.
Hammel, Riglander & Co., New York, N.Y.
Heitz, Karl, Inc., New York, N.Y.
Itek Corp., Lexington, Mass.
Janel, Inc., Stirling, N.J.
Lenox Instr. Co., Philadelphia, Pa.
Moffatt Prods., Inc., Minneapolis, Minn.
Techni-Tool, Inc., Philadelphia, Pa.
Titan Tool Supply Co., Inc., Buffalo, N.Y.
Vigor Tool Co., New York, N.Y.
VWR Scientific, San Francisco, Cal.
Zeiss, Carl, Inc., New York, N.Y.

Marker Strips—See Strips, Marker & Fanning—Vol 3

Markers, Dry Transfer—See Kits, Marking—Vol 2

Markers, Identification—See Labels; Nameplates—Vol 3

Markers, Luminous—See Vol 2

Markers, R-F—See Generators, Marker—Vol 3

Markers, Terminal—See Kits, Marking, etc.—Vol 2

Markers, Wire, Tab & Sleeve—See Wire Markers—Vol 3

Marking Inks—See Inks, Marking—Vol 3

Masers

AIL, Div. Cutler-Hammer, Inc., Deer Park, N.Y.
Crystal Optics Resch., Inc., Ann Arbor, Mich.
Hughes Aircraft Co, Fullerton, Cal.
RCA Govt. & Comm. Sys., Moorestown, N.J.

Mask Alignment & Exposure Systems—See Machines, Mask Alignment & Exposure

Masking Films—See Films, Masking

Masks, Aperture, Color TV

Alloys Unlimited, Inc., Encino, Calif.
Buckbee-Mears Co., St. Paul, Minn.
Conforming Matrix Corp., Toledo, Ohio
GTE Sylvania, Inc., Towanda, Pa.
Omega Labs., Inc., Rowley, Mass.

Masks, Fabrication, Deposition—See Services, Mask Making—Vol 3

Masts, Antenna—See Antenna Towers & Supports

Material Thickness Indicators—See Indicators, Material Thickness

Materials, Acoustic, Sound-Absorbing—See Vol 3

Materials, Conductive Plastic—See Vol 3

Materials, Electromagnetic Wave Absorbing - Also See Coatings—See Vol 3

Materials, Ferrite - Also See Ferrite Parts—See Vol 3

Materials, Garnet - Also See Garnet Parts—See Vol 3

Materials, Graphite—See Vol 3

Materials, Self-Lubricating—See Vol 3

Matrices, Computer-Also See Boards, Programming

A. D. Data Sys., Inc., Rochester, N.Y. p 328
Interswitch, Burlingame, Cal. ..... p 1927
LVC Ind's., Inc., Corona, N.Y. ..... p 2617
Sealectro Corp., Mamaroneck, N.Y. p 2711
Tohoku Metal Inds., Ltd., Tokyo, Japan
Trompeter Elctrns., Chatsworth, Cal. p 1958
Virginia Panel Corp., Waynesboro, Va. p 2723
Hughes Aircraft Co, Culver City, Cal.
Hughes Aircraft Co, Fullerton, Cal.
Info-Lite Corp., Ft. Lee, N.J.
Instrument Data Products, Camarillo, Cal.
Mac Panel Co., High Pt., N.C.
Micro Switch, Freeport, Ill.
Siemens Corp., Comps. Div., Iselin, N.J.
TDK Elctrns. Corp., Long Island City, N.Y.
Virginia Elctrns. Co., Inc., Falls Church, Va.

Master Antenna TV Systems & Equipment

Data Technology, Palo Alto, Cal... p 429
Concord Elctrns., Los Angeles, Cal.
Data Technology Corp., Palo Alto, Cal.
Finney Co., Bedford, Ohio
Franel Corp., So. River, N.J.
Gavin Instrs., Somerville, N.J.
ITT Mackay Marine, Clark, N.J.
Maspro Co., Inc., Nagoya-Shigai, Japan
TACO Div., Sherburne, N.Y.
Varian Assoc., Beverly, Mass

Measuring Wire, Gear—See Gear Measuring Wire—Vol 3

Mechanical Readouts—See Readouts, Electromechanical —Vol 2

Medical Electronic Research Equipment—See Specific Types

Megaphones, Electrical—See Comm. Systems, Portable

Memory Arrays, Core

Ampex Corp., Redwood City, Calif.
Buckbee-Mears Co., St. Paul, Minn.
Cambridge Memories, Inc., Newtonville, Mass.
Data Prods. Corp., Woodland Hills, Calif.
Datapac, Inc., Santa Ana, Cal.
Di/An Controls, Inc., Boston, Mass.
Elctrn. Memories, Hawthorne, Cal.
Fabri-Tek, Inc., Minneapolis, Minn.
Fabri-Tex, Inc., Minneapolis, Minn.
Ferroxcube Corp., Saugerties, N.Y.
Goodyear Aerospace Corp., Akron, Ohio
Hughes Aircraft Co, Culver City, Cal.
Lear Siegler, Inc., Santa Monica, Calif.
Lockheed Elctrns. Co., Los Angeles, Calif.
Northern Sci., Inc., Middleton, Wisc.
Plessey Elctrns. Corp., Farmingdale, N.Y.
Standard Memories, Inc., Sherman Oaks, Cal.
TDK Elctrns. Corp., Long Island City, N.Y.
United Telecontrol Elctrns., Asbury Park, N.J.
Unitron Inds. Corp., Taipei, Taiwan, Republic of China

Memory Arrays, Plated Wire

Goodyear Aerospace Corp., Akron, Ohio
Honeywell, Aerospace & Def., Minneapolis, Minn.
Hughes Aircraft Co, Culver City, Cal.
Lockheed Elctrns. Co., Los Angeles, Calif.
Plessey Elctrns. Corp., Farmingdale, N.Y.

Memory Arrays, Thin-Film, Planar

Cambridge Memories, Inc., Newtonville, Mass.
Fabri-Tex, Inc., Minneapolis, Minn.
Hughes Aircraft Co, Culver City, Cal.

Memory Planes, Core

Computer Devices, Commack, N.Y.
Ampex Corp., Redwood City, Calif.
Cambridge Memories, Inc., Newtonville, Mass.
Data Prods. Corp., Woodland Hills, Calif.
Di/An Controls, Inc., Boston, Mass.
Elctrn. Memories, Hawthorne, Cal.
Fabri-Tek, Inc., Minneapolis, Minn.
Fabri-Tex, Inc., Minneapolis, Minn.
Ferroxcube Corp., Saugerties, N.Y.
Goodyear Aerospace Corp., Akron, Ohio
Hughes Aircraft Co, Culver City, Cal.
Lockheed Elctrns. Co., Los Angeles, Calif.
Northern Sci., Inc., Middleton, Wisc.
Plessey Elctrns. Corp., Farmingdale, N.Y.
Standard Memories, Inc., Sherman Oaks, Cal.
TDK Elctrns. Corp., Long Island City, N.Y.
United Telecontrol Elctrns., Asbury Park, N.J.
Unitron Inds. Corp., Taipei, Taiwan, Republic of China

Memory Planes, Plated Wire

Flexible Circuits, Inc., Warrington, Pa.
Goodyear Aerospace Corp., Akron, Ohio
Honeywell, Aerospace & Def., Minneapolis, Minn.
Hughes Aircraft Co, Culver City, Cal.
Lockheed Elctrns. Co., Los Angeles, Calif.
Plessey Elctrns. Corp., Farmingdale, N.Y.

Memory Planes, Thin-Film, Planar

Cambridge Memories, Inc., Newtonville, Mass.
Fabri-Tex, Inc., Minneapolis, Minn.
Flexible Circuits, Inc., Warrington, Pa.
Hughes Aircraft Co, Culver City, Cal.

Memory Stacks, Core

Digital Equip. Corp., Maynard, Mass.
Ampex Corp., Redwood City, Calif.
Cambridge Memories, Inc., Newtonville, Mass.
Data Prods. Corp., Woodland Hills, Calif.
Di/An Controls, Inc., Boston, Mass.
Elctrn. Memories, Hawthorne, Cal.
Fabri-Tek, Inc., Minneapolis, Minn.
Fabri-Tex, Inc., Minneapolis, Minn.
Ferroxcube Corp., Saugerties, N.Y.
Goodyear Aerospace Corp., Akron, Ohio
Haydu Prods., Inc., Opa Locka, Fla.
Hughes Aircraft Co, Culver City, Cal.
Lockheed Elctrns. Co., Los Angeles, Calif.
Northern Sci., Inc., Middleton, Wisc.
Plessey Elctrns. Corp., Farmingdale, N.Y.
United Telecontrol Elctrns., Asbury Park, N.J.
Unitron Inds. Corp., Taipei, Taiwan, Republic of China

Memory Stacks, Plated Wire

Goodyear Aerospace Corp., Akron, Ohio
Haydu Prods., Inc., Opa Locka, Fla.
Honeywell, Aerospace & Def., Minneapolis, Minn.
Hughes Aircraft Co, Culver City, Cal.
Lockheed Elctrns. Co., Los Angeles, Calif.
Plessey Elctrns. Corp., Farmingdale, N.Y.

Memory Systems, Delay Line

Andersen Labs. Inc., Bloomfield, Conn.
Bel Fuse, Inc., Jersey City, N.J.
Bliley Electric, Erie, Pa.
Computer Devices, Commack, N.Y. p 2739
Control Elctrns. Co., Inc., Farmingdale, N.Y.
Audio Instr. Co., Union City, N.J.
Corning Glass Works, Raleigh, N.C.
Di/An Controls, Inc., Boston, Mass.
Isomet Corp., Oakland, N.J.
Microsonics, Inc., Weymouth, Mass.
National Semiconductor, Santa Clara, Calif.

Memory Systems, Core

Digital Equip. Corp., Maynard, Mass.
AMBAC Inds., Garden City, N.Y.
Ampex Corp., Redwood City, Calif.
Cambridge Memories, Inc., Newtonville, Mass.
Data Prods. Corp., Woodland Hills, Calif.
Datacraft Corp., Ft. Lauderdale, Fla.
Datapac, Inc., Santa Ana, Cal.
Di/An Controls, Inc., Boston, Mass.
Elctrn. Memories, Hawthorne, Cal.
Fabri-Tek, Inc., Minneapolis, Minn.
Fabri-Tex, Inc., Minneapolis, Minn.
Ferroxcube Corp., Saugerties, N.Y.
Ferroxcube Corp., Englewood, Colo.
Goodyear Aerospace Corp., Akron, Ohio
Honeywell, Aerospace & Def., Minneapolis, Minn.
Hughes Aircraft Co, Culver City, Cal.
Lear Siegler, Inc., Santa Monica, Calif.
Lockheed Elctrns. Co., Los Angeles, Calif.
Plessey Elctrns. Corp., Farmingdale, N.Y.
Sanders Assocs., Nashua, N.H.
Standard Logic, Santa Ana, Cal.
Standard Memories, Inc., Sherman Oaks, Cal.
TDK Elctrns. Corp., Long Island City, N.Y.
Texas Instruments, Inc., Houston, Tex.
United Telecontrol Elctrns., Asbury Park, N.J.
Unitron Inds. Corp., Taipei, Taiwan, Republic of China
Varian Assocs., Palo Alto, Cal.

Memory Systems, Disc

Digital Equip. Corp., Maynard, Mass.
Gould, Inc., Cleveland, Ohio
Ampex Corp., Redwood City, Calif.
Barger Corp., Sunnyvale, Cal.
Bryant Computer Prods., Walled Lake, Mich.
California Computer Prods., Anaheim, Cal
Century Data Systems, Anaheim, Cal.
Computer Prods. Int'l., Inc., Santa Clara, Calif.
Data Disc Inc., Computer Prods., Sunnyvale, Cal.
Data Prods. Corp., Woodland Hills, Calif.
Data Recording Sys., Sunnyvale, Cal.
Digital Dev. Corp., San Diego, Calif.
Friden Div., San Leandro, Calif.
General Instr. Corp., Hawthorne, Cal.
Honeywell Information Systems, Wellesley Hills, Mass
Houston Scientific Inds., Inc., Houston, Tex
Hughes Aircraft Co, Culver City, Cal.
Kemper Engrg. Co., Northridge, Cal.
Potter Instr. Co., Melville, N.Y.

Memory Systems, Drum

Digital Equip. Corp., Maynard, Mass.
Bryant Computer Prods., Walled Lake, Mich.
Computer Prods. Int'l., Inc., Santa Clara, Calif.
General Instr. Corp., Hawthorne, Cal.
Honeywell Information Systems, Wellesley Hills, Mass
Houston Scientific Inds., Inc., Houston, Tex
Hughes Aircraft Co, Culver City, Cal.
Kenton Engrg. Corp., Skokie, Ill.
O E M Prods., Carlstadt, N.J.
Precision Instr. Co., Palo Alto, Calif.
RCA Govt. & Comm. Sys., Moorestown, N.J.

Memory Systems, Tape

Almond Instrs. Co., Covina, Cal
American Astrionics, Hollywood, Cal
Cook Electric Co., Morton Grove, Ill.
Datacom, Inc., Ft. Walton Bch., Fla.
Digital Equip. Corp., Maynard, Mass.
Hewlett-Packard, Palo Alto, Cal.
Remex Elctrns., Santa Ana, Cal.
Tohoku Metal Inds., Ltd., Tokyo, Japan
Ampex Corp., Redwood City, Calif.
Artronix, Inc., St. Louis, Mo.
Audio Instr. Co., Union City, N.J.
Barger Corp., Sunnyvale, Cal.
Bell & Howell Co., Pasadena, Calif.
California Computer Prods., Anaheim, Cal
Collins, G.L. Corp., Long Beach, Calif.
Collins Radio Co., Dallas, Tex.
Computer Mate, Inc., San Clemente, Cal
Data Prods. Corp., Woodland Hills, Calif.
Data Recording Sys., Sunnyvale, Cal.
Echo Science Corp., Pasadena, Cal.
Friden Div., San Leandro, Calif.
Himmelstein, S. & Co., Elk Grove Village, Ill.
Honeywell Information Systems, Wellesley Hills, Mass
Houston Scientific Inds., Inc., Houston, Tex
Hughes Aircraft Co, Culver City, Cal.
Lockheed Elctrns. Co., Watchung, N.J.
Orion Prods. Co., Sunnyvale, Cal.
Potter Instr. Co., Melville, N.Y.
Raymond Engrg., Inc., Middletown, Conn.
RCA Govt. & Comm. Sys., Moorestown, N.J.
Sanders Assocs., Nashua, N.H.
Texas Instruments, Inc., Houston, Tex.
3M Co., St. Paul, Minn.

Memory Systems, Thin-Film, Planar

Cambridge Memories, Inc., Newtonville, Mass.
Fabri-Tex, Inc., Minneapolis, Minn.
Hughes Aircraft Co, Culver City, Cal.
Rogers Corp., Rogers, Conn.

Memory Systems, Thin-Film, Plated Wire

Berg Elctrns., Inc., New Cumberland, Pa.
Tohoku Metal Inds., Ltd., Tokyo, Japan
Data Prods. Corp., Woodland Hills, Calif.
Ferroxcube Corp., Englewood, Colo.
General Dynamics, San Diego, Cal.
Goodyear Aerospace Corp., Akron, Ohio
GTE Sylvania Inc., Elctrn. Sys. Gp., Waltham, Mass.
Hughes Aircraft Co, Culver City, Cal.
Lockheed Elctrns. Co., Watchung, N.J.
Plessey Elctrns. Corp., Farmingdale, N.Y.

Memory Systems, Integrated Circuit

American Astrionics, Hollywood, Cal
Pacific Technology, Renton, Wash. p 830
Tempo/UTI Div., Chatsworth, Cal.
Advanced Memory Systems, Inc., Sunnyvale, Cal
AMBAC Inds., Garden City, N.Y.
American Micro-Sys., Inc., Santa Clara, Cal.
Ampex Corp., Redwood City, Calif.
Cambridge Memories, Inc., Newtonville, Mass.
Datapac, Inc., Santa Ana, Cal.
Di/An Controls, Inc., Boston, Mass.
Dionics, Inc., Westbury, N.Y.
Electronic Arrays, Inc., Mountain View, Cal.
Fabri-Tex, Inc., Minneapolis, Minn.
Fairchild Semiconductor, Mountain View, Calif.
Ferroxcube Corp., Englewood, Colo.
General Instr. Corp., Hicksville, N.Y.
GTE Sylvania Inc., Elctrn. Sys. Gp., Waltham, Mass.
Harris Semiconductor, Melbourne, Fla.
Hartman Sys. Div. A-T-O, Inc., Huntington Sta., N.Y.
Hughes Aircraft Co, Culver City, Cal.
Intel Corp., Mountain View, Cal.
Lear Siegler, Inc., Santa Monica, Calif.
Mostek Corp., Carrollton,, Tex.
National Semiconductor, Santa Clara, Calif.
Northern Sci., Inc., Middleton, Wisc.
Qualidyne Corp., Santa Clara, Cal.
Raytheon Co., Mt. View, Calif.
RCA Govt. & Comm. Sys., Moorestown, N.J.
RCA Solid State Div., Somerville, N.J.
Signetics Corp., Sunnyvale, Calif.
Solitron Devices, Tappan, N.Y.
Spectrum Dynamics, Inc., Ft. Lauderdale, Fla.
Standard Logic, Santa Ana, Cal.
Standard Memories, Inc., Sherman Oaks, Cal.
Xerox Data Sys., El Segundo, Cal

Metal Compounds, Foils, Powders, Sheet, Stock—See Vol 3

Metal Oxides—See Vol 3

Metal Parts, Cast—See Vol 3

Metal Parts, Chemically Milled —See Vol 3

Metal Parts, Deep Drawn—See Vol 3

Metal Parts, Laminated—See Vol 3

Metal Parts, Machined—See Vol 3

Metal Parts, Powdered—See Vol 3

Metal Parts, Screw Machine—See Vol 3

Metal Parts, Spun—See Vol 3

Metal Parts, Stamped—See Vol 3

Metals, Clad—See Vol 3

Metals, High Purity—See Vol 3

Metals, Precious-Also See Powders, Precious Metal—See Vol 3

Metals, Rare—See Vol 3

Metals, Refractory—See Vol 3

Metals, Semiconductor—See Crystals, Semiconductor

Metal-To-Glass Alloys—See Seals, Glass-To-Metal—Vol 3

Meter Cases—See Cases, Equipment—Vol 3

Meter Controllers—See Relays, Meter—Vol 2

Meter Expanders—See Multipliers, Meter

Meter Shunts—See Shunts, Meter

Meter Testers—See Testers, Meter

Meters, Acceleration

Dytronics Co., Columbus, Ohio
Ithaco, Inc., Ithaca, N.Y.
Metrix Instr. Co., Houston, Tex..... p 518
AGAC-Derritron, Inc., Alexandria, Va.
Bendix Corp., Davenport, Iowa
Columbia Resch. Labs., Woodlyn, Pa.
Engdahl Enterprises, Costa Mesa, Cal.
Hickok Indicating Sys. Inc., Gardena, Cal.
IMPACT-O-GRAPH Div., Bedford, Ohio
Indikon Co., Watertown, Mass.
Larson Aero Dev., Concord, Calif.
MB Elctrns/Textron Co., New Haven, Conn.
Reliance Elec. Co., Cleveland, Ohio
Spectral Dynamics Corp. San Diego, San Diego, Cal.
Sprengnether, W.F. Instr. Co., Inc., St. Louis, Mo.
Unholtz-Dickie Corp., Hamden, Conn.

Meters, Admittance

Dranetz Engrg. Labs., Plainfield, N.J. p 433,436
General Radio Co., Concord, Mass.
Rohde & Schwarz Sls., Passaic, N.J.
Scientific-Atlanta, Inc., Atlanta, Ga.

Meters, Air Permeability

Central Scientific Co., Chicago, Ill.
Teledyne Gurley, Troy, N.Y.

Meters, Ampere, A-C

Alco Elctrn. Prods., Lawrence, Mass.
API Instrs. Co., Waltham,, Mass.
Beede Electrical Instr. Co., Inc., Penacook, N.H.
Biddle, James G., Plymouth Meeting, Pa.
Dranetz Engrg. Labs., Plainfield, N.J. p 436
Electro-Mechanical Instr. Div., Perkasie, Pa. ..... p 451
Electro-Numerics, Santa Clara, Cal.
Electronic Research Co., Shawnee Mission, Kans.
Faria Meter Corp., Uncasville, Conn. p 468
Fluke, John Mfg. Co., Inc., Seattle, Wash. ..... p 471,473
General Elec. Co., Schenectady, N.Y. p 484
Hickok Elect. Instr., Cleveland, Ohio p 487
Hoyt Elec. Instr. Works, Belmont, Mass. p 494
Kratos Instrument Div., Pasadena, Cal p 510
Modutec, Inc., Norwalk, Conn. ..... p 527
Sangamo Elec. Co., Pickens, S.C.
Scientific Columbus, Columbus, Ohio
Simpson Elec. Co., Chicago, Ill..... p 556
Triplett Elec. Instr. Co., Bluffton, Ohio p 573,576
Westinghouse Elec. Corp., Newark, N.J. p 582
A & D Electrical Instrs., Glendale, N.Y.
A & M Instrument, Inc., Great Neck, N.Y.
Allied Elctrns. Corp., Chicago, Ill.
Ammon Instrs., Inc., Manchester, N.H.
Amprobe Instr., Lynbrook, N.Y.
A.O.I.P., 75/Paris 12eme, France
Atlantic Instrs. Corp., Watertown, Mass.
BAC Elctrns., Pennsauken, N.J.
Bristol Div, Waterbury, Conn
Bruno-New York Inds. Corp., New York, N.Y.
Buck Engrg. Co., Farmingdale, N.J.
California Instrs. Co., San Diego, Cal.
Canadian Research Institute, Don Mills, Ont., Canada
Central Scientific Co., Chicago, Ill.
Components Specialties, Inc., Freeport, N.Y.
Dana Labs., Inc., Irvine, Calif.
Dittmore-Freimuth Corp., Milwaukee, Wisc.
Ealing Corp., Cambridge, Mass.
Electrical Instr. Svc., Inc., Mt. Vernon, N.Y.
Electro-Standards Labs., Inc., Miami, Fla.
Electronic Design Labs., Inc., Phila., Pa.
Esterline Angus Div., Indianapolis, Ind.
Ferranti Elec., Inc., Plainview, N.Y.
Ferranti Ltd., Hollinwood, Lancs., England
Hallmark Standards, Inc., Mt. Vernon, N.Y.
Hickok Indicating Sys. Inc., Gardena, Cal.
Ideal Precision Meter Co., Inc., Brooklyn, N.Y.
Int'l. Instrs., Orange, Conn.
Jewell Electrical Instrs., Manchester, N.H.
Lewis Engrg. Co., Naugatuck, Conn.
Neutronic Corp., Bridgeton, Mo.
Newport Labs., Inc., Santa Ana, Cal.
Parker Instr. Corp., Stamford, Conn.
Phaostron Instr. & Elctrn. Co., So. Pasadena, Cal.
Q.V.S., Inc., East Orange, N.J.
Scientific Educational Prods., N.Y., N.Y.
Shigoto Inds., Ltd., New York, N.Y.
Shurite Meters, New Haven, Conn.
Stark Elctrn. Instrs., Ltd., Ajax, Ont., Canada
Sun Electric Corp., Chicago, Ill.
Sunshine Sci. Instrs., Inc., Philadelphia, Pa.
Westberg Mfg. Co., Sonoma, Cal.
Weston Instruments, Inc., Newark, N.J.
Yewtec Corporation, Larchmont, N.Y.

Meters, Ampere, D-C

Alco Elctrn. Prods., Lawrence, Mass.
API Instrs. Co., Waltham,, Mass.
Beede Electrical Instr. Co., Inc., Penacook, N.H.
Biddle, James G., Plymouth Meeting, Pa.
Boonton Elctrns., Parsippany, N.J. p 423
Boonton Electronics Corp., Parsippany, N.J. ..... p 423
Data Technology, Palo Alto, Cal.
Dixson Inc., Grand Junction, Colo.
Electro-Mechanical Instr. Div., Perkasie, Pa. ..... p 451
Electro-Numerics, Santa Clara, Cal.
Electro Sci. Inds., Portland, Ore.
Electronic Research Co., Shawnee Mission, Kans.
Faria Meter Corp., Uncasville, Conn. p 468
Fluke, John Mfg. Co., Inc., Seattle, Wash. ..... p 471,473
General Elec. Co., Schenectady, N.Y. p 484
Hickok Elect. Instr., Cleveland, Ohio p 487,488
Hoyt Elec. Instr. Works, Belmont, Mass. p 494
Kratos Instrument Div., Pasadena, Cal p 510
Modutec, Inc., Norwalk, Conn. ..... p 526
Ohio Semitronics, Columbus, Ohio p 533
RCA Elctrns. Comps., Harrison, N.J.
Schauer Mfg. Corp., Cincinnati, Ohio
Scientific Columbus, Columbus, Ohio
Simpson Elec. Co., Chicago, Ill..... p 556
Triplett Elec. Instr. Co., Bluffton, Ohio p 573-576
Westinghouse Elec. Corp., Newark, N.J. p 582
A & D Electrical Instrs., Glendale, N.Y.
A & M Instrument, Inc., Great Neck, N.Y.
Allied Elctrns. Corp., Chicago, Ill.
Ammon Instrs., Inc., Manchester, N.H.
Amprobe Instr., Lynbrook, N.Y.
Analogic, Wakefield, Mass.
A.O.I.P., 75/Paris 12eme, France
Atlantic Instrs. Corp., Watertown, Mass.
AUL Instrs., Inc., Flushng, N.Y.
BAC Elctrns., Pennsauken, N.J.
Bruno-New York Inds. Corp., New York, N.Y.
Buck Engrg. Co., Farmingdale, N.J.
California Instrs. Co., San Diego, Cal.
Canadian Research Institute, Don Mills, Ont., Canada
Central Scientific Co., Chicago, Ill.
Columbia Elec. Mfg. Co., Cleveland, Ohio
Components Specialties, Inc., Freeport, N.Y.
Dana Labs., Inc., Irvine, Calif.
Dittmore-Freimuth Corp., Milwaukee, Wisc.
Ealing Corp., Cambridge, Mass.
Electrical Instr. Svc., Inc., Mt. Vernon, N.Y.
Electronic Design Labs., Inc., Phila., Pa.
Esterline Angus Div., Indianapolis, Ind.
Ferranti Ltd., Hollinwood, Lancs., England
Hallmark Standards, Inc., Mt. Vernon, N.Y.
Halmar Elctrns., Inc., Columbus, Ohio
Heath Co., Benton Harbor, Mich.
Hickok Indicating Sys. Inc., Gardena, Cal.
Ideal Precision Meter Co., Inc., Brooklyn, N.Y.
Int'l. Instrs., Orange, Conn.
Jewell Electrical Instrs., Manchester, N.H.
Keithley Instrs., Inc., Cleveland, Ohio
Lewis Engrg. Co., Naugatuck, Conn.
Millivac Instrs., Schenectady, N.Y.
Neutronic Corp., Bridgeton, Mo.
Newport Labs., Inc., Santa Ana, Cal.
Parker Instr. Corp., Stamford, Conn.
Phaostron Instr. & Elctrn. Co., So. Pasadena, Cal.
Proto Tool Co, Los Angeles, Calif.
Q.V.S., Inc., East Orange, N.J.
Scientific Educational Prods., N.Y., N.Y.
Shigoto Inds., Ltd., New York, N.Y.
Shurite Meters, New Haven, Conn.
Stark Elctrn. Instrs., Ltd., Ajax, Ont., Canada
Sun Electric Corp., Chicago, Ill.
Sunshine Sci. Instrs., Inc., Philadelphia, Pa.
Westberg Mfg. Co., Sonoma, Cal.
Weston Instruments, Inc., Newark, N.J.
Yewtec Corporation, Larchmont, N.Y.

Meters, Ampere, R-F

Hickok Elect. Instr., Cleveland, Ohio
Simpson Elec. Co., Chicago, Ill.
Triplett Elec. Instr. Co., Bluffton, Ohio p 576
Westinghouse Elec. Corp., Newark, N.J. p 582
A & D Electrical Instrs., Glendale, N.Y.
A & M Instrument, Inc., Great Neck, N.Y.
Canadian Research Institute, Don Mills, Ont., Canada
Components Specialties, Inc., Freeport, N.Y.
Electrical Instr. Svc., Inc., Mt. Vernon, N.Y.
Ferranti Ltd., Hollinwood, Lancs., England
Hallmark Standards, Inc., Mt. Vernon, N.Y.
Hickok Indicating Sys. Inc., Gardena, Cal.
Ideal Precision Meter Co., Inc., Brooklyn, N.Y.
Keithley Instrs., Inc., Cleveland, Ohio
Phaostron Instr. & Elctrn. Co., So. Pasadena, Cal.
Q.V.S., Inc., East Orange, N.J.
Stark Elctrn. Instrs., Ltd., Ajax, Ont., Canada
Sun Electric Corp., Chicago, Ill.
Weston Instruments, Inc., Newark, N.J.
Yewtec Corporation, Larchmont, N.Y.

Meters, Ampere, True RMS

Beede Electrical Instr. Co., Inc., Penacook, N.H.
Hickok Elect. Instr., Cleveland, Ohio
Scientific Columbus, Columbus, Ohio
Triplett Elec. Instr. Co., Bluffton, Ohio
Westinghouse Elec. Corp., Newark, N.J.
A & D Electrical Instrs., Glendale, N.Y.
Electrical Instr. Svc., Inc., Mt. Vernon, N.Y.
Electronic Design Labs., Inc., Phila., Pa.
Esterline Angus Div., Indianapolis, Ind.
Phaostron Instr. & Elctrn. Co., So. Pasadena, Cal.
Q.V.S., Inc., East Orange, N.J.
Shigoto Inds., Ltd., New York, N.Y.
Sunshine Sci. Instrs., Inc., Philadelphia, Pa.
Weston Instruments, Inc., Newark, N.J.

Meters, Ampere-Hour

Curtis Instrs., Inc., Mt. Kisco, N.Y. p 427
General Elec. Co., Schenectady, N.Y.
Ohio Semitronics, Columbus, Ohiop 533
Sangamo Elec. Co., Pickens, S.C.
Simpson Elec. Co., Chicago, Ill.
A & D Electrical Instrs., Glendale, N.Y.
Ferranti Ltd., Hollinwood, Lancs., England
Gulton Inds., Hawthorne, Calif.
Halmar Elctrns., Inc., Columbus, Ohio
Hickok Indicating Sys. Inc., Gardena, Cal.
Ideal Precision Meter Co., Inc., Brooklyn, N.Y.
Rapid Elec. Co., Bronx, N.Y.
Weston Instruments, Inc., Newark, N.J.

Meters, Attenuation

Hewlett-Packard, Palo Alto, Cal.
Simpson Elec. Co., Chicago, Ill.
Weinschel Engrg. Co., Gaithersburg, Md. ..... p 1571
A & M Instrument, Inc., Great Neck, N.Y.
AIL, Div. Cutler-Hammer, Inc., Deer Park, N.Y.
Edison Elctrns. Div., Manchester, N.H.
Filmohm Div., Long Island City, N.Y.
General Microwave Corp., Farmingdale, N.Y.
Hickok Indicating Sys. Inc., Gardena, Cal.
Maury Microwave Corp., Cucamonga, Calif.
Microlab/FXR, Livingston, N.J.
Narda Microwave Corp., Plainview, N.Y.
Pacific Meas., Inc., Palo Alto, Calif.
PRD Elctrns., Inc., Westbury, N.Y.
Q.V.S., Inc., East Orange, N.J.
Rohde & Schwarz Sls., Passaic, N.J.
Siemens Corp., Comps. Div., Iselin, N.J.

Meters, Audio Level

Beede Electrical Instr. Co., Inc., Penacook, N.H.
Dixson Inc., Grand Junction, Colo.
Hickok Elect. Instr., Cleveland, Ohio
Modutec, Inc., Norwalk, Conn.
RCA Elctrns. Comps., Harrison, N.J.
Sankyo Seiki Mfg. Co., Ltd., Tokyo, Japan ..... p 1630
Simpson Elec. Co., Chicago, Ill.
Triplett Elec. Instr. Co., Bluffton, Ohio
A & D Electrical Instrs., Glendale, N.Y.
Amstro Corp., Fairfield, N.J.
B & K Instrs., Inc., Cleveland, Ohio
BAC Elctrns., Pennsauken, N.J.
Bowmar/Ali, Inc., Acton, Mass.
Edison Elctrns. Div., Manchester, N.H.
General Radio Co., Concord, Mass.
Hickok Indicating Sys. Inc., Gardena, Cal.
Ideal Precision Meter Co., Inc., Brooklyn, N.Y.
Instrument Labs. Corp., Chicago, Ill.
Int'l. Instrs., Orange, Conn.
Lab Electro-Acoustique, 92-Rueil, Malmaison, France
Leader Instr. Corp., Long Island City, N.Y.
Lingenfelter Applied Tech., Gaithersburg, Md.
Northeast Elctrns. Corp., Concord, N.H.
Phaostron Instr. & Elctrn. Co., So. Pasadena, Cal.
Q.V.S., Inc., East Orange, N.J.
Rohde & Schwarz Sls., Passaic, N.J.
Shigoto Inds., Ltd., New York, N.Y.
Singer - Tele-Signal, Woodbury, N.Y.
Sprengnether, W.F. Instr. Co., Inc., St. Louis, Mo.
Sun Electric Corp., Chicago, Ill.
United Telecontrol Elctrns., Asbury Park, N.J.
Vu-data Corp., San Diego, Cal.
Wandel & Goltermann, E. Hanover, N.J.
Waveforms, No. Hollywood, Cal.
Weston Instruments, Inc., Newark, N.J.

Meters, Cable Testing—See Testers, Cable

Meters, Capacitance

Beckman Instrs., Cedar Grove, N.J.
Boonton Elctrns., Parsippany, N.J. p 423
Boonton Electronics Corp., Parsippany, N.J. ..... p 423
Dranetz Engrg. Labs., Plainfield, N.J.
Electro Sci. Inds., Portland, Ore.
Freed Transformer Co., Bklyn., N.Y.

Hickok Elect. Instr., Cleveland, Ohio p 488
Marconi Instrs., Englewood, N.J.
Penn Airborne Prods., Southampton, Pa.
Simpson Elec. Co., Chicago, Ill.
Sprague Elec. Co., No. Adams, Mass.
Systron-Donner Corp., Concord, Cal. p 565
Systron-Donner Alpha Div., Oakland, Cal. p 565
Systron-Donner Concord Instr. Div., Concord, Cal. p 565
Systron-Donner Kruse Elctrns. Sub., Mountain View, Cal. p 565
Tektronix, Inc., Beaverton, Ore.
A & M Instrument, Inc., Great Neck, N.Y.
Components Specialties, Inc., Freeport, N.Y.
Consolidated Ohmic Devices, Carle Pl., N.Y.
Decker Corp., Bala-Cynwyd, Pa.
Foxboro Co., Foxboro, Mass.
General Radio Co., Concord, Mass.
Hickok Indicating Sys. Inc., Gardena, Cal.
Kikusui Elctrns. Corp., Kawasaki City, Kanagawa-Pref., Japan
Lion Precision Div., Newton, Mass.
Micro Instr., Hawthorne, Cal.
Rohde & Schwarz Sls., Passaic, N.J.
Siemens Corp., Comps. Div., Iselin, N.J.
Stark Elctrn. Instrs., Ltd., Ajax, Ont., Canada

Meters, Cavitation Intensity

Hickok Indicating Sys. Inc., Gardena, Cal.

Meters, Conductance

Beckman Instrs., Cedar Grove, N.J.
Dranetz Engrg. Labs., Plainfield, N.J.
Simpson Elec. Co., Chicago, Ill.
Beckman Instrs., Process Instrs., Fullerton, Cal.
General Radio Co., Concord, Mass.
Halmar Elctrns., Inc., Columbus, Ohio
Hickok Indicating Sys. Inc., Gardena, Cal.
Kahl Scientific Instr. Corp., El Cajon, Calif.
Midland Standard Inc., Elgin, Ill.
Philips Elctrn. Instrs., Mt. Vernon, N.Y.
Rohde & Schwarz Sls., Passaic, N.J.
Siemens Corp., Comps. Div., Iselin, N.J.
Weston Instruments, Inc., Newark, N.J.

Meters, Conductivity—See Indicators, Fluid Conductivity

Meters, Counting Rate, Nuclear

Eldorado Electrodata, Concord, Cal.
General Elec. Co., Schenectady, N.Y.
Solid State Elctrns., Sepulveda, Cal.
Victoreen Instr., Cleveland, Ohio
AMBAC Inds., Garden City, N.Y.
Beckman Instrs., (AISSD), Fullerton, Cal.
Hickok Indicating Sys. Inc., Gardena, Cal.
Kahl Scientific Instr. Corp., El Cajon, Calif.
Milletron, Inc., Pittsburgh, Pa.
Nuclear-Chicago, Des Plaines, Ill.
Nuclear Corp. Amer., Denville, N.J.
Nuclear Equip. Chem. Corp., Farmingdale, N.Y.
Nuclear Resch. Corp., Southampton, Pa.
Packard Instrument Co., Inc., Downers Grove, Ill.
Phaostron Instr. & Elctrn. Co., So. Pasadena, Cal.
Soltec Corp., No. Hollywood, Cal.
SSR Instrs. Co., Santa Monica, Cal.
Universal Transistor Prods., Copiague, N.Y.

Meters, Decibel Indicating

Dixson Inc., Grand Junction, Colo. p 430
Dranetz Engrg. Labs., Plainfield, N.J. p 437
Electro-Mechanical Instr. Div., Perkasie, Pa. p 451
Fluke, John Mfg. Co., Inc., Seattle, Wash. p 471
Hickok Elect. Instr., Cleveland, Ohio p 487
Simpson Elec. Co., Chicago, Ill.
Trio Labs, Inc., Plainview, N.Y.
Triplett Elec. Instr. Co., Bluffton, Ohio p 573
Weinschel Engrg. Co., Gaithersburg, Md. p 1571
A & D Electrical Instrs., Glendale, N.Y.
Amstro Corp., Fairfield, N.J.
B & K Instrs., Inc., Cleveland, Ohio
BAC Elctrns., Pennsauken, N.J.
CBS Laboratories, Stamford, Conn.
Components Specialties, Inc., Freeport, N.Y.
Edison Elctrns. Div., Manchester, N.H.
General Radio Co., Concord, Mass.
Gotham Audio Corp., New York, N.Y.
Ideal Precision Meter Co., Inc., Brooklyn, N.Y.
Instrument Labs. Corp., Chicago, Ill.
Int'l. Instrs., Orange, Conn.
Lab Electro-Acoustique, 92-Rueil, Malmaison, France
Leader Instr. Corp., Long Island City, N.Y.
Millivac Instrs., Schenectady, N.Y.
Northeast Elctrns. Corp., Concord, N.H.
Pacific Meas., Inc., Palo Alto, Calif.
Q.V.S., Inc., East Orange, N.J.
Rohde & Schwarz Sls., Passaic, N.J.
Shigoto Inds., Ltd., New York, N.Y.
Shurite Meters, New Haven, Conn.
Siemens Corp., Comps. Div., Iselin, N.J.
Siemens Corp., Comm. Eq. Div., Iselin, N.J.
Sprengnether, W.F. Instr. Co., Inc., St. Louis, Mo.
Stark Elctrn. Instrs., Ltd., Ajax, Ont., Canada
Sun Electric Corp., Chicago, Ill.
Vu-data Corp., San Diego, Cal.

Meters, Distortion & Noise

Beede Electrical Instr. Co., Inc., Penacook, N.H.
Freed Transformer Co., Bklyn., N.Y. p 482
Hewlett-Packard, Palo Alto, Cal.
London Co., Cleveland, Ohio p 516
Marconi Instrs., Englewood, N.J... p 520
Quan-Tech, Whippany, N.J. p 546,547
Audio Instr. Co., Union City, N.J.
Edison Elctrns. Div., Manchester, N.H.
General Radio Co., Concord, Mass.
Heath Co., Benton Harbor, Mich.
Int'l. Microwave, Cos Cob, Conn.
Lab Electro-Acoustique, 92-Rueil, Malmaison, France
MSE, Inc., Westlake, Ohio
Northeast Elctrns. Corp., Concord, N.H.
Phaostron Instr. & Elctrn. Co., So. Pasadena, Cal.
Rohde & Schwarz Sls., Passaic, N.J.
Siemens Corp., Comps. Div., Iselin, N.J.
Siemens Corp., Comm. Eq. Div., Iselin, N.J.
Sprengnether, W.F. Instr. Co., Inc., St. Louis, Mo.
Trepac Corp. America, Englewood, N.J.
Wandel & Goltermann, E. Hanover, N.J.

Meters, Dynamometer—See Dynamometers

Meters, Edge-Wise

API Instrs. Co., Waltham,, Mass. .. p 403
Beede Electrical Instr. Co., Inc., Penacook, N.H. p 417
Electro-Mechanical Instr. Div., Perkasie, Pa. p 451
General Elec. Co., Schenectady, N.Y. p 484
Hickok Elect. Instr., Cleveland, Ohio
Hoyt Elec. Instr. Works, Belmont, Mass. p 495
Larson Instr. Co., Inc., Orangeburg, N.Y. p 513
Simpson Elec. Co., Chicago, Ill.... p 556
Triplett Elec. Instr. Co., Bluffton, Ohio
Westinghouse Elec. Corp., Newark, N.J.
A & D Electrical Instrs., Glendale, N.Y.
A & M Instrument, Inc., Great Neck, N.Y.
Canadian Research Institute, Don Mills, Ont., Canada
Electrical Instr. Svc., Inc., Mt. Vernon, N.Y.
Hallmark Standards, Inc., Mt. Vernon, N.Y.
Hickok Indicating Sys. Inc., Gardena, Cal.
Ideal Precision Meter Co., Inc., Brooklyn, N.Y.
Int'l. Instrs., Orange, Conn.
Jewell Electrical Instrs., Manchester, N.H.
Lewis Engrg. Co., Naugatuck, Conn.
Mura Corp., Jericho, N.Y.
Parker Instr. Corp., Stamford, Conn.
Phaostron Instr. & Elctrn. Co., So. Pasadena, Cal.
Rystl Elctrns. Corp., N. Miami Beach, Fla.
Shigoto Inds., Ltd., New York, N.Y.
Shurite Meters, New Haven, Conn.
Sigma Instrs., Inc., Braintree, Mass.
Stark Elctrn. Instrs., Ltd., Ajax, Ont., Canada
Sunshine Sci. Instrs., Inc., Philadelphia, Pa.
Weston Instruments, Inc., Newark, N.J.
Yewtec Corporation, Larchmont, N.Y.

Meters, Elapsed Time—See Indicators, Elapsed Time

Meters, Electrometer

Simpson Elec. Co., Chicago, Ill.
Sticht, Herman H. Co., Inc., New York, N.Y.
Victoreen Instr., Cleveland, Ohio
A & M Instrument, Inc., Great Neck, N.Y.
Beckman Instrs., (AISSD), Fullerton, Cal.
Bio-Medical Elctrns., Inc., Rockville, Md.
Cary Instrs., Monrovia, Calif.
Corning Glass Works, Lab. Prods. Dept., Corning, N.Y.
General Microwave Corp., Farmingdale, N.Y.
Gralex Inds., Inc., Farmingdale, N.Y.
Int'l. Instrs., Orange, Conn.
Keithley Instrs., Inc., Cleveland, Ohio
Medistor Instr. Co., Seattle, Wash.
Nuclear Corp. Amer., Denville, N.J.
Packard Instrument Co., Inc., Downers Grove, Ill.
Phaostron Instr. & Elctrn. Co., So. Pasadena, Cal.
Philips Elctrn. Instrs., Mt. Vernon, N.Y.
Princeton Applied Resch. Corp., Princeton, N.J.
Rohde & Schwarz Sls., Passaic, N.J.
Soltec Corp., No. Hollywood, Cal.
Varian Assocs., Palo Alto, Cal.
Veeco Instrs., Inc., Plainview, N.Y.
Weston Instruments, Inc., Newark, N.J.

Meters, Electronic Micrometer —See Micrometers, Electronic—Vol 2

Meters, Events-Per-Unit-Time —See Counters, Mechanical; etc.—Vol 2

Meters, Field Strength

Bell, F.W., Inc., Columbus, Ohio.... p 418
Electro-Mechanics Co., Austin, Tex. p 452
Hickok Elect. Instr., Cleveland, Ohio
Honeywell, Denver, Colo.
ISC Magnetics Div., Huntington, N.Y.
Polarad Elctrn. Instrs., Lake Success, N.Y. p 540
Singer Instrumentation Los Angeles Oper., Los Angeles, Cal. p 562
Singer Instrumentation Palo Alto Oper., Palo Alto, Cal. p 562
Anritsu Electric Co., Ltd., Tokyo, Japan
AUL Instrs., Inc., Flushng, N.Y.
Benco Television Assoc., Rexdale, Ont., Can.
Blonder-Tongue Labs., Inc., Old Bridge, N.J.
Components Specialties, Inc., Freeport, N.Y.
Dittmore-Freimuth Corp., Milwaukee, Wisc.
Eico Electronic Instrument Co., Inc., Brooklyn, N.Y.
Elcom Sys., Deer Pk., N.Y.
Fairchild Electro-Metrics, Amsterdam, N.Y.
Heath Co., Benton Harbor, Mich.
Hickok Indicating Sys. Inc., Gardena, Cal.
Jerrold Elctrns. Corp., Philadelphia, Pa.
Kahl Scientific Instr. Corp., El Cajon, Calif.
Leader Instr. Corp., Long Island City, N.Y.
Lingenfelter Applied Tech., Gaithersburg, Md.
Magnaflux Corp., Chicago, Ill.
Magnetic Sys. & Instrs., Worcester, Mass.
Magnetics Sys. & Instrs., Worcester, Mass.
Mobil Elctrns., Inc., Anderson, Ind.
Narda Microwave Corp., Plainview, N.Y.
Philmore Mfg. Co., Richmond Hill, N.Y.
Reeve Elctrns., Inc., Chicago, Ill.
Rohde & Schwarz Sls., Passaic, N.J.
Shurite Meters, New Haven, Conn.
Siemens Corp., Comps. Div., Iselin, N.J.
Solar Elctrns. Co., Hollywood, Calif.
Varian Assocs., Palo Alto, Cal.
VIKOA, Hoboken, N.J.
Wilkinson Elctrns., Woodlyn, Pa.

Meters, Fluid Flow

Computer Instrs., Hempstead, N.Y.
Astronautics Corp. of Amer., Milwaukee, Wisc.
Auto Control Labs., Los Angeles, Calif.
Bailey Meter Co., Wickliffe, Ohio
Bendix Corp., Davenport, Iowa
Brooks Instr. Div., Hatfield, Pa.
Carolina Medical Elctrns., Inc., King, N.C.
Decker Corp., Bala-Cynwyd, Pa.
Dynalco Corp., Ft. Lauderdale, Fla.
Dynasonics Corp., Pipestone, Minn.
Ellison Draft Gage Co., Inc., New Buffalo, Mich.
Erdco Engrg. Corp., Addison, Ill.
Fischer & Porter Co., Warminster, Pa.
Flow Technology, Inc., Tempe, Ariz.
Fox Valve Dev. Co., Inc., Hanover, N.J.
Foxboro Co., Foxboro, Mass.
Hastings-Raydist, Hampton, Va.
Honeywell, Ft. Washington, Pa.
Ideas, Inc., Laramie, Wyo.
Johnson Corp., Three Rivers, Mich.
Kingmann-White, Inc., Placentia, Calif.
Laboratory Data Control, Riviera Beach, Fla.
Leupold & Stevens, Inc., Beaverton, Ore.
MEM Controls, Inc., Wickliffe, Ohio
Nat'l. Instr. Labs., Rockville, Md.
Pennwalt Corp., Phila., Pa.
Selas Corp. America, Dresher, Pa.
Simmonds Precision Prods., Inc., Bellows Falls, Vt.
Taylor Instr. Process Control Div., Rochester, N.Y.
Technology/Versatronics, Yellow Springs, Ohio
Thermo Sys., Inc., St. Paul, Minn.
Tylan Corp., Torrance, Calif.
Wallace & Tiernan Div., Belleville, N.J.
West Coast Resch. Corp., Los Angeles, Calif.
Westinghouse Elec. Corp., Pittsburgh, Pa.

Meters, Flutter & Wow

Solid State Elctrns., Sepulveda, Cal.
Abphot, New York, N.Y.
Amplifier Corp. America, Westbury, N.Y.
Gotham Audio Corp., New York, N.Y.
Kenton Engrg. Corp., Skokie, Ill.
Kikusui Elctrns. Corp., Kawasaki City, Kanagawa-Pref., Japan
Lab Electro-Acoustique, 92-Rueil, Malmaison, France
Leader Instr. Corp., Long Island City, N.Y.
RIL Elctrns., Inc., Southampton, Pa.
Video Resch. Corp., Rockville, Md.

Meters, Flux

Hewlett-Packard, Palo Alto, Cal.
ISC Magnetics Div., Huntington, N.Y. p 500
RFL Inds., Instr. Div., Boonton, N.J. p 554
Annis, R.B. Co., Indianapolis, Ind.
ARC Prods. Div., Chicago, Ill.
Electrical Instr. Svc., Inc., Mt. Vernon, N.Y.
Empire Sci., Ind'l. Instr., Garden City, N.Y.
Hallmark Standards, Inc., Mt. Vernon, N.Y.
High Voltage Engrg. Corp., Burlington, Mass.
ISC/Telephonics Div, Huntington, N.Y.
Magnetic Sys. & Instrs., Worcester, Mass.
Magnetics Sys. & Instrs., Worcester, Mass.
Stark Elctrn. Instrs., Ltd., Ajax, Ont., Canada
Thomas & Skinner, Inc., Indianapolis, Ind.
Varian Assocs., Analytical Instr., Palo Alto, Cal.
Yewtec Corporation, Larchmont, N.Y.

Meters, F-M Deviation

Kratos Instrument Div., Pasadena, Cal
London Co., Cleveland, Ohio p 516
Marconi Instrs., Englewood, N.J... p 520
Solid State Elctrns., Sepulveda, Cal.
Anritsu Electric Co., Ltd., Tokyo, Japan
A.R.F. Products, Inc., Raton, N.M.
Communication Elctrns., Rockville, Md.
Edison Elctrns. Div., Manchester, N.H.
Fairchild Electro-Metrics, Amsterdam, N.Y.
Lampkin Labs., Inc., Bradenton, Fla.
New London Instr. Co., Inc., New London, Conn.
Radio Specialty Mfg. Co., Portland, Ore.

Rohde & Schwarz Sls., Passaic, N.J.
Sage Labs. Inc., Natick, Mass.
Video Resch. Corp., Rockville, Md.
Vu-data Corp., San Diego, Cal.

Meters, Frequency

Airpax Elctrns., Inc., Cambridge, Md.
Airpax Elctrns., Ft. Lauderdale, Fla. p 1308
American Time Products, Woodside, N.Y.
Anadex Instrs., Inc., Van Nuys, Calif. p 400
Atec, Inc., Houston, Tex. p 410
Austron, Inc., Austin, Tex.
Beckman Instruments, Shiller Pk., Ill. p 413
Biddle, James G., Plymouth Meeting, Pa. p 419
Bulova Watch Elctrns. Div. Amer. Time Prods., Woodside, N.Y.
Dixson Inc., Grand Junction, Colo.
EIP, Inc., Santa Clara, Cal. p 448
Eldorado Electrodata, Concord, Cal. p 449
Electro/Data, Inc., Garland, Tex.
Frequency Elctrns., New Hyde Pk., N.Y.
Frequency Engrg. Labs., Farmingdale, N.J. p 604,605
General Elec. Co., Schenectady, N.Y.
Hewlett-Packard, Palo Alto, Cal.
Hickok Elect. Instr., Cleveland, Ohio
Honeywell, Denver, Colo.
International Rectifier, El Segundo, Cal.
J-B-T Instrs., Inc., New Haven, Conn. p 1929
Kratos Instrument Div., Pasadena, Cal
Marconi Instrs., Englewood, N.J... p 521
Matrix Corp., Beech Grove, Ind.
Nova Electric Mfg. Co., Nutley, N.J.
Simpson Elec. Co., Chicago, Ill.
Solid State Elctrns., Sepulveda, Cal.
Sticht, Herman H. Co., Inc., New York, N.Y. p 563
Systron-Donner Concord Instr. Div., Concord, Cal.
Waveline, Inc., W. Caldwell, N.J.
Wavetek, San Diego, Cal.
Western Reserve Elctrns., Twinsburg, Ohio
Westinghouse Elec. Corp., Newark, N.J.
A & M Instrument, Inc., Great Neck, N.Y.
AMF Electical Prods., Alexandria, Va.
Arco Systems Inc., Palo Alto, Cal
Arnoux Corp., Santa Barbara, Cal
Avtron Mfg., Inc., Cleveland, Ohio
BAC Elctrns., Pennsauken, N.J.
Brower Laboratories, Inc., Waltham, Mass.
CCA Elctrns. Corp., Gloucester, N.J.
Davidson Elctrn. Dev. Co., Erie, Pa.
Digital Displays, Mendham, N.J.
Dittmore-Freimuth Corp., Milwaukee, Wisc.
Dynalco Corp., Ft. Lauderdale, Fla.
Dynamic Precision Controls, Hagerstown, Ind.
Edison Elctrns. Div., Manchester, N.H.
Electrical Instr. Svc., Inc., Mt. Vernon, N.Y.
Entron Inc., Morganville, N.J.
Esterline Angus Div., Indianapolis, Ind.
Ferranti Ltd., Hollinwood, Lancs., England
Fischer & Porter Co., Warminster, Pa.
General Microwave Corp., Farmingdale, N.Y.
General Radio Co., Concord, Mass.
Heath Co., Benton Harbor, Mich.
Hickok Indicating Sys. Inc., Gardena, Cal.
Hughes Aircraft Co, Fullerton, Cal.
Industrial Microwave, Scotch Plains, N.J.
Jerrold/Watkins Div., Toronto, 395, Ont., Can.
Lampkin Labs., Inc., Bradenton, Fla.
Lewis Engrg. Co., Naugatuck, Conn.
MCS Corp., Monrovia, Calif.
Microlab/FXR, Livingston, N.J.
N-H Microwave, Inc., Red Bank, N.J.
Narda Microwave Corp., Plainview, N.Y.
New London Instr. Co., Inc., New London, Conn.
Nuclear-Chicago, Des Plaines, Ill.
Optomechanisms, Inc., Plainview, N.Y.
Parker Instr. Corp., Stamford, Conn.
Phaostron Instr. & Elctrn. Co., So. Pasadena, Cal.
Philips Elctrn. Instrs., Mt. Vernon, N.Y.
PRD Elctrns., Inc., Westbury, N.Y.
Premier Microwave, Port Chester, N.Y.
Q.V.S., Inc., East Orange, N.J.
Rohde & Schwarz Sls., Passaic, N.J.
Sell-Tronic Prods. Co., Inc., Flushing, N.Y.
Shigoto Inds., Ltd., New York, N.Y.
Stromberg Carlson Corp., Rochester, N.Y.
Struthers Elctrns. Corp., Mamaroneck, N.Y.
Sun Electric Corp., Chicago, Ill.
Sunshine Sci. Instrs., Inc., Philadelphia, Pa.
Systron-Donner Microwave Div., Van Nuys, Cal.
Tempo Instr., Plainview, N.Y.
TRG Prods., E. Boston, Mass.
Video Resch. Corp., Rockville, Md.
Viz Mfg. Co., Philadelphia, Pa.
Waters Mfg., Inc., Wayland, Mass.
Waveforms, No. Hollywood, Cal.
Westberg Mfg. Co., Sonoma, Cal.
Weston Instruments, Inc., Newark, N.J.
Weston Instrs. Div., Hatboro, Pa
Yewtec Corporation, Larchmont, N.Y.

Meters, Frequency Deviation

American Time Products, Woodside, N.Y.
Anadex Instrs., Inc., Van Nuys, Calif. p 400
Atec, Inc., Houston, Tex. p 410
Austron, Inc., Austin, Tex.
Beckman Instruments, Shiller Pk., Ill. p 413
Bulova Watch Elctrns. Div. Amer. Time Prods., Woodside, N.Y.
Frequency Elctrns., New Hyde Pk., N.Y.
Frequency Engrg. Labs., Farmingdale, N.J. p 604
Kratos Instrument Div., Pasadena, Cal
Solid State Elctrns., Sepulveda, Cal.
A & M Instrument, Inc., Great Neck, N.Y.
Aerospace Resch. Inc., Boston, Mass.
AMF Electical Prods., Alexandria, Va.
Avtron Mfg., Inc., Cleveland, Ohio
Dittmore-Freimuth Corp., Milwaukee, Wisc.
Dynamic Precision Controls, Hagerstown, Ind.
Edison Elctrns. Div., Manchester, N.H.
Entron Inc., Morganville, N.J.
Hughes Aircraft Co, Fullerton, Cal.
Industrial Microwave, Scotch Plains, N.J.
Lampkin Labs., Inc., Bradenton, Fla.
Microwave/Sys., Inc., E. Syracuse, N.Y.
New London Instr. Co., Inc., New London, Conn.
Parker Instr. Corp., Stamford, Conn.
Phaostron Instr. & Elctrn. Co., So. Pasadena, Cal.
Rohde & Schwarz Sls., Passaic, N.J.
Tracor, Inc., Austin, Tex.
Video Resch. Corp., Rockville, Md.
Weston Instruments, Inc., Newark, N.J.
Zehntel, Inc., Berkeley, Calif.

Meters, Frequency Digital

American Time Products, Woodside, N.Y.
Anadex Instrs., Inc., Van Nuys, Calif. p 391-393
Atec, Inc., Houston, Tex. p 410
Beckman Instruments, Shiller Pk., Ill. p 413
Bulova Watch Elctrns. Div. Amer. Time Prods., Woodside, N.Y.
Calico Div., San Diego, Cal. p 424
EIP, Inc., Santa Clara, Cal. p 448
Eldorado Electrodata, Concord, Cal. p 449
Electronic Research Co., Shawnee Mission, Kans.
Frequency Elctrns., New Hyde Pk., N.Y.
Hewlett-Packard, Palo Alto, Cal.
Hickok Elect. Instr., Cleveland, Ohio p 488
Marconi Instrs., Englewood, N.J.
Monsanto Company, Electronic Instruments, W. Caldwell, N.J.
Systron-Donner Concord Instr. Div., Concord, Cal.
Triplett Elec. Instr. Co., Bluffton, Ohio
Veeder-Root, Hartford, Conn.
Wavetek, San Diego, Cal.
Anritsu Electric Co., Ltd., Tokyo, Japan
Avtron Mfg., Inc., Cleveland, Ohio
BAC Elctrns., Pennsauken, N.J.
California Instrs. Co., San Diego, Cal.
Dana Labs., Inc., Irvine, Calif.
Digital Displays, Mendham, N.J.
Dixson, Inc., Grand Junction, Colo.
Dynalco Corp., Ft. Lauderdale, Fla.
Dynamic Precision Controls, Hagerstown, Ind.
Fairchild Electro-Metrics, Amsterdam, N.Y.
Fischer & Porter Co., Warminster, Pa.
General Radio Co., Concord, Mass.
Heath Co., Benton Harbor, Mich.
Hughes Aircraft Co, Culver City, Cal.
Hughes Aircraft Co, Fullerton, Cal.
Industrial Microwave, Scotch Plains, N.J.
Instrumentation Tech. Corp., Northridge, Calif.
Intercontinental Elctrns., E. Rochester, N.Y.
Lampkin Labs., Inc., Bradenton, Fla.
Milletron, Inc., Pittsburgh, Pa.
Neutronic Corp., Bridgeton, Mo.
Northeast Elctrns. Corp., Concord, N.H.
Philips Elctrn. Instrs., Mt. Vernon, N.Y.
Techmetric Co., Redwood City, Calif.
Zehntel, Inc., Berkeley, Calif.

Meters, Galvanometer

Beckman Instrs., Cedar Grove, N.J.
Biddle, James G., Plymouth Meeting, Pa.
Dynamics Instr. Co., Monterey Pk., Cal. p 432
Electro Sci. Inds., Portland, Ore.. p 455
Fluke, John Mfg. Co., Inc., Seattle, Wash.
Hickok Elect. Instr., Cleveland, Ohio
Honeywell, Denver, Colo.
ISC Magnetics Div., Huntington, N.Y.
London Co., Cleveland, Ohio p 516
Penn Airborne Prods., Southampton, Pa.
Shallcross, Selma, N.C. p 555
Simpson Elec. Co., Chicago, Ill.
A & D Electrical Instrs., Glendale, N.Y.
A & M Instrument, Inc., Great Neck, N.Y.
A.O.I.P., 75/Paris 12eme, France
Atlantic Instrs. Corp., Watertown, Mass.
Bell & Howell Co., Pasadena, Calif.
Buck Engrg. Co., Farmingdale, N.J.
Canadian Research Institute, Don Mills, Ont., Canada
Central Scientific Co., Chicago, Ill.
Cohu Elctrns., Inc., San Diego, Calif.
Coleman Instrs., Maywood, Ill.
Dixson, Inc., Grand Junction, Colo.
Ealing Corp., Cambridge, Mass.
Esterline Angus Div., Indianapolis, Ind.
Guildline Instrs., Inc., Larchmont, N.Y.
Hallmark Standards, Inc., Mt. Vernon, N.Y.
Maurer, J.A., Inc., Woodside, N.Y.
MSE, Inc., Westlake, Ohio
New London Instr. Co., Inc., New London, Conn.
Photron Instr. Co., Cleveland, Ohio
Q.V.S., Inc., East Orange, N.J.
Scientific Educational Prods., N.Y., N.Y.
Shigoto Inds., Ltd., New York, N.Y.
Sprengnether, W.F. Instr. Co., Inc., St. Louis, Mo.
Stark Elctrn. Instrs., Ltd., Ajax, Ont., Canada
Sunshine Sci. Instrs., Inc., Philadelphia, Pa.
Weston Instruments, Inc., Newark, N.J.
Winslow Tele-Tronics, Inc., Eatontown, N.J.
Yewtec Corporation, Larchmont, N.Y.

Meters, Gauss

Bell, F.W., Inc., Columbus, Ohio.... p 418
Electro-Mechanics Co., Austin, Tex. p 452
ISC Magnetics Div., Huntington, N.Y. p 500
Ohio Semitronics, Columbus, Ohiop 533
RFL Inds., Instr. Div., Boonton, N.J. p 554
Systron-Donner Corp., Concord, Cal. p 565
Systron-Donner Alpha Div., Oakland, Cal. p 565
Systron-Donner Concord Instr. Div., Concord, Cal. p 565
Systron-Donner Kruse Elctrns. Sub., Mountain View, Cal. p 565
Andonian Assocs., Inc., Waltham, Mass.
Annis, R.B. Co., Indianapolis, Ind.
Ealing Corp., Cambridge, Mass.
Empire Sci., Ind'l. Instr., Garden City, N.Y.
Irwin Labs., Inc., Los Angeles, Calif.
ISC/Telephonics Div, Huntington, N.Y.
Magnetic Analysis Corp., Mt. Vernon, N.Y.
Magnetic Sys. & Instrs., Worcester, Mass.
Magnetics Sys. & Instrs., Worcester, Mass.
Stark Elctrn. Instrs., Ltd., Ajax, Ont., Canada
Thomas & Skinner, Inc., Indianapolis, Ind.
Varian Assocs., Analytical Instr., Palo Alto, Cal.
Westinghouse Elec., Pittsburgh, Pa.
Yewtec Corporation, Larchmont, N.Y.

Meters, Gel Time

Sunshine Sci. Instrs., Inc., Philadelphia, Pa.

Meters, Goniometer

Gaertner Scientific Corp., Chicago, Ill.
Hacker Instrs., Inc., W. Caldwell, N.J.
Materials Resch. Corp., Orangeburg, N.Y.
Philips Elctrn. Instrs., Mt. Vernon, N.Y.
Servo Corp. America, Hicksville, N.Y.
Teledyne Gurley, Troy, N.Y.

Meters, Grid Dip

Millen, James Mfg., Malden, Mass. p 523
Eico Electronic Instrument Co., Inc., Brooklyn, N.Y.
Heath Co., Benton Harbor, Mich.
Leader Instr. Corp., Long Island City, N.Y.

Meters, Heat Transfer (Semiconductor)

Hy-Cal Engrg., Santa Fe Springs, Cal.
Westinghouse Elec. Int'l., New York, N.Y.

Meters, Illuminated Scale

Beede Electrical Instr. Co., Inc., Penacook, N.H. p 416
Hickok Elect. Instr., Cleveland, Ohio
Kratos Instrument Div., Pasadena, Cal
Modutec, Inc., Norwalk, Conn. p 524
Triplett Elec. Instr. Co., Bluffton, Ohio
A & D Electrical Instrs., Glendale, N.Y.
Hickok Indicating Sys. Inc., Gardena, Cal.
Int'l. Instrs., Orange, Conn.
Lewis Engrg. Co., Naugatuck, Conn.
Q.V.S., Inc., East Orange, N.J.
Shigoto Inds., Ltd., New York, N.Y.
Sunshine Sci. Instrs., Inc., Philadelphia, Pa.
Weston Instruments, Inc., Newark, N.J.

Meters, Impedance

Alford Mfg. Co., Winchester, Mass.
Beckman Instrs., Cedar Grove, N.J.
Dranetz Engrg. Labs., Plainfield, N.J. p 433,436
Freed Transformer Co., Bklyn., N.Y. p 483
Hewlett-Packard, Palo Alto, Cal.
Hickok Elect. Instr., Cleveland, Ohio
London Co., Cleveland, Ohio p 516
Marconi Instrs., Englewood, N.J.
RFL Inds., Instr. Div., Boonton, N.J. p 554
Simpson Elec. Co., Chicago, Ill.
Triplett Elec. Instr. Co., Bluffton, Ohio
A & M Instrument, Inc., Great Neck, N.Y.
Components Specialties, Inc., Freeport, N.Y.
General Microwave Corp., Farmingdale, N.Y.
General Oceanology, Inc., Cambridge, Mass.
General Radio Co., Concord, Mass.
Leader Instr. Corp., Long Island City, N.Y.
Mechanical Technology, Inc., Latham, N.Y.
Microlab/FXR, Livingston, N.J.
MSE, Inc., Westlake, Ohio
Narda Microwave Corp., Plainview, N.Y.
Philips Elctrn. Instrs., Mt. Vernon, N.Y.
PRD Elctrns., Inc., Westbury, N.Y.
Rohde & Schwarz Sls., Passaic, N.J.
Rystl Elctrns. Corp., N. Miami Beach, Fla.
Scientific-Atlanta, Inc., Atlanta, Ga.
Siemens Corp., Comps. Div., Iselin, N.J.
Weston Instruments, Inc., Newark, N.J.
Wiltron Co., Palo Alto, Calif.

Meters, Inductance

Beckman Instrs., Cedar Grove, N.J.
Boonton Elctrns., Parsippany, N.J.p 423
Boonton Electronics Corp., Parsippany, N.J. p 423
Dranetz Engrg. Labs., Plainfield, N.J.
Electro-Mechanical Instr. Div., Perkasie, Pa. p 451
Freed Transformer Co., Bklyn., N.Y. p 483
Hewlett-Packard, Palo Alto, Cal.
Hickok Elect. Instr., Cleveland, Ohio
Marconi Instrs., Englewood, N.J.
Simpson Elec. Co., Chicago, Ill.

Systron-Donner Corp., Concord, Cal. p 565
Systron-Donner Alpha Div., Oakland, Cal. ..... p 565
Systron-Donner Concord Instr. Div., Concord, Cal. ..... p 565
Systron-Donner Kruse Elctrns. Sub., Mountain View, Cal. ..... p 565
Tektronix, Inc., Beaverton, Ore.
Components Specialties, Inc., Freeport, N.Y.
General Radio Co., Concord, Mass.
Kikusui Elctrns. Corp., Kawasaki City, Kanagawa-Pref., Japan
Leader Instr. Corp., Long Island City, N.Y.
Rohde & Schwarz Sls., Passaic, N.J.
Siemens Corp., Comps. Div., Iselin, N.J.

Meters, Infrared—See Vol 2

Meters, Intermodulation

Marconi Instrs., Englewood, N.J... p 521
Anritsu Electric Co., Ltd., Tokyo, Japan
Audio Instr. Co., Union City, N.J.
Eico Electronic Instrument Co., Inc., Brooklyn, N.Y.
Siemens Corp., Comps. Div., Iselin, N.J.
Siemens Corp., Comm. Eq. Div., Iselin, N.J.

Meters, Kilovolt

Associated Resch., Chicago, Ill. .. p 405
Beckman Instrs., Cedar Grove, N.J.
Beede Electrical Instr. Co., Inc., Penacook, N.H.
Biddle, James G., Plymouth Meeting, Pa.
Calico Div., San Diego, Cal.
Fluke, John Mfg. Co., Inc., Seattle, Wash.
General Elec. Co., Schenectady, N.Y.
Hickok Elect. Instr., Cleveland, Ohio
Hipotronics, Inc., Brewster, N.Y. .. p 493
Kilovolt Corp., Hackensack, N.J.
Kratos Instrument Div., Pasadena, Cal
Light Elec. Corp., Rancocas, N.J.
Pomona Elctrns. Co., Inc., Pomona, Cal. p 2696
RCA Elctrns. Comps., Harrison, N.J.
Ross Engrg. Corp., Campbell, Cal. p 1786
Sangamo Elec. Co., Pickens, S.C.
Simpson Elec. Co., Chicago, Ill.
Triplett Elec. Instr. Co., Bluffton, Ohio
Universal Voltronics Corp., Mt. Kisco, N.Y.
Westinghouse Elec. Corp., Newark, N.J.
A & D Electrical Instrs., Glendale, N.Y.
A & M Instrument, Inc., Great Neck, N.Y.
AUL Instrs., Inc., Flushng, N.Y.
Bertan Assocs., Inc., Plainview, N.Y.
California Instrs. Co., San Diego, Cal.
Canadian Research Institute, Don Mills, Ont., Canada
Dana Labs., Inc., Irvine, Calif.
Data Precision, Wakefield, Mass.
Ealing Corp., Cambridge, Mass.
Electrical Instr. Svc., Inc., Mt. Vernon, N.Y.
Electronic Design Labs., Inc., Phila., Pa.
Hallmark Standards, Inc., Mt. Vernon, N.Y.
Hickok Indicating Sys. Inc., Gardena, Cal.
Ideal Precision Meter Co., Inc., Brooklyn, N.Y.
Keithley Instrs., Inc., Cleveland, Ohio
Leader Instr. Corp., Long Island City, N.Y.
Micro Instr., Hawthorne, Cal.
Millivac Instrs., Schenectady, N.Y.
Parker Instr. Corp., Stamford, Conn.
Peschel Instrs., Cape Coral, Fla.
Phaostron Instr. & Elctrn. Co., So. Pasadena, Cal.
Q.V.S., Inc., East Orange, N.J.
Rohde & Schwarz Sls., Passaic, N.J.
Shigoto Inds., Ltd., New York, N.Y.
Stark Elctrn. Instrs., Ltd., Ajax, Ont., Canada
Sun Electric Corp., Chicago, Ill.
Weston Instruments, Inc., Newark, N.J.
Yewtec Corporation, Larchmont, N.Y.

Meters, Kilowatt

Bird Elctrn., Cleveland, Ohio..... p 421
Fluke, John Mfg. Co., Inc., Seattle, Wash.
General Elec. Co., Schenectady, N.Y.
Hickok Elect. Instr., Cleveland, Ohio
Kratos Instrument Div., Pasadena, Cal
Sangamo Elec. Co., Pickens, S.C.
Scientific Columbus, Columbus, Ohio
Simpson Elec. Co., Chicago, Ill.
Triplett Elec. Instr. Co., Bluffton, Ohio
Westinghouse Elec. Corp., Newark, N.J.
A & M Instrument, Inc., Great Neck, N.Y.
Electrical Instr. Svc., Inc., Mt. Vernon, N.Y.
Ferranti Ltd., Hollinwood, Lancs., England
Hallmark Standards, Inc., Mt. Vernon, N.Y.
Halmar Elctrns., Inc., Columbus, Ohio
Parker Instr. Corp., Stamford, Conn.
Phaostron Instr. & Elctrn. Co., So. Pasadena, Cal.
Scientific Educational Prods., N.Y., N.Y.
Stark Elctrn. Instrs., Ltd., Ajax, Ont., Canada
Weston Instruments, Inc., Newark, N.J.
Yewtec Corporation, Larchmont, N.Y.

Meters, Laser Energy—See Monitors, Laser Energy

Meters, Light, (Non Photographic)

Hewlett-Packard, Palo Alto, Cal.
Simpson Elec. Co., Chicago, Ill.
United Detector Tech., Santa Monica, Cal. ..... p 1639
Abtronics, Inc., Livermore, Calif.
American Ultraviolet Co., Chatham, N.J.
Atlas Electric Devices, Chicago, Ill.
Canadian Research Institute, Don Mills, Ont., Canada
Cintra Physics Int'l., Sunnyvale, Cal.
Davidson Elctrn. Dev. Co., Erie, Pa.
EG & G, Inc., Salem, Mass.
EG&G, Inc., Electro-Optics Div., Salem, Mass.
Gamma Sci., San Diego, Cal.
Gencom Div., Plainview, N.Y.
International Light, Newburyport, Mass.
Kahl Scientific Instr. Corp., El Cajon, Calif.
Kahn & Co., Inc., Wethersfield, Conn.
Oriel Optics Corp., Stamford, Conn.
Pacific Photometric Instrs., Berkeley, Cal.
Photo Resch. Corp., Burbank, Calif.
Photovolt Corp., New York, N.Y.
Princeton Applied Resch. Corp., Princeton, N.J.
Rockwell Engrg. Co., Indianapolis, Ind.
Schoeffel Instr. Corp., Westwood, N.J.
Shurite Meters, New Haven, Conn.
Spectra-Physics, Inc., Mountain View, Calif.
SSR Instrs. Co., Santa Monica, Cal.
Weston Instruments, Inc., Newark, N.J.
Yewtec Corporation, Larchmont, N.Y.

Meters, Megohm

Associated Resch., Chicago, Ill. p 404,405
Beckman Instrs., Cedar Grove, N.J. p 415
Biddle, James G., Plymouth Meeting, Pa.
Calico Div., San Diego, Cal.
Electro Sci. Inds., Portland, Ore.
Fluke, John Mfg. Co., Inc., Seattle, Wash. ..... p 471
Freed Transformer Co., Bklyn., N.Y. p 480,483
Hewlett-Packard, Palo Alto, Cal.
Hickok Elect. Instr., Cleveland, Ohio
Hipotronics, Inc., Brewster, N.Y. p 492,493
London Co., Cleveland, Ohio ..... p 516
Penn Airborne Prods., Southampton, Pa. ..... p 534
RCA Elctrns. Comps., Harrison, N.J.
Ross Engrg. Corp., Campbell, Cal.
Simpson Elec. Co., Chicago, Ill.
Slaughter Co., Ardmore, Okla. ..... p 558
Sticht, Herman H. Co., Inc., New York, N.Y. ..... p 563
Systron-Donner Concord Instr. Div., Concord, Cal.
Triplett Elec. Instr. Co., Bluffton, Ohio
Western Reserve Elctrns., Twinsburg, Ohio ..... p 580
A & M Instrument, Inc., Great Neck, N.Y.
B & K Instrs., Inc., Cleveland, Ohio
Canadian Research Institute, Don Mills, Ont., Canada
Components Specialties, Inc., Freeport, N.Y.
Data Precision, Wakefield, Mass.
Ealing Corp., Cambridge, Mass.
Electrical Instr. Svc., Inc., Mt. Vernon, N.Y.
General Oceanology, Inc., Cambridge, Mass.
General Radio Co., Concord, Mass.
Hallmark Standards, Inc., Mt. Vernon, N.Y.
Hickok Indicating Sys. Inc., Gardena, Cal.
Kahl Scientific Instr. Corp., El Cajon, Calif.
Keithley Instrs., Inc., Cleveland, Ohio
Lab Electro-Acoustique, 92-Rueil, Malmaison, France
Mechanical Technology, Inc., Latham, N.Y.
Medistor Instr. Co., Seattle, Wash.
Millivac Instrs., Schenectady, N.Y.
Mura Corp., Jericho, N.Y.
Neutronic Corp., Bridgeton, Mo.
Phaostron Instr. & Elctrn. Co., So. Pasadena, Cal.
Philips Elctrn. Instrs., Mt. Vernon, N.Y.
Q.V.S., Inc., East Orange, N.J.
Rohde & Schwarz Sls., Passaic, N.J.
Scientific Educational Prods., N.Y., N.Y.
Shigoto Inds., Ltd., New York, N.Y.
Stark Elctrn. Instrs., Ltd., Ajax, Ont., Canada
Sunshine Sci. Instrs., Inc., Philadelphia, Pa.
Weston Instruments, Inc., Newark, N.J.
Winslow Tele-Tronics, Inc., Eatontown, N.J.
Yewtec Corporation, Larchmont, N.Y.

Meters, Microampere

Alco Elctrn. Prods., Lawrence, Mass.
API Instrs. Co., Waltham,, Mass. .. p 402
Beede Electrical Instr. Co., Inc., Penacook, N.H. .....p 416,417
Biddle, James G., Plymouth Meeting, Pa.
Boonton Elctrns., Parsippany, N.J.
Calico Div., San Diego, Cal.
Dixson Inc., Grand Junction, Colo. p 431
Dynamics Instr. Co., Monterey Pk., Cal.
Electro-Mechanical Instr. Div., Perkasie, Pa. ..... p 451
Electro-Numerics, Santa Clara, Cal.
Electro Sci. Inds., Portland, Ore.
Elctrn. Applications, S. El Monte, Cal.
Faria Meter Corp., Uncasville, Conn. p 468
Fluke, John Mfg. Co., Inc., Seattle, Wash.
General Elec. Co., Schenectady, N.Y. p 484
Hewlett-Packard, Palo Alto, Cal.
Hickok Elect. Instr., Cleveland, Ohio
Hoyt Elec. Instr. Works, Belmont, Mass. p 494
Kratos Instrument Div., Pasadena, Cal
Modutec, Inc., Norwalk, Conn. p 524-527
RCA Elctrns. Comps., Harrison, N.J.
Simpson Elec. Co., Chicago, Ill..... p 556
Systron-Donner Concord Instr. Div., Concord, Cal.
Triplett Elec. Instr. Co., Bluffton, Ohio p 576
Victoreen Instr., Cleveland, Ohio
Westinghouse Elec. Corp., Newark, N.J. p 582
A & D Electrical Instrs., Glendale, N.Y.
A & M Instrument, Inc., Great Neck, N.Y.
Abtronics, Inc., Livermore, Calif.
Allied Elctrns. Corp., Chicago, Ill.
Ammon Instrs., Inc., Manchester, N.H.
Amprobe Instr., Lynbrook, N.Y.
Analogic, Wakefield, Mass.
A.O.I.P., 75/Paris 12eme, France.
Atlantic Instrs. Corp., Watertown, Mass.
AUL Instrs., Inc., Flushng, N.Y.
California Instrs. Co., San Diego, Cal.
Canadian Research Institute, Don Mills, Ont., Canada
Central Scientific Co., Chicago, Ill.
Cohu Elctrns., Inc., San Diego, Calif.
Components Specialties, Inc., Freeport, N.Y.
Doric Sci. Corp., San Diego, Calif.
Electrical Instr. Svc., Inc., Mt. Vernon, N.Y.
Electronic Design Labs., Inc., Phila., Pa.
Esterline Angus Div., Indianapolis, Ind.
Ferranti Ltd., Hollinwood, Lancs., England
Gencom Div., Plainview, N.Y.
Hallmark Standards, Inc., Mt. Vernon, N.Y.
Hickok Indicating Sys. Inc., Gardena, Cal.
Hy-Cal Engrg., Santa Fe Springs, Cal.
Ideal Precision Meter Co., Inc., Brooklyn, N.Y.
Int'l. Instrs., Orange, Conn.
Jewell Electrical Instrs., Manchester, N.H.
Keithley Instrs., Inc., Cleveland, Ohio
Levell Electronics Ltd., High Barnet, Herts,, England
Lewis Engrg. Co., Naugatuck, Conn.
Medistor Instr. Co., Seattle, Wash.
Millivac Instrs., Schenectady, N.Y.
Mura Corp., Jericho, N.Y.
Neutronic Corp., Bridgeton, Mo.
Parker Instr. Corp., Stamford, Conn.
Phaostron Instr. & Elctrn. Co., So. Pasadena, Cal.
Philips Elctrn. Instrs., Mt. Vernon, N.Y.
Q.V.S., Inc., East Orange, N.J.
Rohde & Schwarz Sls., Passaic, N.J.
Rystl Elctrns. Corp., N. Miami Beach, Fla.
Scientific Educational Prods., N.Y., N.Y.
Shigoto Inds., Ltd., New York, N.Y.
Shurite Meters, New Haven, Conn.
Stark Elctrn. Instrs., Ltd., Ajax, Ont., Canada
Sun Electric Corp., Chicago, Ill.
Sunshine Sci. Instrs., Inc., Philadelphia, Pa.
Weston Instruments, Inc., Newark, N.J.
Yewtec Corporation, Larchmont, N.Y.

Meters, Micro-Microampere—See Meters, Nanoampere

Meters, Micro-Nanovolt—See Meters, Nanovolt

Meters, Microhm

Associated Resch., Chicago, Ill.
Biddle, James G., Plymouth Meeting, Pa.
Calico Div., San Diego, Cal.
Electro Sci. Inds., Portland, Ore.
Simpson Elec. Co., Chicago, Ill.
A & M Instrument, Inc., Great Neck, N.Y.
California Instrs. Co., San Diego, Cal.
Cohu Elctrns., Inc., San Diego, Calif.
Data Precision, Wakefield, Mass.
Dice, J.W. Co., Englewood, N.J.
Gotham Audio Corp., New York, N.Y.
Hickok Indicating Sys. Inc., Gardena, Cal.
Keithley Instrs., Inc., Cleveland, Ohio
Medistor Instr. Co., Seattle, Wash.
Mura Corp., Jericho, N.Y.
Phaostron Instr. & Elctrn. Co., So. Pasadena, Cal.
Philips Elctrn. Instrs., Mt. Vernon, N.Y.
Shigoto Inds., Ltd., New York, N.Y.
Weston Instruments, Inc., Newark, N.J.

Meters, Microvolt

Biddle, James G., Plymouth Meeting, Pa.
Boonton Elctrns., Parsippany, N.J.
Calico Div., San Diego, Cal.
Dynamics Instr. Co., Monterey Pk., Cal.
Electro Sci. Inds., Portland, Ore.
Elctrn. Applications, S. El Monte, Cal.
Fluke, John Mfg. Co., Inc., Seattle, Wash. .....p 471,479
General Elec. Co., Schenectady, N.Y. p 484
Hewlett-Packard, Palo Alto, Cal.
Hickok Elect. Instr., Cleveland, Ohio p 488
Kratos Instrument Div., Pasadena, Cal
North Atlantic Inds., Plainview, N.Y.
Simpson Elec. Co., Chicago, Ill.
Systron-Donner Concord Instr. Div., Concord, Cal.
Victoreen Instr., Cleveland, Ohio
Western Reserve Elctrns., Twinsburg, Ohio ..... p 580
A & D Electrical instrs., Glendale, N.Y.
A & M Instrument, Inc., Great Neck, N.Y.
Allied Elctrns. Corp., Chicago, Ill.
Atlantic Instrs. Corp., Watertown, Mass.
Brower Laboratories, Inc., Waltham, Mass.
California Instrs. Co., San Diego, Cal.
Cohu Elctrns., Inc., San Diego, Calif.
Dana Labs., Inc., Irvine, Calif.
Data Precision, Wakefield, Mass.
Doric Sci. Corp., San Diego, Calif.
Ferranti Ltd., Hollinwood, Lancs., England
Gencom Div., Plainview, N.Y.
General Microwave Corp., Farmingdale, N.Y.
General Radio Co., Concord, Mass.
Hallmark Standards, Inc., Mt. Vernon, N.Y.
Hickok Indicating Sys. Inc., Gardena, Cal.
Hy-Cal Engrg., Santa Fe Springs, Cal.
Innovatek Enterprise, Millerton, N.Y.
Instrument Displays, Haverhill, Mass.
Jewell Electrical Instrs., Manchester, N.H.
Keithley Instrs., Inc., Cleveland, Ohio

Leader Instr. Corp., Long Island City, N.Y.
Levell Electronics Ltd., High Barnet, Herts,, England
Lewis Engrg. Co., Naugatuck, Conn.
Medistor Instr. Co., Seattle, Wash.
Millivac Instrs., Schenectady, N.Y.
Mura Corp., Jericho, N.Y.
Newport Labs., Inc., Santa Ana, Cal.
Phaostron Instr. & Elctrn. Co., So. Pasadena, Cal.
Philips Elctrn. Instrs., Mt. Vernon, N.Y.
Rohde & Schwarz Sls., Passaic, N.J.
Scientific Educational Prods., N.Y., N.Y.
Sunshine Sci. Instrs., Inc., Philadelphia, Pa.
Weston Instruments, Inc., Newark, N.J.

Meters, Microwave

Boonton Elctrns., Parsippany, N.J. p 422
Electro/Data, Inc., Garland, Tex.
Frequency Engrg. Labs., Farmingdale, N.J. ..... p 604,605
Hewlett-Packard, Palo Alto, Cal.
Polarad Elctrn. Instrs., Lake Success, N.Y. ..... p 540
Singer Instrumentation Palo Alto Oper., Palo Alto, Cal.
Waveline, Inc., W. Caldwell, N.J.
Weinschel Engrg. Co., Gaithersburg, Md. ..... p 1571
Western Reserve Elctrns., Twinsburg, Ohio
Anritsu Electric Co., Ltd., Tokyo, Japan
Chemalloy Elctrns., Santee, Cal.
General Microwave Corp., Farmingdale, N.Y.
Guide Inds., Inc., Sun Valley, Calif.
Hickok Indicating Sys. Inc., Gardena, Cal.
Industrial Microwave, Scotch Plains, N.J.
Instrument Displays, Haverhill, Mass.
MCS Corp., Monrovia, Calif.
Microlab/FXR, Livingston, N.J.
Narda Microwave Corp., Plainview, N.Y.
Pacific Meas., Inc., Palo Alto, Calif.
PRD Elctrns., Inc., Westbury, N.Y.
Premier Microwave, Port Chester, N.Y.
Rohde & Schwarz Sls., Passaic, N.J.
Sage Labs. Inc., Natick, Mass.
Struthers Elctrns. Corp., Mamaroneck, N.Y.

Meters, Milliampere

Alco Elctrn. Prods., Lawrence, Mass.
API Instrs. Co., Waltham,, Mass.
Beede Electrical Instr. Co., Inc., Penacook, N.H.
Biddle, James G., Plymouth Meeting, Pa.
Boonton Elctrns., Parsippany, N.J.
Calico Div., San Diego, Cal.
Data Technology, Palo Alto, Cal.
Dixson Inc., Grand Junction, Colo.
Dynamics Instr. Co., Monterey Pk., Cal.
Electro-Mechanical Instr. Div., Perkasie, Pa. ..... p 451
Electro-Numerics, Santa Clara, Cal.
Electro Sci. Inds., Portland, Ore.
Elctrn. Applications, S. El Monte, Cal.
Faria Meter Corp., Uncasville, Conn. p 468
General Elec. Co., Schenectady, N.Y. p 484
Hewlett-Packard, Palo Alto, Cal.
Hickok Elect. Instr., Cleveland, Ohio
Hoyt Elec. Instr. Works, Belmont, Mass. p 494,495
Kratos Instrument Div., Pasadena, Cal
Modutec, Inc., Norwalk, Conn. p 524,526,527
RCA Elctrns. Comps., Harrison, N.J.
Simpson Elec. Co., Chicago, Ill. ..... p 556
Systron-Donner Concord Instr. Div., Concord, Cal.
Trio Labs, Inc., Plainview, N.Y.
Triplett Elec. Instr. Co., Bluffton, Ohio p 576
Western Reserve Elctrns., Twinsburg, Ohio ..... p 580
Westinghouse Elec. Corp., Newark, N.J. p 582
A & D Electrical Instrs., Glendale, N.Y.
A & M Instrument, Inc., Great Neck, N.Y.
Allied Elctrns. Corp., Chicago, Ill.
Ammon Instrs., Inc., Manchester, N.H.
Amprobe Instr., Lynbrook, N.Y.
Analogic, Wakefield, Mass.
Atlantic Instrs. Corp., Watertown, Mass.
AUL Instrs., Inc., Flushng, N.Y.
Buck Engrg. Co., Farmingdale, N.J.
California Instrs. Co., San Diego, Cal.
Canadian Research Institute, Don Mills, Ont., Canada
Central Scientific Co., Chicago, Ill.
Components Specialties, Inc., Freeport, N.Y.
Doric Sci. Corp., San Diego, Calif.
Ealing Corp., Cambridge, Mass.
Electrical Instr. Svc., Inc., Mt. Vernon, N.Y.
Electronic Design Labs., Inc., Phila., Pa.
Esterline Angus Div., Indianapolis, Ind.
Ferranti Ltd., Hollinwood, Lancs., England
General Microwave Corp., Farmingdale, N.Y.
Gralex Inds., Inc., Farmingdale, N.Y.
Hallmark Standards, Inc., Mt. Vernon, N.Y.
Heath Co., Benton Harbor, Mich.
Hickok Indicating Sys. Inc., Gardena, Cal.
Ideal Precision Meter Co., Inc., Brooklyn, N.Y.
Instrument Displays, Haverhill, Mass.
Int'l. Instrs., Orange, Conn.
Jewell Electrical Instrs., Manchester, N.H.
Keithley Instrs., Inc., Cleveland, Ohio
Kikusui Elctrns. Corp., Kawasaki City, Kanagawa-Pref., Japan
Lewis Engrg. Co., Naugatuck, Conn.
Millivac Instrs., Schenectady, N.Y.
Mura Corp., Jericho, N.Y.
Neutronic Corp., Bridgeton, Mo.
Parker Instr. Corp., Stamford, Conn.
Phaostron Instr. & Elctrn. Co., So. Pasadena, Cal.
Philips Elctrn. Instrs., Mt. Vernon, N.Y.
Philmore Mfg. Co., Richmond Hill, N.Y.
Q.V.S., Inc., East Orange, N.J.
Shigoto Inds., Ltd., New York, N.Y.
Shurite Meters, New Haven, Conn.
Stark Elctrn. Instrs., Ltd., Ajax, Ont., Canada
Sun Electric Corp., Chicago, Ill.
Sunshine Sci. Instrs., Inc., Philadelphia, Pa.
Taylor Instr. Process Control Div., Rochester, N.Y.
Viz Mfg. Co., Philadelphia, Pa.
Weston Instruments, Inc., Newark, N.J.
Yewtec Corporation, Larchmont, N.Y.

Meters, Milliohm

Associated Resch., Chicago, Ill.
Biddle, James G., Plymouth Meeting, Pa.
Calico Div., San Diego, Cal.
Electro-Numerics, Santa Clara, Cal.
Electro Sci. Inds., Portland, Ore.
Hewlett-Packard, Palo Alto, Cal.
Hickok Elect. Instr., Cleveland, Ohio
Honeywell, Denver, Colo.
Simpson Elec. Co., Chicago, Ill.
Sticht, Herman H. Co., Inc., New York, N.Y.
Tech Labs., Inc., Palisades Pk., N.J.
Teledyne Philbrick, Dedham, Mass.
Triplett Elec. Instr. Co., Bluffton, Ohio
Western Reserve Elctrns., Twinsburg, Ohio ..... p 580
A & M Instrument, Inc., Great Neck, N.Y.
Amstro Corp., Fairfield, N.J.
Analogic, Wakefield, Mass.
California Instrs. Co., San Diego, Cal.
Dana Labs., Inc., Irvine, Calif.
Data Precision, Wakefield, Mass.
Dice, J.W. Co., Englewood, N.J.
Ealing Corp., Cambridge, Mass.
Innovatek Enterprise, Millerton, N.Y.
Jewell Electrical Instrs., Manchester, N.H.
Keithley Instrs., Inc., Cleveland, Ohio
Medistor Instr. Co., Seattle, Wash.
Mura Corp., Jericho, N.Y.
Phaostron Instr. & Elctrn. Co., So. Pasadena, Cal.
Philips Elctrn. Instrs., Mt. Vernon, N.Y.
Rohde & Schwarz Sls., Passaic, N.J.
Shigoto Inds., Ltd., New York, N.Y.
Stark Elctrn. Instrs., Ltd., Ajax, Ont., Canada
Sunshine Sci. Instrs., Inc., Philadelphia, Pa.
Viz Mfg. Co., Philadelphia, Pa.
Yewtec Corporation, Larchmont, N.Y.

Meters, Millivolt

API Instrs. Co., Waltham,, Mass.
Beede Electrical Instr. Co., Inc., Penacook, N.H. ..... p 416,417
Biddle, James G., Plymouth Meeting, Pa.
Boonton Elctrns., Parsippany, N.J. p 422
Calico Div., San Diego, Cal.
Data Technology, Palo Alto, Cal.
Dynamics Instr. Co., Monterey Pk., Cal.
Electro-Mechanical Instr. Div., Perkasie, Pa. ..... p 451
Electro-Numerics, Santa Clara, Cal.
Electro Sci. Inds., Portland, Ore.
Elctrn. Applications, S. El Monte, Cal.
Fluke, John Mfg. Co., Inc., Seattle, Wash.
General Elec. Co., Schenectady, N.Y. p 484
Hewlett-Packard, Palo Alto, Cal.
Hickok Elect. Instr., Cleveland, Ohio
Hoyt Elec. Instr. Works, Belmont, Mass. p 494
Ind'l. Test Equip., Port Washington, N.Y.
Kratos Instrument Div., Pasadena, Cal
London Co., Cleveland, Ohio ..... p 516
Marconi Instrs., Englewood, N.J... p 521
Modutec, Inc., Norwalk, Conn. ..... p 526
North Atlantic Inds., Plainview, N.Y.
Simpson Elec. Co., Chicago, Ill.
Systron-Donner Concord Instr. Div., Concord, Cal.
Teledyne Philbrick, Dedham, Mass.
Trio Labs, Inc., Plainview, N.Y.
Triplett Elec. Instr. Co., Bluffton, Ohio p 574-576
Western Reserve Elctrns., Twinsburg, Ohio ..... p 580
Westinghouse Elec. Corp., Newark, N.J. p 582
A & D Electrical Instrs., Glendale, N.Y.
A & M Instrument, Inc., Great Neck, N.Y.
Allied Elctrns. Corp., Chicago, Ill.
Amprobe Instr., Lynbrook, N.Y.
Analogic, Wakefield, Mass.
Anritsu Electric Co., Ltd., Tokyo, Japan
Atlantic Instrs. Corp., Watertown, Mass.
AUL Instrs., Inc., Flushng, N.Y.
B & K Instrs., Inc., Cleveland, Ohio
BAC Elctrns., Pennsauken, N.J.
Barber-Colman Co., Industrial Instrs. Div., Rockford, Ill.
Bristol Div, Waterbury, Conn
Brower Laboratories, Inc., Waltham, Mass.
California Instrs. Co., San Diego, Cal.
Canadian Research Institute, Don Mills, Ont., Canada
Central Scientific Co., Chicago, Ill.
Dana Labs., Inc., Irvine, Calif.
Doric Sci. Corp., San Diego, Calif.
Ealing Corp., Cambridge, Mass.
Electrical Instr. Svc., Inc., Mt. Vernon, N.Y.
Electro-Standards Labs., Inc., Miami, Fla.
Electronic Design Labs., Inc., Phila., Pa.
Esterline Angus Div., Indianapolis, Ind.
Ferranti Ltd., Hollinwood, Lancs., England
Gencom Div., Plainview, N.Y.
General Microwave Corp., Farmingdale, N.Y.
General Radio Co., Concord, Mass.
Hallmark Standards, Inc., Mt. Vernon, N.Y.
Heath Co., Benton Harbor, Mich.
Hickok Indicating Sys. Inc., Gardena, Cal.
Honeywell, Apparatus Controls, Mpls., Minn.
Honeywell, Ft. Washington, Pa.
Hy-Cal Engrg., Santa Fe Springs, Cal.
Ideal Precision Meter Co., Inc., Brooklyn, N.Y.
Innovatek Enterprise, Millerton, N.Y.
Instrument Displays, Haverhill, Mass.
Int'l. Instrs., Orange, Conn.
Jewell Electrical Instrs., Manchester, N.H.
Keithley Instrs., Inc., Cleveland, Ohio
Kikusui Elctrns. Corp., Kawasaki City, Kanagawa-Pref., Japan
Lab Electro-Acoustique, 92-Rueil, Malmaison, France
Leader Instr. Corp., Long Island City, N.Y.
Levell Electronics Ltd., High Barnet, Herts,, England
Lewis Engrg. Co., Naugatuck, Conn.
Medistor Instr. Co., Seattle, Wash.
Millivac Instrs., Schenectady, N.Y.
Mura Corp., Jericho, N.Y.
Neutronic Corp., Bridgeton, Mo.
Newport Labs., Inc., Santa Ana, Cal.
Phaostron Instr. & Elctrn. Co., So. Pasadena, Cal.
Philips Elctrn. Instrs., Mt. Vernon, N.Y.
Q.V.S., Inc., East Orange, N.J.
Radiation Devices Co., Baltimore, Md.
Rohde & Schwarz Sls., Passaic, N.J.
Scientific Educational Prods., N.Y., N.Y.
Shigoto Inds., Ltd., New York, N.Y.
Shurite Meters, New Haven, Conn.
Sigma Instrs., Inc., Braintree, Mass.
Sun Electric Corp., Chicago, Ill.
Sunshine Sci. Instrs., Inc., Philadelphia, Pa.
Viz Mfg. Co., Philadelphia, Pa.
West Instr. Div., Schiller Pk., Ill.
Weston Instruments, Inc., Newark, N.J.
Yewtec Corporation, Larchmont, N.Y.

Meters, Miniature

Alco Elctrn. Prods., Lawrence, Mass.
Data Technology, Palo Alto, Cal.
General Elec. Co., Schenectady, N.Y. p 484
Hickok Elect. Instr., Cleveland, Ohio
Hoyt Elec. Instr. Works, Belmont, Mass. p 494,495
Kratos Instrument Div., Pasadena, Cal
Modutec, Inc., Norwalk, Conn. ..... p 527
Simpson Elec. Co., Chicago, Ill.
Trio Labs, Inc., Plainview, N.Y.
Triplett Elec. Instr. Co., Bluffton, Ohio
A & M Instrument, Inc., Great Neck, N.Y.
Ammon Instrs., Inc., Manchester, N.H.
Amprobe Instr., Lynbrook, N.Y.
Aristo-Craft Distinctive Miniatures, New York, N.Y.
Atlantic Instrs. Corp., Watertown, Mass.
Components Specialties, Inc., Freeport, N.Y.
Edison, Thomas A. Instr. Div., W. Orange, N.J.
Esterline Angus Div., Indianapolis, Ind.
General Microwave Corp., Farmingdale, N.Y.
Hickok Indicating Sys. Inc., Gardena, Cal.
Ideal Precision Meter Co., Inc., Brooklyn, N.Y.
Int'l. Instrs., Orange, Conn.
Jewell Electrical Instrs., Manchester, N.H.
Lewis Engrg. Co., Naugatuck, Conn.
Mura Corp., Jericho, N.Y.
Parker Instr. Corp., Stamford, Conn.
Phaostron Instr. & Elctrn. Co., So. Pasadena, Cal.
Q.V.S., Inc., East Orange, N.J.
Rystl Elctrns. Corp., N. Miami Beach, Fla.
Shigoto Inds., Ltd., New York, N.Y.
Sigma Instrs., Inc., Braintree, Mass.
Sun Electric Corp., Chicago, Ill.
Sunshine Sci. Instrs., Inc., Philadelphia, Pa.
Yewtec Corporation, Larchmont, N.Y.

Meters, Modulation

Kratos Instrument Div., Pasadena, Cal p 510
London Co., Cleveland, Ohio ..... p 516
Marconi Instrs., Englewood, N.J... p 520
Simpson Elec. Co., Chicago, Ill.
Avtron Mfg., Inc., Cleveland, Ohio
CCA Elctrns. Corp., Gloucester, N.J.
Fairchild Electro-Metrics, Amsterdam, N.Y.
Lampkin Labs., Inc., Bradenton, Fla.
MSE, Inc., Westlake, Ohio
New London Instr. Co., Inc., New London, Conn.
Zoomar, Inc., Glen Cove, N.Y.

Meters, Moisture (Electronic)

—See Indicators, Moisture

Meters, Moving Scale

Jonard Inds. Corp., Bronx, N.Y.
Philips Elctrn. Instrs., Mt. Vernon, N.Y.
Q.V.S., Inc., East Orange, N.J.
Sigma Instrs., Inc., Braintree, Mass.
Weston Instruments, Inc., Newark, N.J.

Meters, Multitester

Alco Elctrn. Prods., Lawrence, Mass.
Associated Resch., Chicago, Ill. .. p 405
Biddle, James G., Plymouth Meeting, Pa. ..... p 419
Data Technology, Palo Alto, Cal.
Fluke, John Mfg. Co., Inc., Seattle, Wash. ..... p 473
Hewlett-Packard, Palo Alto, Cal.
Hickok Elect. Instr., Cleveland, Ohio
Julie Research Lab., New York, N.Y. p 503
RCA Elctrns. Comps., Harrison, N.J.
Schauer Mfg. Corp., Cincinnati, Ohio
Scientific Columbus, Columbus, Ohio
Simpson Elec. Co., Chicago, Ill. ..... p 557
Teledyne Philbrick, Dedham, Mass.
Trio Labs, Inc., Plainview, N.Y.
Triplett Elec. Instr. Co., Bluffton, Ohio p 573

Wavetek, San Diego, Cal.
A & M Instrument, Inc., Great Neck, N.Y.
Abbey Elctrns. Div., Plainview, N.Y.
Amprobe Instr., Lynbrook, N.Y.
A.O.I.P., 75/Paris 12eme, France
Aristo-Craft Distinctive Miniatures, New York, N.Y.
AUL Instrs., Inc., Flushng, N.Y.
BAC Elctrns., Pennsauken, N.J.
Bruno-New York Inds. Corp., New York, N.Y.
California Instrs. Co., San Diego, Cal.
Canadian Research Institute, Don Mills, Ont., Canada
Cohu Elctrns., Inc., San Diego, Calif.
Components Specialties, Inc., Freeport, N.Y.
Data Precision, Wakefield, Mass.
Delta Products, Inc., Grand Junction, Colo.
Doric Sci. Corp., San Diego, Calif.
Eico Electronic Instrument Co., Inc., Brooklyn, N.Y.
Electronic Design Labs., Inc., Phila., Pa.
Epic, Inc., New York, N.Y.
Esterline Angus Div., Indianapolis, Ind.
Gencom Div., Plainview, N.Y.
Hallmark Standards, Inc., Mt. Vernon, N.Y.
Heath Co., Benton Harbor, Mich.
Hickok Indicating Sys. Inc., Gardena, Cal.
Instrument Labs. Corp., Chicago, Ill.
Keithley Instrs., Inc., Cleveland, Ohio
Leader Instr. Corp., Long Island City, N.Y.
Levell Electronics Ltd., High Barnet, Herts,, England
Medistor Instr. Co., Seattle, Wash.
Millivac Instrs., Schenectady, N.Y.
Model Rectifier Corp., Edison, N.J.
Model Rectifier, Edison, N.J.
Mura Corp., Jericho, N.Y.
Phaostron Instr. & Elctrn. Co., So. Pasadena, Cal.
Philips Elctrn. Instrs., Mt. Vernon, N.Y.
Philmore Mfg. Co., Richmond Hill, N.Y.
Q.V.S., Inc., East Orange, N.J.
Radiation Devices Co., Baltimore, Md.
Robertson Instr., Azusa, Cal.
Rohde & Schwarz Sls., Passaic, N.J.
Rystl Elctrns. Corp., N. Miami Beach, Fla.
Sanwa Corp. America, Edison, N.J.
Scientific Educational Prods., N.Y., N.Y.
Shigoto Inds., Ltd., New York, N.Y.
Stark Elctrn. Instrs., Ltd., Ajax, Ont., Canada
Sunshine Sci. Instrs., Inc., Philadelphia, Pa.
Weston Instruments, Inc., Newark, N.J.
Yewtec Corporation, Larchmont, N.Y.

Meters, Multitester (Digital)

Alco Elctrn. Prods., Lawrence, Mass.
Calico Div., San Diego, Cal. ..... p 424
Data Technology, Palo Alto, Cal... p 429
Dixson Inc., Grand Junction, Colo.
Dytro Corp., Hicksville, N.Y.
Electro-Numerics, Santa Clara, Cal. p 453
Fluke, John Mfg. Co., Inc., Seattle, Wash. .....p 470,471
Hewlett-Packard, Palo Alto, Cal.
Hickok Elect. Instr., Cleveland, Ohio p 487,488
Honeywell, Denver, Colo. ..... p 590
Precision Standards Corp., Santa Ana, Cal. ..... p 541
Preston Scientific, Anaheim, Cal. p 549
Simpson Elec. Co., Chicago, Ill..... p 557
Systron-Donner Corp., Concord, Cal. p 564
Systron-Donner Concord Instr. Div., Concord, Cal. ..... p 564
Systron-Donner Datapulse Div., Culver City, Cal. ..... p 564
Systron Donner Trygon Elctrns. Sub., Roosevelt, N.Y. ..... p 564
Tektronix, Inc., Beaverton, Ore.
Triplett Elec. Instr. Co., Bluffton, Ohio
Western Reserve Elctrns., Twinsburg, Ohio ..... p 580
A & M Instrument, Inc., Great Neck, N.Y.
Artronix, Inc., St. Louis, Mo.
BAC Elctrns., Pennsauken, N.J.
California Instrs. Co., San Diego, Cal.
Dana Labs., Inc., Irvine, Calif.
Data Precision, Wakefield, Mass.
Dixson, Inc., Grand Junction, Colo.
Doric Sci. Corp., San Diego, Calif.
Electrical Instr. Svc., Inc., Mt. Vernon, N.Y.
Electronic Design Labs., Inc., Phila., Pa.
Esterline Angus Div., Indianapolis, Ind.
Gencom Div., Plainview, N.Y.
General Oceanology, Inc., Cambridge, Mass.
Keithley Instrs., Inc., Cleveland, Ohio
Kikusui Elctrns. Corp., Kawasaki City, Kanagawa-Pref., Japan
Millivac Instrs., Schenectady, N.Y.
Neutronic Corp., Bridgeton, Mo.
Non-Linear Sys., Inc., Del Mar, Cal.
Northeast Elctrns. Corp., Concord, N.H.
Philips Elctrn. Instrs., Mt. Vernon, N.Y.
Robertson Instr., Azusa, Cal.
Rohde & Schwarz Sls., Passaic, N.J.
Sunshine Sci. Instrs., Inc., Philadelphia, Pa.
United Sys. Corp., Dayton, Ohio

Meters, Multitester (Potentiometric)

Biddle, James G., Plymouth Meeting, Pa.
Electro Sci. Inds., Portland, Ore.
Hickok Elect. Instr., Cleveland, Ohio
Wavetek, San Diego, Cal.
Western Reserve Elctrns., Twinsburg, Ohio
A & M Instrument, Inc., Great Neck, N.Y.
AUL Instrs., Inc., Flushng, N.Y.
Doric Sci. Corp., San Diego, Calif.
Esterline Angus Div., Indianapolis, Ind.
Guildline Instrs., Inc., Larchmont, N.Y.
Keithley Instrs., Inc., Cleveland, Ohio
Neutronic Corp., Bridgeton, Mo.

Meters, Nanampere

Boonton Elctrns., Parsippany, N.J.
Elcor Prods. Welex Elctrns., Silver Spring, Md.
Electro Sci. Inds., Portland, Ore.
Fluke, John Mfg. Co., Inc., Seattle, Wash.
General Elec. Co., Schenectady, N.Y.
Hewlett-Packard, Palo Alto, Cal.
Simpson Elec. Co., Chicago, Ill.
Victoreen Instr., Cleveland, Ohio
A & M Instrument, Inc., Great Neck, N.Y.
A.O.I.P., 75/Paris 12eme, France
California Instrs. Co., San Diego, Cal.
Datum, Inc., Anaheim, Calif.
Doric Sci. Corp., San Diego, Calif.
Gencom Div., Plainview, N.Y.
Keithley Instrs., Inc., Cleveland, Ohio
Levell Electronics Ltd., High Barnet, Herts,, England
Millivac Instrs., Schenectady, N.Y.
Neutronic Corp., Bridgeton, Mo.
Pacific Photometric Instrs., Berkeley, Cal.
Philips Elctrn. Instrs., Mt. Vernon, N.Y.

Meters, Nanovolt

Electro Sci. Inds., Portland, Ore.
General Elec. Co., Schenectady, N.Y.
Ithaco, Inc., Ithaca, N.Y.
Quan-Tech, Whippany, N.J.
Simpson Elec. Co., Chicago, Ill.
A & M Instrument, Inc., Great Neck, N.Y.
Artronix, Inc., St. Louis, Mo.
Brower Laboratories, Inc., Waltham, Mass.
Datum, Inc., Anaheim, Calif.
Doric Sci. Corp., San Diego, Calif.
Keithley Instrs., Inc., Cleveland, Ohio
Medistor Instr. Co., Seattle, Wash.
Philips Elctrn. Instrs., Mt. Vernon, N.Y.
Princeton Applied Resch. Corp., Princeton, N.J.

Meters, Noise-Figure

Hewlett-Packard, Palo Alto, Cal.
Kay Elemetrics, Pine Brook, N.J. p 507,509
Quan-Tech, Whippany, N.J.....p 546,547
Singer Instrumentation Los Angeles Oper., Los Angeles, Cal. ..... p 562
Singer Instrumentation Palo Alto Oper., Palo Alto, Cal. ..... p 562
Aerospace Resch. Inc., Boston, Mass.
AIL, Div. Cutler-Hammer, Inc., Deer Park, N.Y.
Anritsu Electric Co., Ltd., Tokyo, Japan
B & K Instrs., Inc., Cleveland, Ohio
Edison Elctrns. Div., Manchester, N.H.
Elcom Sys., Deer Pk., N.Y.
Fairchild Electro-Metrics, Amsterdam, N.Y.
General Microwave Corp., Farmingdale, N.Y.
Int'l. Microwave, Cos Cob, Conn.
Siemens Corp., Comps. Div., Iselin, N.J.
Solatron Enterprises, Inglewood, Calif.
Sprengnether, W.F. Instr. Co., Inc., St. Louis, Mo.

Meters, Null

API Instrs. Co., Waltham,, Mass.
Boonton Elctrns., Parsippany, N.J.
Dixson Inc., Grand Junction, Colo.
Dynamics Instr. Co., Monterey Pk., Cal.
Electro Sci. Inds., Portland, Ore.
Fluke, John Mfg. Co., Inc., Seattle, Wash. ..... p 479
Freed Transformer Co., Bklyn., N.Y. p 481
Hewlett-Packard, Palo Alto, Cal.
Hickok Elect. Instr., Cleveland, Ohio
Hoyt Elec. Instr. Works, Belmont, Mass.
Ind'l. Test Equip., Port Washington, N.Y. p 497
Julie Research Lab., New York, N.Y. p 502
Modutec, Inc., Norwalk, Conn. ..... p 527
North Atlantic Inds., Plainview, N.Y.
Simpson Elec. Co., Chicago, Ill.
Teledyne Philbrick, Dedham, Mass.
Trio Labs, Inc., Plainview, N.Y.
Triplett Elec. Instr. Co., Bluffton, Ohio p 576
Wavetek, San Diego, Cal.
Weinschel Engrg. Co., Gaithersburg, Md.
Western Reserve Elctrns., Twinsburg, Ohio
A & D Electrical Instrs., Glendale, N.Y.
A & M Instrument, Inc., Great Neck, N.Y.
Ammon Instrs., Inc., Manchester, N.H.
A.O.I.P., 75/Paris 12eme, France
AUL Instrs., Inc., Flushng, N.Y.
Brower Laboratories, Inc., Waltham, Mass.
Canadian Research Institute, Don Mills, Ont., Canada
Doric Sci. Corp., San Diego, Calif.
General Microwave Corp., Farmingdale, N.Y.
General Radio Co., Concord, Mass.
Hallmark Standards, Inc., Mt. Vernon, N.Y.
Hickok Indicating Sys. Inc., Gardena, Cal.
Ideal Precision Meter Co., Inc., Brooklyn, N.Y.
Int'l. Instrs., Orange, Conn.
Jewell Electrical Instrs., Manchester, N.H.
Keithley Instrs., Inc., Cleveland, Ohio
Levell Electronics Ltd., High Barnet, Herts,, England
MB Elctrns/Textron Co., New Haven, Conn.
McKee-Pedersen Instrs., Danville, Calif.
Mechanical Technology, Inc., Latham, N.Y.
Medistor Instr. Co., Seattle, Wash.
Millivac Instrs., Schenectady, N.Y.
Mura Corp., Jericho, N.Y.
Phaostron Instr. & Elctrn. Co., So. Pasadena, Cal.
Philips Elctrn. Instrs., Mt. Vernon, N.Y.
Q.V.S., Inc., East Orange, N.J.
Rohde & Schwarz Sls., Passaic, N.J.
Scientific Educational Prods., N.Y., N.Y.
Shigoto Inds., Ltd., New York, N.Y.
Sunshine Sci. Instrs., Inc., Philadelphia, Pa.
Theta Instr. Corp., Fairfield, N.J.

Meters, Ohm

Associated Resch., Chicago, Ill. .. p 405
Beckman Instrs., Cedar Grove, N.J. p 414
Biddle, James G., Plymouth Meeting, Pa. ..... p 419
Calico Div., San Diego, Cal. ..... p 424
Data Technology, Palo Alto, Cal.
Dynamics Instr. Co., Monterey Pk., Cal.
Eldorado Electrodata, Concord, Cal. p 449
Electro-Numerics, Santa Clara, Cal.
Electro Sci. Inds., Portland, Ore.
Electronic Research Co., Shawnee Mission, Kans.
Hewlett-Packard, Palo Alto, Cal.
Hickok Elect. Instr., Cleveland, Ohio p 487
RCA Elctrns. Comps., Harrison, N.J.
Simpson Elec. Co., Chicago, Ill.
Slaughter Co., Ardmore, Okla. ..... p 558
Sticht, Herman H. Co., Inc., New York, N.Y. ..... p 563
Systron-Donner Concord Instr. Div., Concord, Cal.
Teledyne Philbrick, Dedham, Mass.
Trio Labs, Inc., Plainview, N.Y.
Triplett Elec. Instr. Co., Bluffton, Ohio p 570,573,576
Wavetek, San Diego, Cal.
Western Reserve Elctrns., Twinsburg, Ohio
A & M Instrument, Inc., Great Neck, N.Y.
Amprobe Instr., Lynbrook, N.Y.
Amstro Corp., Fairfield, N.J.
Analogic, Wakefield, Mass.
Anderson, W.E., Inc., Kansas City, Mo.
A.O.I.P., 75/Paris 12eme, France
AUL Instrs., Inc., Flushng, N.Y.
BAC Elctrns., Pennsauken, N.J.
Bliss Elctrn. Corp., Sussex, N.J.
Bruno-New York Inds. Corp., New York, N.Y.
California Instrs. Co., San Diego, Cal.
Canadian Research Institute, Don Mills, Ont., Canada
Components Specialties, Inc., Freeport, N.Y.
Dana Labs., Inc., Irvine, Calif.
Data Precision, Wakefield, Mass.
Ealing Corp., Cambridge, Mass.
General Oceanology, Inc., Cambridge, Mass.
General Radio Co., Concord, Mass.
Gotham Audio Corp., New York, N.Y.
Hallmark Standards, Inc., Mt. Vernon, N.Y.
Heath Co., Benton Harbor, Mich.
Hickok Indicating Sys. Inc., Gardena, Cal.
Jewell Electrical Instrs., Manchester, N.H.
Keithley Instrs., Inc., Cleveland, Ohio
Kikusui Elctrns. Corp., Kawasaki City, Kanagawa-Pref., Japan
Levell Electronics Ltd., High Barnet, Herts,, England
Millivac Instrs., Schenectady, N.Y.
Mura Corp., Jericho, N.Y.
Neutronic Corp., Bridgeton, Mo.
Phaostron Instr. & Elctrn. Co., So. Pasadena, Cal.
Philips Elctrn. Instrs., Mt. Vernon, N.Y.
Proto Tool Co, Los Angeles, Calif.
Q.V.S., Inc., East Orange, N.J.
Robertson Instr., Azusa, Cal.
Rohde & Schwarz Sls., Passaic, N.J.
Sanwa Corp. America, Edison, N.J.
Scientific Educational Prods., N.Y., N.Y.
Shigoto Inds., Ltd., New York, N.Y.
Shurite Meters, New Haven, Conn.
Snap-On Tools Corp., Kenosha, Wisc.
Stark Elctrn. Instrs., Ltd., Ajax, Ont., Canada
Sunshine Sci. Instrs., Inc., Philadelphia, Pa.
Viz Mfg. Co., Philadelphia, Pa.
Weston Instruments, Inc., Newark, N.J.
Yewtec Corporation, Larchmont, N.Y.

Meters, Panel (D'Arsonval Movement)

Alco Elctrn. Prods., Lawrence, Mass.
API Instrs. Co., Waltham,, Mass. .. p 402
Beede Electrical Instr. Co., Inc., Penacook, N.H. ..... p 417
Dixson Inc., Grand Junction, Colo. p 430,431
Electro-Mechanical Instr. Div., Perkasie, Pa. ..... p 451
Faria Meter Corp., Uncasville, Conn. p 468
General Elec. Co., Schenectady, N.Y. p 484
Hickok Elect. Instr., Cleveland, Ohio
Hoyt Elec. Instr. Works, Belmont, Mass. p 494,495
Kratos Instrument Div., Pasadena, Cal p 510
Modutec, Inc., Norwalk, Conn. ..... p 524
Simpson Elec. Co., Chicago, Ill..... p 556
Trio Labs, Inc., Plainview, N.Y.
Triplett Elec. Instr. Co., Bluffton, Ohio p 576
Westinghouse Elec. Corp., Newark, N.J. p 582
A & D Electrical Instrs., Glendale, N.Y.
A & M Instrument, Inc., Great Neck, N.Y.
Ammon Instrs., Inc., Manchester, N.H.
A.O.I.P., 75/Paris 12eme, France
Atlantic Instrs. Corp., Watertown, Mass.
Canadian Research Institute, Don Mills, Ont., Canada
Components Specialties, Inc., Freeport, N.Y.
Electrical Instr. Svc., Inc., Mt. Vernon, N.Y.
Esterline Angus Div., Indianapolis, Ind.
Ferranti Ltd., Hollinwood, Lancs., England

Hallmark Standards, Inc., Mt. Vernon, N.Y.
Hickok Indicating Sys. Inc., Gardena, Cal.
Ideal Precision Meter Co., Inc., Brooklyn, N.Y.
Int'l. Instrs., Orange, Conn.
Jewell Electrical Instrs., Manchester, N.H.
Lewis Engrg. Co., Naugatuck, Conn.
Mura Corp., Jericho, N.Y.
Parker Instr. Corp., Stamford, Conn.
Phaostron Instr. & Elctrn. Co., So. Pasadena, Cal.
Q.V.S., Inc., East Orange, N.J.
Rystl Elctrns. Corp., N. Miami Beach, Fla.
Shigoto Inds., Ltd., New York, N.Y.
Stark Elctrn. Instrs., Ltd., Ajax, Ont., Canada
Sun Electric Corp., Chicago, Ill.
Sunshine Sci. Instrs., Inc., Philadelphia, Pa.
Weston Instruments, Inc., Newark, N.J.

Meters, Panel (Digital)

Alco Elctrn. Prods., Lawrence, Mass.
API Instrs. Co., Waltham,, Mass. .. p 402
Beede Electrical Instr. Co., Inc., Penacook, N.H. ..... p 416
Calico Div., San Diego, Cal. ..... p 424
Computer Prods., Ft. Lauderdale, Fla. p 341
Data Technology, Palo Alto, Cal... p 429
Datascan, Inc., Clifton, N.J..... p 428
Dixson Inc., Grand Junction, Colo.
Dytro Corp., Hicksville, N.Y.
Electro-Numerics, Santa Clara, Cal. p 453
Hickok Elect. Instr., Cleveland, Ohio
Honeywell, Denver, Colo.
Multitech Automation Prods., Monterey Pk., Cal. ..... p 362
Preston Scientific, Anaheim, Cal. p 549
Schaevitz Engrg., Pennsauken, N.J. p 1991
Simpson Elec. Co., Chicago, Ill.
Systron-Donner Corp., Concord, Cal. p 564
Systron-Donner Concord Instr. Div., Concord, Cal. ..... p 564
Systron-Donner Datapulse Div., Culver City, Cal. ..... p 564
Systron Donner Trygon Elctrns. Sub., Roosevelt, N.Y. ..... p 564
Triplett Elec. Instr. Co., Bluffton, Ohio p 574,575
A & M Instrument, Inc., Great Neck, N.Y.
Abbey Elctrns. Div., Plainview, N.Y.
Analogic, Wakefield, Mass.
California Instrs. Co., San Diego, Cal.
Dixson, Inc., Grand Junction, Colo.
Doric Sci. Corp., San Diego, Calif.
Electronic Design Labs., Inc., Phila., Pa.
Foxboro Co., Foxboro, Mass.
General Microwave Corp., Farmingdale, N.Y.
General Oceanology, Inc., Cambridge, Mass.
Gralex Inds., Inc., Farmingdale, N.Y.
Heath Co., Benton Harbor, Mich.
Innovatek Enterprise, Millerton, N.Y.
Instrument Displays, Haverhill, Mass.
Integrated Circuit Elctrns., Inc., Waltham, Mass.
Intercontinental Elctrns., E. Rochester, N.Y.
Lewis Engrg. Co., Naugatuck, Conn.
Neutronic Corp., Bridgeton, Mo.
Newport Labs., Inc., Santa Ana, Cal.
Non-Linear Sys., Inc., Del Mar, Cal.
Robertson Instr., Azusa, Cal.
Sigma Instrs., Inc., Braintree, Mass.
Sunshine Sci. Instrs., Inc., Philadelphia, Pa.
United Sys. Corp., Dayton, Ohio

Meters, Peak Power

Bendix, Franklin, Ind. ..... p 1555
Bird Elctrn., Cleveland, Ohio..... p 421
Electro Impulse, Inc., Red Bank, N.J.
Hewlett-Packard, Palo Alto, Cal.
Ohio Semitronics, Columbus, Ohiop 533
Simpson Elec. Co., Chicago, Ill.
Weinschel Engrg. Co., Gaithersburg, Md. p 1571
A & M Instrument, Inc., Great Neck, N.Y.
Anritsu Electric Co., Ltd., Tokyo, Japan
General Microwave Corp., Farmingdale, N.Y.
Hickok Indicating Sys. Inc., Gardena, Cal.
Narda Microwave Corp., Plainview, N.Y.
Pacific Meas., Inc., Palo Alto, Calif.
Phaostron Instr. & Elctrn. Co., So. Pasadena, Cal.
Philco-Ford Corp., Washington, D.C.
PRD Elctrns., Inc., Westbury, N.Y.
Vu-data Corp., San Diego, Cal.

Meters, Period

Atec, Inc., Houston, Tex. ..... p 410
General Elec. Co., Schenectady, N.Y.
Hewlett-Packard, Palo Alto, Cal.
Hickok Elect. Instr., Cleveland, Ohio
Simpson Elec. Co., Chicago, Ill.
Systron-Donner Concord Instr. Div., Concord, Cal.
Dynamic Precision Controls, Hagerstown, Ind.
General Radio Co., Concord, Mass.
Instrumentation Tech. Corp., Northridge, Calif.
Neutronic Corp., Bridgeton, Mo.

Meters, Permeameter

Bell, F.W., Inc., Columbus, Ohio.... p 418
ISC Magnetics Div., Huntington, N.Y.
Magnetic Sys. & Instrs., Worcester, Mass.
Magnetics Sys. & Instrs., Worcester, Mass.
Sunshine Sci. Instrs., Inc., Philadelphia, Pa.
Thomas & Skinner, Inc., Indianapolis, Ind.

Meters, Phase-Angle

Alford Mfg. Co., Winchester, Mass.
Austron, Inc., Austin, Tex.
Clarke - Hess, New York, N.Y.
Control Elctrns. Co., Inc., Farmingdale, N.Y.
Dranetz Engrg. Labs., Plainfield, N.J. p 435,438
Dytronics Co., Columbus, Ohio .... p 441
General Elec. Co., Schenectady, N.Y.
Hewlett-Packard, Palo Alto, Cal.
Ind'l. Test Equip., Port Washington, N.Y. p 497
Kratos Instrument Div., Pasadena, Cal p 510
Krohn-Hite, Cambridge, Mass.
North Atlantic Inds., Plainview, N.Y. p 531
Quan-Tech, Whippany, N.J. ..... p 545
Scientific Columbus, Columbus, Ohio
Singer Instrumentation Los Angeles Oper., Los Angeles, Cal. ..... p 562
Singer Instrumentation Palo Alto Oper., Palo Alto, Cal. ..... p 562
Solid State Elctrns., Sepulveda, Cal.
Trio Labs, Inc., Plainview, N.Y.
Universal Ad-Yu Elctrns., Inc., Passaic, N.J. ..... p 579
Wavetek, San Diego, Cal. ..... p 585
Westinghouse Elec. Corp., Newark, N.J.
A & M Instrument, Inc., Great Neck, N.Y.
Aerospace Resch. Inc., Boston, Mass.
BAC Elctrns., Pennsauken, N.J.
Bergen Labs., Inc., Paterson, N.J.
Brower Laboratories, Inc., Waltham, Mass.
Canadian Research Institute, Don Mills, Ont., Canada
Collins Radio Co., Dallas, Tex.
Computer Conversions Corp., East Northport, N.Y.
Dittmore-Freimuth Corp., Milwaukee, Wisc.
Eastern Specialty Co., Philadelphia, Pa.
Hickok Indicating Sys. Inc., Gardena, Cal.
Princeton Applied Resch. Corp., Princeton, N.J.
Rohde & Schwarz Sls., Passaic, N.J.
Siemens Corp., Comps. Div., Iselin, N.J.
Spectral Dynamics Corp. San Diego, San Diego, Cal.
Theta Instr. Corp., Fairfield, N.J.
Video Resch. Corp., Rockville, Md.
Weston Instruments, Inc., Newark, N.J.
Wiltron Co., Palo Alto, Calif.
Yewtec Corporation, Larchmont, N.Y.

Meters, Phase Vector Volt

Austron, Inc., Austin, Tex.
Dranetz Engrg. Labs., Plainfield, N.J. p 433,435
Dytronics Co., Columbus, Ohio .... p 441
Hewlett-Packard, Palo Alto, Cal.
Ind'l. Test Equip., Port Washington, N.Y. p 497
Kratos Instrument Div., Pasadena, Cal
Krohn-Hite, Cambridge, Mass.
North Atlantic Inds., Plainview, N.Y. p 531
Universal Ad-Yu Elctrns., Inc., Passaic, N.J. ..... p 579
Brower Laboratories, Inc., Waltham, Mass.
Dittmore-Freimuth Corp., Milwaukee, Wisc.
PRD Elctrns., Inc., Westbury, N.Y.
Scientific-Atlanta, Inc., Atlanta, Ga.
Spectral Dynamics Corp. San Diego, San Diego, Cal.
Theta Instr. Corp., Fairfield, N.J.
Wiltron Co., Palo Alto, Calif.

Meters, Photoelectric, Reflection—See Vol 2

Meters, Picoampere

Boonton Elctrns., Parsippany, N.J.
Electro Sci. Inds., Portland, Ore.
RCA Elctrns. Comps., Harrison, N.J.
Victoreen Instr., Cleveland, Ohio
A.O.I.P., 75/Paris 12eme, France
Artronix, Inc., St. Louis, Mo.
Datum, Inc., Anaheim, Calif.
Doric Sci. Corp., San Diego, Calif.
General Microwave Corp., Farmingdale, N.Y.
Gralex Inds., Inc., Farmingdale, N.Y.
Harshaw Chem. Co., Cleveland, Ohio
Keithley Instrs., Inc., Cleveland, Ohio
Levell Electronics Ltd., High Barnet, Herts,, England
Millivac Instrs., Schenectady, N.Y.
Pacific Photometric Instrs., Berkeley, Cal.
Philips Elctrn. Instrs., Mt. Vernon, N.Y.
Rohde & Schwarz Sls., Passaic, N.J.

Meters, Pocket

Associated Resch., Chicago, Ill.
Simpson Elec. Co., Chicago, Ill.
Triplett Elec. Instr. Co., Bluffton, Ohio
Western Reserve Elctrns., Twinsburg, Ohio
Amprobe Instr., Lynbrook, N.Y.
Components Specialties, Inc., Freeport, N.Y.
Eico Electronic Instrument Co., Inc., Brooklyn, N.Y.
Mura Corp., Jericho, N.Y.
Philmore Mfg. Co., Richmond Hill, N.Y.
Shigoto Inds., Ltd., New York, N.Y.
Shurite Meters, New Haven, Conn.
Stark Elctrn. Instrs., Ltd., Ajax, Ont., Canada
Weston Instruments, Inc., Newark, N.J.

Meters, Power Density

A & M Instrument, Inc., Great Neck, N.Y.
Fairchild Electro-Metrics, Amsterdam, N.Y.
Narda Microwave Corp., Plainview, N.Y.
Rank Precision Inds., W. Nyack, N.Y.

Meters, Power Factor

Associated Resch., Chicago, Ill.
Dranetz Engrg. Labs., Plainfield, N.J.
General Elec. Co., Schenectady, N.Y.
Hickok Elect. Instr., Cleveland, Ohio
Ind'l. Test Equip., Port Washington, N.Y.
Kratos Instrument Div., Pasadena, Cal
Scientific Columbus, Columbus, Ohio
A & M Instrument, Inc., Great Neck, N.Y.
Davidson Elctrn. Dev. Co., Erie, Pa.
Edison Elctrns. Div., Manchester, N.H.
Electrical Instr. Svc., Inc., Mt. Vernon, N.Y.
Esterline Angus Div., Indianapolis, Ind.
Ferranti Ltd., Hollinwood, Lancs., England
Hallmark Standards, Inc., Mt. Vernon, N.Y.
Q.V.S., Inc., East Orange, N.J.
Stark Elctrn. Instrs., Ltd., Ajax, Ont., Canada
Sunshine Sci. Instrs., Inc., Philadelphia, Pa.
Weston Instruments, Inc., Newark, N.J.
Yewtec Corporation, Larchmont, N.Y.

Meters, Power, R-F

Bendix, Franklin, Ind. ..... p 1555
Bird Elctrn., Cleveland, Ohio..... p 421
Boonton Elctrns., Parsippany, N.J.p 422
Electro Impulse, Inc., Red Bank, N.J.
Fluke, John Mfg. Co., Inc., Seattle, Wash.
Hewlett-Packard, Palo Alto, Cal.
Simpson Elec. Co., Chicago, Ill.
Singer Instrumentation Los Angeles Oper., Los Angeles, Cal. ..... p 562
Singer Instrumentation Palo Alto Oper., Palo Alto, Cal. ..... p 562
Triplett Elec. Instr. Co., Bluffton, Ohio
A & M Instrument, Inc., Great Neck, N.Y.
Anritsu Electric Co., Ltd., Tokyo, Japan
Comdel, Inc., Beverly, Mass.
Components Specialties, Inc., Freeport, N.Y.
Elctrn. Navigation Inds., Inc., Rochester, N.Y.
Fairchild Electro-Metrics, Amsterdam, N.Y.
General Microwave Corp., Farmingdale, N.Y.
Gillette Elctrn. Prods. Co., Beverly, N.J.
Guide Inds., Inc., Sun Valley, Calif.
Heath Co., Benton Harbor, Mich.
Mobil Elctrns., Inc., Anderson, Ind.
Narda Microwave Corp., Plainview, N.Y.
Pacific Meas., Inc., Palo Alto, Calif.
Phaostron Instr. & Elctrn. Co., So. Pasadena, Cal.
Philco-Ford Corp., Washington, D.C.
PRD Elctrns., Inc., Westbury, N.Y.
Q.V.S., Inc., East Orange, N.J.
RCA Corp., Camden, N.J.
Reeve Elctrns., Inc., Chicago, Ill.
RF Communications, Inc., Rochester, N.Y.
Rohde & Schwarz Sls., Passaic, N.J.
Stark Elctrn. Instrs., Ltd., Ajax, Ont., Canada
Struthers Elctrns. Corp., Mamaroneck, N.Y.

Meters, Pyrometer

API Instrs. Co., Waltham,, Mass. .. p 402
Beede Electrical Instr. Co., Inc., Penacook, N.H. ..... p 416
General Elec. Co., Schenectady, N.Y.
J-B-T Instrs., Inc., New Haven, Conn.
Simpson Elec. Co., Chicago, Ill.
Sticht, Herman H. Co., Inc., New York, N.Y.
Triplett Elec. Instr. Co., Bluffton, Ohio
A & M Instrument, Inc., Great Neck, N.Y.
Alnor Instr. Co., Chicago, Ill.
Amprobe Instr., Lynbrook, N.Y.
Amstro Corp., Fairfield, N.J.
Atkins Technical, Inc., Gainesville, Fla.
Barber-Colman Co., Industrial Instrs. Div., Rockford, Ill.
Bristol Div, Waterbury, Conn
Caig Labs., Inc., Westbury, N.Y.
Canadian Research Institute, Don Mills, Ont., Canada
Cole-Parmer Instr. Co., Chicago, Ill.
Doric Sci. Corp., San Diego, Calif.
Edison, Thomas A. Instr. Div., W. Orange, N.J.
Electronic Design Labs., Inc., Phila., Pa.
Elctrn. Dev. Labs., Plainview, N.Y.
Epic, Inc., New York, N.Y.
Exotic Materials, Inc., Costa Mesa, Cal.
Hafstrom Tech. Prods., Inc., San Diego, Calif.
Hydor Therme Corp., Pennsauken, N.J.
Int'l. Instrs., Orange, Conn.
Jewell Electrical Instrs., Manchester, N.H.
Leeds & Northrup Corp., No. Wales, Pa.
Lewis Engrg. Co., Naugatuck, Conn.
Omega Engrg., Inc., Stamford, Conn.
Pacific Transducer Corp., Los Angeles, Calif.
Pyrometer Instr. Co., Inc., Northvale, N J
Stark Elctrn. Instrs., Ltd., Ajax, Ont., Canada
Sunshine Sci. Instrs., Inc., Philadelphia, Pa.
Thermo Elec. Co., Inc., Saddle Brook, N.J.
VWR Scientific, San Francisco, Cal.
West Instr. Div., Schiller Pk., Ill.
Yewtec Corporation, Larchmont, N.Y.

Meters, Q

Dranetz Engrg. Labs., Plainfield, N.J.
Freed Transformer Co., Bklyn., N.Y. p 481
Hewlett-Packard, Palo Alto, Cal.
Marconi Instrs., Englewood, N.J... p 520
A & M Instrument, Inc., Great Neck, N.Y.
New London Instr. Co., Inc., New London, Conn.
Rohde & Schwarz Sls., Passaic, N.J.

Meters, Radiation, Nuclear—See Counters, Geiger; Counters, Scintillation

Meters, Ratio

Atec, Inc., Houston, Tex. ..... p 411
Computer Instrs., Hempstead, N.Y.
Dytro Corp., Hicksville, N.Y.
Electro-Numerics, Santa Clara, Cal.
Electro Sci. Inds., Portland, Ore. p 454,455

Freed Transformer Co., Bklyn., N.Y. p 482
Hewlett-Packard, Palo Alto, Cal.
Hickok Elect. Instr., Cleveland, Ohio
North Atlantic Inds., Plainview, N.Y. p 531
Singer Instrumentation Los Angeles Oper., Los Angeles, Cal. p 562
Singer Instrumentation Palo Alto Oper., Palo Alto, Cal. p 562
Systron-Donner Concord Instr. Div., Concord, Cal.
Teledyne Philbrick, Dedham, Mass.
Wavetek, San Diego, Cal.
Weinschel Engrg. Co., Gaithersburg, Md. p 1571
A & M Instrument, Inc., Great Neck, N.Y.
Allis, Louis Co., Milwaukee, Wisc.
BAC Elctrns., Pennsauken, N.J.
Brower Laboratories, Inc., Waltham, Mass.
California Instrs. Co., San Diego, Cal.
Canadian Research Institute, Don Mills, Ont., Canada
Cohu Elctrns., Inc., San Diego, Calif.
Dana Labs., Inc., Irvine, Calif.
Data Precision, Wakefield, Mass.
Doric Sci. Corp., San Diego, Calif.
Edison, Thomas A. Instr. Div., W. Orange, N.J.
Electric Tachometer Corp., Philadelphia, Pa.
Esterline Angus Div., Indianapolis, Ind.
FKS Comms., Inc., New Hyde Park, N.Y.
General Radio Co., Concord, Mass.
Gralex Inds., Inc., Farmingdale, N.Y.
Hallmark Standards, Inc., Mt. Vernon, N.Y.
Idalee Elctrns. Corp., Valley Stream, N.Y.
Innovatek Enterprise, Millerton, N.Y.
Lewis Engrg. Co., Naugatuck, Conn.
Pacific Meas., Inc., Palo Alto, Calif.
Robertson Instr., Azusa, Cal.
Taylor Instr. Process Control Div., Rochester, N.Y.

Meters, Recorders & Comparators, P-H

Hewlett-Packard, Palo Alto, Cal.
A & M Instrument, Inc., Great Neck, N.Y.
Amstro Corp., Fairfield, N.J.
Analytical Meas., Inc., Chatham, N.J.
Bailey Meter Co., Wickliffe, Ohio
Beckman Instrs., (AISSD), Fullerton, Cal.
Beckman Instrs., Process Instrs., Fullerton, Cal.
Bristol Div, Waterbury, Conn
Coleman Instrs., Maywood, Ill.
Esterline Angus Div., Indianapolis, Ind.
Fisher Sci. Co., Pittsburgh, Pa.
Foxboro Co., Foxboro, Mass.
Hallmark Standards, Inc., Mt. Vernon, N.Y.
Heath Co., Benton Harbor, Mich.
Leeds & Northrup Corp., No. Wales, Pa.
Photovolt Corp., New York, N.Y.
Soltec Corp., No. Hollywood, Cal.
Strandberg Engrg. Labs., Inc., Greensboro, N.C.
VWR Scientific, San Francisco, Cal.
Yewtec Corporation, Larchmont, N.Y.

Meters, Recording

Dytro Corp., Hicksville, N.Y. p 440
Electronic Dev. Corp., Boston, Mass.
General Elec. Co., Schenectady, N.Y. p 485
Houston Instr., Bellaire, Tex.
Rustrak Instr. Div., Manchester, N.H. p 595
Sangamo Elec. Co., Pickens, S.C.
Schaevitz Engrg., Pennsauken, N.J. p 1991
Simpson Elec. Co., Chicago, Ill.
Veeder-Root, Hartford, Conn.
A & M Instrument, Inc., Great Neck, N.Y.
Abbey Elctrns. Div., Plainview, N.Y.
Amprobe Instr., Lynbrook, N.Y.
Amstro Corp., Fairfield, N.J.
A.O.I.P., 75/Paris 12eme, France
B & K Instrs., Inc., Cleveland, Ohio
Bailey Meter Co., Wickliffe, Ohio
Barber-Colman Co., Industrial Instrs. Div., Rockford, Ill.
Beckman Instrs., (AISSD), Fullerton, Cal.
Beckman Instrs., Process Instrs., Fullerton, Cal.
Bristol Div, Waterbury, Conn
California Instrs. Co., San Diego, Cal.
Dixson, Inc., Grand Junction, Colo.
Engler Instr. Corp., Jersey City, N.J.
Esterline Angus Div., Indianapolis, Ind.
Fischer & Porter Co., Warminster, Pa.
Foxboro Co., Foxboro, Mass.
Hallmark Standards, Inc., Mt. Vernon, N.Y.
Honeywell, Ft. Washington, Pa.
Kingmann-White, Inc., Placentia, Calif.
Leeds & Northrup Corp., No. Wales, Pa.
Leupold & Stevens, Inc., Beaverton, Ore.
Micro Instr., Hawthorne, Cal.
Motorola Instr. & Control, Phoenix, Ariz.
Nuclear Equip. Chem. Corp., Farmingdale, N.Y.
Omega Engrg., Inc., Stamford, Conn.
Pacific Transducer Corp., Los Angeles, Calif.
Schoeffel Instr. Corp., Westwood, N.J.
Sprengnether, W.F. Instr. Co., Inc., St. Louis, Mo.
Sunshine Sci. Instrs., Inc., Philadelphia, Pa.
Taylor Instr. Process Control Div., Rochester, N.Y.
Texas Instruments, Inc., Houston, Tex.
Vu-data Corp., San Diego, Cal.
West Instr. Div., Schiller Pk., Ill.
Yewtec Corporation, Larchmont, N.Y.

Meters, Reflectometer

Hewlett-Packard, Palo Alto, Cal.
Weinschel Engrg. Co., Gaithersburg, Md.
Beckman Instrs., (AISSD), Fullerton, Cal.
Brower Laboratories, Inc., Waltham, Mass.
Gamma Sci., San Diego, Cal.
General Microwave Corp., Farmingdale, N.Y.
General Radio Co., Concord, Mass.
Lion Precision Div., Newton, Mass.
Narda Microwave Corp., Plainview, N.Y.
New-Tronics Corp., Brookpark, Ohio
Rohde & Schwarz Sls., Passaic, N.J.
Schoeffel Instr. Corp., Westwood, N.J.
Siemens Corp., Comps. Div., Iselin, N.J.
Zeiss, Carl, Inc., New York, N.Y.

Meters, Refractometer

Electron-Machine Corp., Umatilla, Fla.
Laboratory Data Control, Riviera Beach, Fla.
Zeiss, Carl, Inc., New York, N.Y.

Meters, R-F

Bendix, Franklin, Ind. p 1555
Boonton Elctrns., Parsippany, N.J. p 422
Hewlett-Packard, Palo Alto, Cal.
Simpson Elec. Co., Chicago, Ill.
Collins Electronics, Inc., Stevensville, Md.
Elctrn. Navigation Inds., Inc., Rochester, N.Y.
Fairchild Electro-Metrics, Amsterdam, N.Y.
General Microwave Corp., Farmingdale, N.Y.
Hallmark Standards, Inc., Mt. Vernon, N.Y.
Hickok Indicating Sys. Inc., Gardena, Cal.
Ideal Precision Meter Co., Inc., Brooklyn, N.Y.
Industrial Microwave, Scotch Plains, N.J.
Pacific Meas., Inc., Palo Alto, Calif.
Phaostron Instr. & Elctrn. Co., So. Pasadena, Cal.
Q.V.S., Inc., East Orange, N.J.
Reeve Elctrns., Inc., Chicago, Ill.

Meters, RFI

Electro/Data, Inc., Garland, Tex.
Electro-Mechanics Co., Austin, Tex. p 452
Honeywell, Denver, Colo.
Polarad Elctrn. Instrs., Lake Success, N.Y.
A & M Instrument, Inc., Great Neck, N.Y.
Anritsu Electric Co., Ltd., Tokyo, Japan
Astro Comm. Lab., Gaithersburg, Md.
AUL Instrs., Inc., Flushng, N.Y.
Fairchild Electro-Metrics, Amsterdam, N.Y.
Phaostron Instr. & Elctrn. Co., So. Pasadena, Cal.
Rohde & Schwarz Sls., Passaic, N.J.
Solar Elctrns. Co., Hollywood, Calif.
Spectrum Control, Inc., Fairview, Pa.

Meters, Roentgen—See Meters, X-Ray-Intensity

Meters, S-Units

Beede Electrical Instr. Co., Inc., Penacook, N.H. p 417
Hoyt Elec. Instr. Works, Belmont, Mass. p 494
Simpson Elec. Co., Chicago, Ill.
Allied Elctrns. Corp., Chicago, Ill.
Ideal Precision Meter Co., Inc., Brooklyn, N.Y.
Mura Corp., Jericho, N.Y.
Philmore Mfg. Co., Richmond Hill, N.Y.
Rystl Elctrns. Corp., N. Miami Beach, Fla.
Shurite Meters, New Haven, Conn.

Meters, Snap-Around

Simpson Elec. Co., Chicago, Ill.
Triplett Elec. Instr. Co., Bluffton, Ohio
Amprobe Instr., Lynbrook, N.Y.
Columbia Elec. Mfg. Co., Cleveland, Ohio
Esterline Angus Div., Indianapolis, Ind.
Sunshine Sci. Instrs., Inc., Philadelphia, Pa.
Weston Instruments, Inc., Newark, N.J.

Meters, Sound Velocity

James Elctrns., Inc., Chicago, Ill.
NUS Corp., Paramus, N.J.

Meters, Spectral

Electro/Data, Inc., Garland, Tex.
Hickok Elect. Instr., Cleveland, Ohio
American Ultraviolet Co., Chatham, N.J.
Brower Laboratories, Inc., Waltham, Mass.
EG & G, Inc., Salem, Mass.
EG&G, Inc., Electro-Optics Div., Salem, Mass.
International Light, Newburyport, Mass.
Schoeffel Instr. Corp., Westwood, N.J.
Zeiss, Carl, Inc., New York, N.Y.

Meters, Standing Wave Ratio

Alford Mfg. Co., Winchester, Mass.
Bendix, Franklin, Ind.
Bird Elctrn., Cleveland, Ohio
Hewlett-Packard, Palo Alto, Cal.
Johnson E. F. Co., Waseca, Minn.
Singer Instrumentation Palo Alto Oper., Palo Alto, Cal.
Weinschel Engrg. Co., Gaithersburg, Md. p 1571
Aircom, Inc., Union, N.H.
Components Specialties, Inc., Freeport, N.Y.
Delta Elctrns., Alexandria, Va.
Dynascan Corp., Chicago, Ill.
General Microwave Corp., Farmingdale, N.Y.
General Radio Co., Concord, Mass.
Gillette Elctrn. Prods. Co., Beverly, N.J.
Heath Co., Benton Harbor, Mich.
Hickok Indicating Sys. Inc., Gardena, Cal.
Ideal Precision Meter Co., Inc., Brooklyn, N.Y.
McElroy Elctrns. Corp., Shirley, Mass.
Narda Microwave Corp., Plainview, N.Y.
New-Tronics Corp., Brookpark, Ohio
Philco-Ford Corp., Washington, D.C.
PRD Elctrns., Inc., Westbury, N.Y.
Radiation Devices Co., Baltimore, Md.
Rank Precision Inds., W. Nyack, N.Y.
RF Communications, Inc., Rochester, N.Y.
Rohde & Schwarz Sls., Passaic, N.J.
Telonic Inds., Inc., Laguna Beach, Calif.
Wiltron Co., Palo Alto, Calif.

Meters, Tachometer—See Tachometers, Electronic—Vol 2

Meters, Temperature, Dial-Type (Contacting)

API Instrs. Co., Waltham,, Mass. .. p 402
Elmwood Sensors, Inc., Cranston, R.I.
Harrel, Inc., E. Norwalk, Conn.
Hickok Elect. Instr., Cleveland, Ohio
Larson Instr. Co., Inc., Orangeburg, N.Y. p 513
Modutec, Inc., Norwalk, Conn. p 525
Penn Airborne Prods., Southampton, Pa. p 534
RFL Inds., Thermocontrol Div., Boonton, N.J. p 1983
Simpson Elec. Co., Chicago, Ill.
Triplett Elec. Instr. Co., Bluffton, Ohio p 573
Weed Instr. Co., Elgin, Tex.
A & M Instrument, Inc., Great Neck, N.Y.
Addison Div., Mountainside, N.J.
Alnor Instr. Co., Chicago, Ill.
American Standard, Franklin Pk., Ill.
Amprobe Instr., Lynbrook, N.Y.
Amstro Corp., Fairfield, N.J.
Astronautics Corp. of Amer., Milwaukee, Wisc.
Atkins Technical, Inc., Gainesville, Fla.
Bailey Instrs., Inc., Saddle Brook, N.J.
Bailey Meter Co., Wickliffe, Ohio
Beckman Instrs., Process Instrs., Fullerton, Cal.
Bycoski, Casmir T., Inc., Hartford, Conn.
Caig Labs., Inc., Westbury, N.Y.
Electro-Standards Labs., Inc., Miami, Fla.
Electronic Design Labs., Inc., Phila., Pa.
Fenwal, Inc., Ashland, Mass.
Gencom Div., Plainview, N.Y.
Hy-Cal Engrg., Santa Fe Springs, Cal.
Lab-Line Instrs., Inc., Melrose Park, Ill.
Leeds & Northrup Corp., No. Wales, Pa.
Mag-Con Engrg. Co., St. Paul, Minn.
Marshall Instrs., Inc., Van Nuys, Calif.
Neill Engrg. Co., Akron, Ohio
Ogden Technology Labs., Fullerton, Cal.
Omega Engrg., Inc., Stamford, Conn.
Pacific Transducer Corp., Los Angeles, Calif.
Pyrometer Instr. Co., Inc., Northvale, N J
RDF Corp., Hudson, N.H.
Sunshine Sci. Instrs., Inc., Philadelphia, Pa.
Syscon Int'l., Inc., So. Bend, Ind.
Thermometrics, Inc., Edison, N.J.
United Elec. Controls Co., Watertown, Mass.
VWR Scientific, San Francisco, Cal.
West Instr. Div., Schiller Pk., Ill.
Westberg Mfg. Co., Sonoma, Cal.
Weston Instruments, Inc., Newark, N.J.
Zeva Elec. Corp., Hanover, N.J.

Meters, Temperature, Dial-Type (Non-Contacting) —See Pyrometers

Meters, Temperature, Digital (Contacting)

Anadex Instrs., Inc., Van Nuys, Calif.
API Instrs. Co., Waltham,, Mass. .. p 402
Astro-Space Labs., Huntsville, Ala
Astrosystems, Lake Success, N.Y.
Beede Electrical Instr. Co., Inc., Penacook, N.H.
Electronic Research Co., Shawnee Mission, Kans. p 458
Elmwood Sensors, Inc., Cranston, R.I.
Harrel, Inc., E. Norwalk, Conn. .... p 1973
Hewlett-Packard, Palo Alto, Cal.
Hickok Elect. Instr., Cleveland, Ohio
Penn Airborne Prods., Southampton, Pa.
PPM, Inc., Bedford, Ohio p 535
Rustrak Instr. Div., Manchester, N.H.
Simpson Elec. Co., Chicago, Ill.
Tektronix, Inc., Beaverton, Ore.
Weed Instr. Co., Elgin, Tex. p 1984
American Standard, Franklin Pk., Ill.
Astronautics Corp. of Amer., Milwaukee, Wisc.
Atkins Technical, Inc., Gainesville, Fla.
Barber-Colman Co., Industrial Instrs. Div., Rockford, Ill.
Bio-Medical Elctrns., Inc., Rockville, Md.
Bycoski, Casmir T., Inc., Hartford, Conn.
Consolidated Ohmic Devices, Carle Pl., N.Y.
Doric Sci. Corp., San Diego, Calif.
Electronic Design Labs., Inc., Phila., Pa.
General Oceanology, Inc., Cambridge, Mass.
Instrulab, Inc., Dayton, Ohio
Intercontinental Elctrns., E. Rochester, N.Y.
Ircon Inc., Niles, Ill.
Neutronic Corp., Bridgeton, Mo.
Omega Engrg., Inc., Stamford, Conn.
Pyco, Inc., Penndel, Pa.
Relco Prods., Denver, Colo.
Robertson Instr., Azusa, Cal.
Rosemount, Minneapolis, Minn.
Rosemount Plug-In, Inc., Nashville, Tenn.
Transducer Controls Corp., Covina, Calif.
United Sys. Corp., Dayton, Ohio

Meters, Tension

General Elec. Co., Schenectady, N.Y.
Jonard Inds. Corp., Bronx, N.Y.
Bergen Labs., Inc., Paterson, N.J.
Celtic Inds., Inc., Van Nuys, Cal.
Chatillon John & Sons, Kew Gardens, N.Y.

Custom Sci. Instrs., Inc., Whippany, N.J.
Dillon, W.C. & Co., Van Nuys 340, Calif.
Electromatic Equip. Co., Cedarhurst, N.Y.
Ind'l. Winding Mach., River Edge, N.J.
Lab Electro-Acoustique, 92-Rueil, Malmaison, France
Pacific Scien. Co., City Commerce, Cal.
Tensitron, Inc., Harvard, Mass.
Transducer Controls Corp., Covina, Calif.
Tyco Instr. Div., Waltham, Mass.
West Coast Resch. Corp., Los Angeles, Calif.

Meters, Thermal Coefficient Of Expansion

Custom Sci. Instrs., Inc., Whippany, N.J.

Meters, Thermal Transfer

Astro-Space Labs., Huntsville, Ala
Fluke, John Mfg. Co., Inc., Seattle, Wash. ..... p 479
Julie Research Lab., New York, N.Y. p 502
Filmohm Div., Long Island City, N.Y.
Hallmark Standards, Inc., Mt. Vernon, N.Y.
Holt Instr. Labs., Oconto, Wisc.
Hy-Cal Engrg., Santa Fe Springs, Cal.
Thermo Sys., Inc., St. Paul, Minn.

Meters, Thermocouple

API Instrs. Co., Waltham,, Mass.
Beede Electrical Instr. Co., Inc., Penacook, N.H.
Ectron Corp., San Diego, Cal.
Fluke, John Mfg. Co., Inc., Seattle, Wash.
J-B-T Instrs., Inc., New Haven, Conn.
Kratos Instrument Div., Pasadena, Cal
Penn Airborne Prods., Southampton, Pa.
PPM, Inc., Bedford, Ohio ..... p 535
Simpson Elec. Co., Chicago, Ill.
Triplett Elec. Instr. Co., Bluffton, Ohio
Westinghouse Elec. Corp., Newark, N.J.
A & M Instrument, Inc., Great Neck, N.Y.
Alnor Instr. Co., Chicago, Ill.
American Standard, Franklin Pk., Ill.
Amstro Corp., Fairfield, N.J.
Andonian Assocs., Inc., Waltham, Mass.
Astronautics Corp. of Amer., Milwaukee, Wisc.
Bailey Instrs., Inc., Saddle Brook, N.J.
Bailey Meter Co., Wickliffe, Ohio
Barber-Colman Co., Industrial Instrs. Div., Rockford, Ill.
Bristol Div, Waterbury, Conn
Brower Laboratories, Inc., Waltham, Mass.
Canadian Research Institute, Don Mills, Ont., Canada
Central Scientific Co., Chicago, Ill.
Consolidated Ohmic Devices, Carle Pl., N.Y.
Doric Sci. Corp., San Diego, Calif.
Ealing Corp., Cambridge, Mass.
Electrical Instr. Svc., Inc., Mt. Vernon, N.Y.
Electronic Design Labs., Inc., Phila., Pa.
Elctrn. Dev. Labs., Plainview, N.Y.
Esterline Angus Div., Indianapolis, Ind.
Fischer & Porter Co., Warminster, Pa.
Foxboro Co., Foxboro, Mass.
General Microwave Corp., Farmingdale, N.Y.
General Oceanology, Inc., Cambridge, Mass.
Hallmark Standards, Inc., Mt. Vernon, N.Y.
Honeywell, Apparatus Controls, Mpls., Minn.
Honeywell, Ft. Washington, Pa.
Howell Instrs., Inc., Ft. Worth, Tex.
Hy-Cal Engrg., Santa Fe Springs, Cal.
Ideal Precision Meter Co., Inc., Brooklyn, N.Y.
Instrulab, Inc., Dayton, Ohio
Int'l. Instrs., Orange, Conn.
Ircon Inc., Niles, Ill.
Keithley Instrs., Inc., Cleveland, Ohio
Leeds & Northrup Corp., No. Wales, Pa.
Lewis Engrg. Co., Naugatuck, Conn.
Narda Microwave Corp., Plainview, N.Y.
Omega Engrg., Inc., Stamford, Conn.
Phaostron Instr. & Elctrn. Co., So. Pasadena, Cal.
Pyrometer Instr. Co., Inc., Northvale, N J
Q.V.S., Inc., East Orange, N.J.
Sigma Instrs., Inc., Braintree, Mass.
Sun Electric Corp., Chicago, Ill.
Sunshine Sci. Instrs., Inc., Philadelphia, Pa.
Syscon Int'l., Inc., So. Bend, Ind.
Taylor Instr. Process Control Div., Rochester, N.Y.
Thermo Elec. Co., Inc., Saddle Brook, N.J.
Transducer Controls Corp., Covina, Calif.
United Sys. Corp., Dayton, Ohio
West Instr. Div., Schiller Pk., Ill.
Westberg Mfg. Co., Sonoma, Cal.
Weston Instruments, Inc., Newark, N.J.

Meters, Tilt

Kahl Scientific Instr. Corp., El Cajon, Calif.
Sprengnether, W.F. Instr. Co., Inc., St. Louis, Mo.
Varian Assocs., Palo Alto, Cal.

Meters, Time Delay Rate

E-H Resch. Labs., Inc., Oakland, Cal.
Electronic Research Co., Shawnee Mission, Kans.
Precision Timer, Westbrook, Conn.
Sticht, Herman H. Co., Inc., New York, N.Y.

Meters, Time Interval—See Timers, Interval—Vol 2

Meters, Torque—See Indicators, Torque

Meters, Ultraviolet

American Ultraviolet Co., Chatham, N.J.
Atlantic Ultraviolet Corp., Long Island City, N.Y.
Atlas Electric Devices, Chicago, Ill.
Black Light Corp. Amer., San Gabriel, Cal.
Brower Laboratories, Inc., Waltham, Mass.
EG&G, Inc., Electro-Optics Div., Salem, Mass.
Hughes Aircraft Co, Malibu, Cal.
International Light, Newburyport, Mass.
Schoeffel Instr. Corp., Westwood, N.J.
SSR Instrs. Co., Santa Monica, Cal.
Sunshine Sci. Instrs., Inc., Philadelphia, Pa.
Ultra-Violet Prods., Inc., San Gabriel, Cal.
VWR Scientific, San Francisco, Cal.
Zeiss, Carl, Inc., New York, N.Y.

Meters, Vacuum Tube Volt (VTVM)

Fluke, John Mfg. Co., Inc., Seattle, Wash.
Hewlett-Packard, Palo Alto, Cal.
Hickok Elect. Instr., Cleveland, Ohio
Ind'l. Test Equip., Port Washington, N.Y.
London Co., Cleveland, Ohio
Marconi Instrs., Englewood, N.J.
North Atlantic Inds., Plainview, N.Y.
RCA Elctrns. Comps., Harrison, N.J. p 550
Ross Engrg. Corp., Campbell, Cal.
Simpson Elec. Co., Chicago, Ill.
Trio Labs, Inc., Plainview, N.Y.
Triplett Elec. Instr. Co., Bluffton, Ohio
A & M Instrument, Inc., Great Neck, N.Y.
Allied Elctrns. Corp., Chicago, Ill.
Anritsu Electric Co., Ltd., Tokyo, Japan
BAC Elctrns., Pennsauken, N.J.
Cohu Elctrns., Inc., San Diego, Calif.
Dynascan Corp., Chicago, Ill.
Edison Elctrns. Div., Manchester, N.H.
Eico Electronic Instrument Co., Inc., Brooklyn, N.Y.
Heath Co., Benton Harbor, Mich.
Instrument Labs. Corp., Chicago, Ill.
Keithley Instrs., Inc., Cleveland, Ohio
Kikusui Elctrns. Corp., Kawasaki City, Kanagawa-Pref., Japan
Leader Instr. Corp., Long Island City, N.Y.
Matsushita Comm. Ind'l. Co., Ltd., Yokohama, Japan
Millivac Instrs., Schenectady, N.Y.
Robertson Instr., Azusa, Cal.
Rohde & Schwarz Sls., Passaic, N.J.
Sanwa Corp. America, Edison, N.J.
Shigoto Inds., Ltd., New York, N.Y.
Stark Elctrn. Instrs., Ltd., Ajax, Ont., Canada
Sunshine Sci. Instrs., Inc., Philadelphia, Pa.
Waveforms, No. Hollywood, Cal.
Winslow Tele-Tronics, Inc., Eatontown, N.J.

Meters, Vibration

Dytronics Co., Columbus, Ohio .... p 441
General Elec. Co., Schenectady, N.Y.
Ithaco, Inc., Ithaca, N.Y.
Metrix Instr. Co., Houston, Tex..... p 518
AGAC-Derritron, Inc., Alexandria, Va.
Amstro Corp., Fairfield, N.J.
Balance Technology, Inc., Ann Arbor, Mich.
Bell & Howell Co., Pasadena, Calif.
Bell & Howell Co., Monrovia, Calif.
Columbia Resch. Labs., Woodlyn, Pa.
Dri-Clave Corp., Westbury, N.Y.
Endevco, Pasadena, Calif.
Engler Instr. Corp., Jersey City, N.J.
Epic, Inc., New York, N.Y.
General Radio Co., Concord, Mass.
Indikon Co., Watertown, Mass.
IRD Mechanalysis, Inc., Columbus, Ohio
L.A.B. Corp., Skaneateles, N.Y.
Larson Aero Dev., Concord, Calif.
Lehigh Valley Elctrn., Inc., Fogelsville, Pa.
Lewis Engrg. Co., Naugatuck, Conn.
MB Elctrns/Textron Co., New Haven, Conn.
Mechanical Technology, Inc., Latham, N.Y.
Parker Instr. Corp., Stamford, Conn.
Philips Elctrn. Instrs., Mt. Vernon, N.Y.
Reliance Elec. Co., Cleveland, Ohio
Rohde & Schwarz Sls., Passaic, N.J.
Spectral Dynamics Corp. San Diego, San Diego, Cal.
Sprengnether, W.F. Instr. Co., Inc., St. Louis, Mo.
Unholtz-Dickie Corp., Hamden, Conn.

Meters, Viscosity (Electronic) —See Indicators, Viscosity—Vol 2

Meters, Volt

Alco Elctrn. Prods., Lawrence, Mass.
API Instrs. Co., Waltham,, Mass.
Beede Electrical Instr. Co., Inc., Penacook, N.H. ..... p 417
Biddle, James G., Plymouth Meeting, Pa. ..... p 419
Boonton Elctrns., Parsippany, N.J. p 423
Boonton Electronics Corp., Parsippany, N.J. ..... p 423
Calico Div., San Diego, Cal.
Data Technology, Palo Alto, Cal.
Dixson Inc., Grand Junction, Colo. p 430,431
Dranetz Engrg. Labs., Plainfield, N.J. p 436,437
Dynamics Instr. Co., Monterey Pk., Cal.
E-H Resch. Labs., Inc., Oakland, Cal. p 447
Eldorado Electrodata, Concord, Cal. p 449
Electro-Mechanical Instr. Div., Perkasie, Pa. ..... p 451
Electro-Numerics, Santa Clara, Cal.
Electro Sci. Inds., Portland, Ore.
Faria Meter Corp., Uncasville, Conn. p 468
Fluke, John Mfg. Co., Inc., Seattle, Wash.
General Elec. Co., Schenectady, N.Y. p 484
Hewlett-Packard, Palo Alto, Cal.
Hickok Elect. Instr., Cleveland, Ohio
Honeywell, Denver, Colo.
Hoyt Elec. Instr. Works, Belmont, Mass. p 494,495
Ind'l. Test Equip., Port Washington, N.Y.
ITT Jennings, Div. Int'l. Telephone & Telegraph Corp., San Jose, Cal. p 501
ITT Jennings, Dunellen,, N.J. ..... p 501
Julie Research Lab., New York, N.Y. p 503
Kratos Instrument Div., Pasadena, Cal p 510
Lambda Elctrns., Melville, N.Y..... p 798
London Co., Cleveland, Ohio ..... p 516
Marconi Instrs., Englewood, N.J... p 521
Modutec, Inc., Norwalk, Conn. p 524-527
North Atlantic Inds., Plainview, N.Y. p 531
Precision Standards Corp., Santa Ana, Cal. ..... p 542
RCA Elctrns. Comps., Harrison, N.J.
Ross Engrg. Corp., Campbell, Cal. p 1786
Scientific Columbus, Columbus, Ohio
Simpson Elec. Co., Chicago, Ill..... p 556
Sonex, Inc., Bethayres, Pa.
Teledyne Philbrick, Dedham, Mass.
Trio Labs, Inc., Plainview, N.Y.
Triplett Elec. Instr. Co., Bluffton, Ohio p 573,576
Wavetek, San Diego, Cal.
Westinghouse Elec. Corp., Newark, N.J. p 582
A & D Electrical Instrs., Glendale, N.Y.
A & M Instrument, Inc., Great Neck, N.Y.
Abphot, New York, N.Y.
Allied Elctrns. Corp., Chicago, Ill.
Ammon Instrs., Inc., Manchester, N.H.
Amprobe Instr., Lynbrook, N.Y.
A.O.I.P., 75/Paris 12eme, France
Atlantic Instrs. Corp., Watertown, Mass.
AUL Instrs., Inc., Flushng, N.Y.
B & K Instrs., Inc., Cleveland, Ohio
BAC Elctrns., Pennsauken, N.J.
Bristol Div, Waterbury, Conn
Brower Laboratories, Inc., Waltham, Mass.
Bruno-New York Inds. Corp., New York, N.Y.
California Instrs. Co., San Diego, Cal.
Canadian Research Institute, Don Mills, Ont., Canada
Central Scientific Co., Chicago, Ill.
Cohu Elctrns., Inc., San Diego, Calif.
Columbia Elec. Mfg. Co., Cleveland, Ohio
Components Specialties, Inc., Freeport, N.Y.
Data Precision, Wakefield, Mass.
Dittmore-Freimuth Corp., Milwaukee, Wisc.
Doric Sci. Corp., San Diego, Calif.
Ealing Corp., Cambridge, Mass.
Eico Electronic Instrument Co., Inc., Brooklyn, N.Y.
Electrical Instr. Svc., Inc., Mt. Vernon, N.Y.
Electronic Design Labs., Inc., Phila., Pa.
Entron Inc., Morganville, N.J.
Esterline Angus Div., Indianapolis, Ind.
Ferranti Ltd., Hollinwood, Lancs., England
Filmohm Div., Long Island City, N.Y.
General Microwave Corp., Farmingdale, N.Y.
General Radio Co., Concord, Mass.
Gralex Inds., Inc., Farmingdale, N.Y.
Hallmark Standards, Inc., Mt. Vernon, N.Y.
Heath Co., Benton Harbor, Mich.
Hickok Indicating Sys. Inc., Gardena, Cal.
Hy-Cal Engrg., Santa Fe Springs, Cal.
Ideal Precision Meter Co., Inc., Brooklyn, N.Y.
Instrument Displays, Haverhill, Mass.
Integrated Circuit Elctrns., Inc., Waltham, Mass.
Int'l. Instrs., Orange, Conn.
Jewell Electrical Instrs., Manchester, N.H.
Keithley Instrs., Inc., Cleveland, Ohio
Kikusui Elctrns. Corp., Kawasaki City, Kanagawa-Pref., Japan
Leader Instr. Corp., Long Island City, N.Y.
Lewis Engrg. Co., Naugatuck, Conn.
Medistor Instr. Co., Seattle, Wash.
Micro Instr., Hawthorne, Cal.
Millivac Instrs., Schenectady, N.Y.
Mura Corp., Jericho, N.Y.
Neutronic Corp., Bridgeton, Mo.
Newport Labs., Inc., Santa Ana, Cal.
Parker Instr. Corp., Stamford, Conn.
Phaostron Instr. & Elctrn. Co., So. Pasadena, Cal.
Philips Elctrn. Instrs., Mt. Vernon, N.Y.
Princeton Applied Resch. Corp., Princeton, N.J.
Q.V.S., Inc., East Orange, N.J.
Radiation Devices Co., Baltimore, Md.
Robertson Instr., Azusa, Cal.
Rohde & Schwarz Sls., Passaic, N.J.
Scientific Educational Prods., N.Y., N.Y.
Shigoto Inds., Ltd., New York, N.Y.
Shurite Meters, New Haven, Conn.
Stark Elctrn. Instrs., Ltd., Ajax, Ont., Canada
State Labs, Inc., New York, N.Y.
Sun Electric Corp., Chicago, Ill.
Sunshine Sci. Instrs., Inc., Philadelphia, Pa.
Viz Mfg. Co., Philadelphia, Pa.
Vu-data Corp., San Diego, Cal.
Waber Elctrns., Inc., Philadelphia, Pa.
Westberg Mfg. Co., Sonoma, Cal.
Weston Instruments, Inc., Newark, N.J.
Yewtec Corporation, Larchmont, N.Y.

Meters, Volt, Deviation

Beede Electrical Instr. Co., Inc., Penacook, N.H.
Dranetz Engrg. Labs., Plainfield, N.J. p 436,437
Electronic Dev. Corp., Boston, Mass. p 457
Fluke, John Mfg. Co., Inc., Seattle, Wash. ..... p 473
Hickok Elect. Instr., Cleveland, Ohio

Kratos Instrument Div., Pasadena, Cal
Precision Standards Corp., Santa Ana, Cal.
Simpson Elec. Co., Chicago, Ill.
Trio Labs, Inc., Plainview, N.Y.
Wavetek, San Diego, Cal.
A & M Instrument, Inc., Great Neck, N.Y.
AMF Electical Prods., Alexandria, Va.
A.O.I.P., 75/Paris 12eme, France
AUL Instrs., Inc., Flushng, N.Y.
Components Specialties, Inc., Freeport, N.Y.
Doric Sci. Corp., San Diego, Calif.
Electronic Design Labs., Inc., Phila., Pa.
Hickok Indicating Sys. Inc., Gardena, Cal.
Keithley Instrs., Inc., Cleveland, Ohio
Neutronic Corp., Bridgeton, Mo.
Parker Instr. Corp., Stamford, Conn.
State Labs, Inc., New York, N.Y.
Weston Instruments, Inc., Newark, N.J.

Meters, Volt, Differential—See Meters, Volt

Meters, Volt, Digital (DVM) & Accessories

A. D. Data Sys., Inc., Rochester, N.Y.
Alco Elctrn. Prods., Lawrence, Mass.
API Instrs. Co., Waltham,, Mass.
Astrosystems, Lake Success, N.Y.
Beede Electrical Instr. Co., Inc., Penacook, N.H.
Biddle, James G., Plymouth Meeting, Pa.
Boonton Elctrns., Parsippany, N.J.
Calico Div., San Diego, Cal. ..... p 424
Computer Prods., Ft. Lauderdale, Fla. p 341
Data Technology, Palo Alto, Cal.
Datascan, Inc., Clifton, N.J..... p 428
Dixson Inc., Grand Junction, Colo.
Dytro Corp., Hicksville, N.Y. ..... p 440
Electro-Numerics, Santa Clara, Cal. p 453
Electronic Dev. Corp., Boston, Mass.
Electronic Research Co., Shawnee Mission, Kans. ..... p 458
Faratron Corp., Hackensack, N.J. p 467
Fluke, John Mfg. Co., Inc., Seattle, Wash. .....p 470-472
Hewlett-Packard, Palo Alto, Cal.
Hickok Elect. Instr., Cleveland, Ohio p 487,488
Honeywell, Denver, Colo.
Monitor Labs, Inc., San Diego, Cal.
Monsanto Company, Electronic Instruments, W. Caldwell, N.J.
Penn Airborne Prods., Southampton, Pa.
Precision Standards Corp., Santa Ana, Cal. ..... p 541
Preston Scientific, Anaheim, Cal. p 549
Simpson Elec. Co., Chicago, Ill.
Systron-Donner Corp., Concord, Cal. p 564
Systron-Donner Concord Instr. Div., Concord, Cal. ..... p 564
Systron-Donner Datapulse Div., Culver City, Cal. ..... p 564
Systron Donner Trygon Elctrns. Sub., Roosevelt, N.Y. ..... p 564
Tektronix, Inc., Beaverton, Ore.
Triplett Elec. Instr. Co., Bluffton, Ohio p 574,575
Western Reserve Elctrns., Twinsburg, Ohio ..... p 580
A & M Instrument, Inc., Great Neck, N.Y.
Abbey Elctrns. Div., Plainview, N.Y.
A.O.I.P., 75/Paris 12eme, France
Artronix, Inc., St. Louis, Mo.
BAC Elctrns., Pennsauken, N.J.
Bio-Medical Elctrns., Inc., Rockville, Md.
Bristol Div, Waterbury, Conn
California Instrs. Co., San Diego, Cal.
Cohu Elctrns., Inc., San Diego, Calif.
Dana Labs., Inc., Irvine, Calif.
Data Precision, Wakefield, Mass.
Dixson, Inc., Grand Junction, Colo.
Doric Sci. Corp., San Diego, Calif.
Electrical Instr. Svc., Inc., Mt. Vernon, N.Y.
Electronic Design Labs., Inc., Phila., Pa.
Esterline Angus Div., Indianapolis, Ind.
Gencom Div., Plainview, N.Y.
General Microwave Corp., Farmingdale, N.Y.
Gralex Inds., Inc.; Farmingdale, N.Y.
Heath Co., Benton Harbor, Mich.
Howell Instrs., Inc., Ft. Worth, Tex.
Innovatek Enterprise, Millerton, N.Y.
Integrated Circuit Elctrns., Inc., Waltham, Mass.
Intercontinental Elctrns., E. Rochester, N.Y.
Kaman Nuclear, Colorado Springs, Colo.
Keithley Instrs., Inc., Cleveland, Ohio
Kikusui Elctrns. Corp., Kawasaki City, Kanagawa-Pref., Japan
Lear Siegler, Inc., Santa Monica, Calif.
Lear Siegler, Anaheim, Cal.
Matsushita Comm. Ind'l. Co., Ltd., Yokohama, Japan
Micro Instr., Hawthorne, Cal.
Millivac Instrs., Schenectady, N.Y.
Neutronic Corp., Bridgeton, Mo.
Newport Labs., Inc., Santa Ana, Cal.
Non-Linear Sys., Inc., Del Mar, Cal.
Northeast Elctrns. Corp., Concord, N.H.
Pacific Meas., Inc., Palo Alto, Calif.
Philips Elctrn. Instrs., Mt. Vernon, N.Y.
Practical Automation, Inc., Shelton, Conn.
Pyco, Inc., Penndel, Pa.
Robertson Instr., Azusa, Cal.
Rohde & Schwarz Sls., Passaic, N.J.
Sensor Corp., Greenwich, Conn.
Stark Elctrn. Instrs., Ltd., Ajax, Ont., Canada
Sunshine Sci. Instrs., Inc., Philadelphia, Pa.
Techmetric Co., Redwood City, Calif.
Transducer Controls Corp., Covina, Calif.
Tyco Instr. Div., Waltham, Mass.
United Sys. Corp., Dayton, Ohio
Vidar Corp., Mountain View, Cal.
Weston Instruments, Inc., Newark, N.J.
Yewtec Corporation, Larchmont, N.Y.

Meters, Volt, Electrostatic

Victoreen Instr., Cleveland, Ohio
A & M Instrument, Inc., Great Neck, N.Y.
Custom Sci. Instrs., Inc., Whippany, N.J.
Ferranti Elec., Inc., Plainview, N.Y.
Ferranti Ltd., Hollinwood, Lancs., England
Hallmark Standards, Inc., Mt. Vernon, N.Y.
Weston Instruments, Inc., Newark, N.J.

Meters, Volt, Frequency Selective

Hewlett-Packard, Palo Alto, Cal.
Hickok Elect. Instr., Cleveland, Ohio
Kratos Instrument Div., Pasadena, Cal
Marconi Instrs., Englewood, N.J... p 521
Quan-Tech, Whippany, N.J.
Simpson Elec. Co., Chicago, Ill.
A & M Instrument, Inc., Great Neck, N.Y.
Anritsu Electric Co., Ltd., Tokyo, Japan
B & K Instrs., Inc., Cleveland, Ohio
Blonder-Tongue Labs., Inc., Old Bridge, N.J.
Brower Laboratories, Inc., Waltham, Mass.
California Instrs. Co., San Diego, Cal.
Elcom Sys., Deer Pk., N.Y.
Fairchild Electro-Metrics, Amsterdam, N.Y.
General Radio Co., Concord, Mass.
Lab Electro-Acoustique, 92-Rueil, Malmaison, France
Lingenfelter Applied Tech., Gaithersburg, Md.
Phaostron Instr. & Elctrn. Co., So. Pasadena, Cal.
Philco-Ford Corp., Washington, D.C.
Princeton Applied Resch. Corp., Princeton, N.J.
Railway Comm., Raytown, Mo.
Rohde & Schwarz Sls., Passaic, N.J.
Spectral Dynamics Corp. San Diego, San Diego, Cal.
Wandel & Goltermann, E. Hanover, N.J.
Weston Instruments, Inc., Newark, N.J.

Meters, Volt, Log-Conversion

Hewlett-Packard, Palo Alto, Cal.
Hickok Elect. Instr., Cleveland, Ohio
Kratos Instrument Div., Pasadena, Cal
Teledyne Philbrick, Dedham, Mass.
A & M Instrument, Inc., Great Neck, N.Y.
Fairchild Electro-Metrics, Amsterdam, N.Y.
Gralex Inds., Inc., Farmingdale, N.Y.
Lingenfelter Applied Tech., Gaithersburg, Md.
Optical Elctrns., Tucson, Ariz.
Pacific Meas., Inc., Palo Alto, Calif.
Q.V.S., Inc., East Orange, N.J.
Spectral Dynamics Corp. San Diego, San Diego, Cal.
Wandel & Goltermann, E. Hanover, N.J.
Waveforms, No. Hollywood, Cal.
Wiltron Co., Palo Alto, Calif.

Meters, Volt, Potentiometric

Electro Sci. Inds., Portland, Ore... p 454
Electronic Dev. Corp., Boston, Mass. p 457
Fluke, John Mfg. Co., Inc., Seattle, Wash.
Hewlett-Packard, Palo Alto, Cal.
Hickok Elect. Instr., Cleveland, Ohio
Precision Standards Corp., Santa Ana, Cal.
A & M Instrument, Inc., Great Neck, N.Y.
A.O.I.P., 75/Paris 12eme, France
AUL Instrs., Inc., Flushng, N.Y.
Barber-Colman Co., Industrial Instrs. Div., Rockford, Ill.
Bristol Div, Waterbury, Conn
Doric Sci. Corp., San Diego, Calif.
Esterline Angus Div., Indianapolis, Ind.
Keithley Instrs., Inc., Cleveland, Ohio
Lingenfelter Applied Tech., Gaithersburg, Md.
Neutronic Corp., Bridgeton, Mo.

Meters, Volt, R-F

Boonton Elctrns., Parsippany, N.J.p 422
Fluke, John Mfg. Co., Inc., Seattle, Wash.
Hewlett-Packard, Palo Alto, Cal.
ITT Jennings, Div. Int'l. Telephone & Telegraph Corp., San Jose, Cal. p 501
ITT Jennings, Dunellen,, N.J. ..... p 501
Marconi Instrs., Englewood, N.J... p 521
RCA Elctrns. Comps., Harrison, N.J.
Ross Engrg. Corp., Campbell, Cal. p 1786
Simpson Elec. Co., Chicago, Ill.
Triplett Elec. Instr. Co., Bluffton, Ohio
Westinghouse Elec. Corp., Newark, N.J.
A & M Instrument, Inc., Great Neck, N.Y.
Anritsu Electric Co., Ltd., Tokyo, Japan
B & K Instrs., Inc., Cleveland, Ohio
Blonder-Tongue Labs., Inc., Old Bridge, N.J.
Fairchild Electro-Metrics, Amsterdam, N.Y.
Filmohm Div., Long Island City, N.Y.
General Microwave Corp., Farmingdale, N.Y.
General Radio Co., Concord, Mass.
Hallmark Standards, Inc., Mt. Vernon, N.Y.
Jerrold/Watkins Div., Toronto, 395, Ont., Can.
Levell Electronics Ltd., High Barnet, Herts,, England
Lingenfelter Applied Tech., Gaithersburg, Md.
Micro Instr., Hawthorne, Cal.
Millivac Instrs., Schenectady, N.Y.
Pacific Meas., Inc., Palo Alto, Calif.
Phaostron Instr. & Elctrn. Co., So. Pasadena, Cal.
Q.V.S., Inc., East Orange, N.J.
Radiation Devices Co., Baltimore, Md.
Rohde & Schwarz Sls., Passaic, N.J.
Stark Elctrn. Instrs., Ltd., Ajax, Ont., Canada
Weston Instruments, Inc., Newark, N.J.

Meters, Volt, Sampling

Automated Meas., Oakland, Calif. p 447
Dranetz Engrg. Labs., Plainfield, N.J. p 436,437
E-H Resch. Labs., Inc., Oakland, Cal. p 447
Hewlett-Packard, Palo Alto, Cal.
Lingenfelter Applied Tech., Gaithersburg, Md.

Meters, Volt, True RMS

Beede Electrical Instr. Co., Inc., Penacook, N.H.
Boonton Elctrns., Parsippany, N.J.
Faratron Corp., Hackensack, N.J. p 467
Fluke, John Mfg. Co., Inc., Seattle, Wash. .....p 472,479
Hewlett-Packard, Palo Alto, Cal.
Hickok Elect. Instr., Cleveland, Ohio p 487
Ind'l. Test Equip., Port Washington, N.Y. p 497
Kratos Instrument Div., Pasadena, Cal
Marconi Instrs., Englewood, N.J... p 521
RCA Elctrns. Comps., Harrison, N.J.
Scientific Columbus, Columbus, Ohio
Simpson Elec. Co., Chicago, Ill.
Teledyne Philbrick, Dedham, Mass.
Western Reserve Elctrns., Twinsburg, Ohio ..... p 580
Westinghouse Elec. Corp., Newark, N.J.
A & M Instrument, Inc., Great Neck, N.Y.
AMF Electical Prods., Alexandria, Va.
A.O.I.P., 75/Paris 12eme, France
B & K Instrs., Inc., Cleveland, Ohio
Electrical Instr. Svc., Inc., Mt. Vernon, N.Y.
Electro-Standards Labs., Inc., Miami, Fla.
Electronic Design Labs., Inc., Phila., Pa.
General Radio Co., Concord, Mass.
Hallmark Standards, Inc., Mt. Vernon, N.Y.
Holt Instr. Labs., Oconto, Wisc.
Lab Electro-Acoustique, 92-Rueil, Malmaison, France
Phaostron Instr. & Elctrn. Co., So. Pasadena, Cal.
Q.V.S., Inc., East Orange, N.J.
Robertson Instr., Azusa, Cal.
Rohde & Schwarz Sls., Passaic, N.J.
Shigoto Inds., Ltd., New York, N.Y.
Spectral Dynamics Corp. San Diego, San Diego, Cal.
Sunshine Sci. Instrs., Inc., Philadelphia, Pa.
Thermo Sys., Inc., St. Paul, Minn.
Vu-data Corp., San Diego, Cal.
Weston Instruments, Inc., Newark, N.J.
Weston Instrs. Div., Hatboro, Pa
Yewtec Corporation, Larchmont, N.Y.

Meters, Volt-Ammeter

Boonton Elctrns., Parsippany, N.J.
Calico Div., San Diego, Cal.
Electro Sci. Inds., Portland, Ore.
Engelhard Minerals & Chem., Murray Hill, N.J.
Faratron Corp., Hackensack, N.J. p 467
General Elec. Co., Schenectady, N.Y. p 484
Hickok Elect. Instr., Cleveland, Ohio
Honeywell, Denver, Colo.
Hoyt Elec. Instr. Works, Belmont, Mass. p 494
Kratos Instrument Div., Pasadena, Cal
RCA Elctrns. Comps., Harrison, N.J.
Schauer Mfg. Corp., Cincinnati, Ohio
Simpson Elec. Co., Chicago, Ill.
Sticht, Herman H. Co., Inc., New York, N.Y.
Systron Donner Trygon Elctrns. Sub., Roosevelt, N.Y.
Teledyne Philbrick, Dedham, Mass.
Triplett Elec. Instr. Co., Bluffton, Ohio
A & M Instrument, Inc., Great Neck, N.Y.
Amprobe Instr., Lynbrook, N.Y.
A.O.I.P., 75/Paris 12eme, France
AUL Instrs., Inc., Flushng, N.Y.
Bruno-New York Inds. Corp., New York, N.Y.
California Instrs. Co., San Diego, Cal.
Cohu Elctrns., Inc., San Diego, Calif.
Columbia Elec. Mfg. Co., Cleveland, Ohio
Connolly & Co., Inc., Mt. View, Calif.
Eico Electronic Instrument Co., Inc., Brooklyn, N.Y.
Electrical Instr. Svc., Inc., Mt. Vernon, N.Y.
Esterline Angus Div., Indianapolis, Ind.
Ferranti Elec., Inc., Plainview, N.Y.
Ferranti Ltd., Hollinwood, Lancs., England
Hallmark Standards, Inc., Mt. Vernon, N.Y.
Heath Co., Benton Harbor, Mich.
Ideal Precision Meter Co., Inc., Brooklyn, N.Y.
Instrument Labs. Corp., Chicago, Ill.
Keithley Instrs., Inc., Cleveland, Ohio
Kikusui Elctrns. Corp., Kawasaki City, Kanagawa-Pref., Japan
Lewis Engrg. Co., Naugatuck, Conn.
Millivac Instrs., Schenectady, N.Y.
Phaostron Instr. & Elctrn. Co., So. Pasadena, Cal.
Philips Elctrn. Instrs., Mt. Vernon, N.Y.
Q.V.S., Inc., East Orange, N.J.
Shigoto Inds., Ltd., New York, N.Y.
State Labs, Inc., New York, N.Y.
Sunshine Sci. Instrs., Inc., Philadelphia, Pa.
Weston Instruments, Inc., Newark, N.J.
Yewtec Corporation, Larchmont, N.Y.
Columbia Elec. Mfg. Co., Cleveland, Ohio

Meters, Volt-Ohm

Biddle, James G., Plymouth Meeting, Pa.
Calico Div., San Diego, Cal.
Data Technology, Palo Alto, Cal.
Electro Sci. Inds., Portland, Ore.
Hewlett-Packard, Palo Alto, Cal.
Hickok Elect. Instr., Cleveland, Ohio
Honeywell, Denver, Colo.
Kratos Instrument Div., Pasadena, Cal

RCA Elctrns. Comps., Harrison, N.J. p 550
Simpson Elec. Co., Chicago, Ill.
Systron Donner Trygon Elctrns. Sub., Roosevelt, N.Y.
Teledyne Philbrick, Dedham, Mass.
Triplett Elec. Instr. Co., Bluffton, Ohio p 571
Wavetek, San Diego, Cal.
Western Reserve Elctrns., Twinsburg, Ohio
A & M Instrument, Inc., Great Neck, N.Y.
AUL Instrs., Inc., Flushng, N.Y.
BAC Elctrns., Pennsauken, N.J.
Bacharach Instr. Co., Pittsburgh, Pa.
Bruno-New York Inds. Corp., New York, N.Y.
Buck Engrg. Co., Farmingdale, N.J.
California Instrs. Co., San Diego, Cal.
Components Specialties, Inc., Freeport, N.Y.
Connolly & Co., Inc., Mt. View, Calif.
Data Precision, Wakefield, Mass.
Delta Products, Inc., Grand Junction, Colo.
Dynascan Corp., Chicago, Ill.
Edison Elctrns. Div., Manchester, N.H.
Eico Electronic Instrument Co., Inc., Brooklyn, N.Y.
Hallmark Standards, Inc., Mt. Vernon, N.Y.
Heath Co., Benton Harbor, Mich.
Instrument Labs. Corp., Chicago, Ill.
Keithley Instrs., Inc., Cleveland, Ohio
Leader Instr. Corp., Long Island City, N.Y.
Lingenfelter Applied Tech., Gaithersburg, Md.
Millivac Instrs., Schenectady, N.Y.
Mura Corp., Jericho, N.Y.
Northeast Elctrns. Corp., Concord, N.H.
Phaostron Instr. & Elctrn. Co., So. Pasadena, Cal.
Philips Elctrn. Instrs., Mt. Vernon, N.Y.
Philmore Mfg. Co., Richmond Hill, N.Y.
Proto Tool Co, Los Angeles, Calif.
Q.V.S., Inc., East Orange, N.J.
Robertson Instr., Azusa, Cal.
Scientific Educational Prods., N.Y., N.Y.
Shigoto Inds., Ltd., New York, N.Y.
Stark Elctrn. Instrs., Ltd., Ajax, Ont., Canada
State Labs, Inc., New York, N.Y.
Sunshine Sci. Instrs., Inc., Philadelphia, Pa.
Viz Mfg. Co., Philadelphia, Pa.
Weston Instruments, Inc., Newark, N.J.
Yewtec Corporation, Larchmont, N.Y.

Meters, Volt-OHM-Milliampere (VOM)

Beckman Instruments, Shiller Pk., Ill.
Calico Div., San Diego, Cal. ..... p 424
Data Technology, Palo Alto, Cal.
Electro Sci. Inds., Portland, Ore.
Hickok Elect. Instr., Cleveland, Ohio
Honeywell, Denver, Colo.
RCA Elctrns. Comps., Harrison, N.J. p 550,552
Simpson Elec. Co., Chicago, Ill..... p 557
Teledyne Philbrick, Dedham, Mass.
Triplett Elec. Instr. Co., Bluffton, Ohio p 567-573
Western Reserve Elctrns., Twinsburg, Ohio
Allied Elctrns. Corp., Chicago, Ill.
AUL Instrs., Inc., Flushng, N.Y.
BAC Elctrns., Pennsauken, N.J.
California Instrs. Co., San Diego, Cal.
Components Specialties, Inc., Freeport, N.Y.
Dynascan Corp., Chicago, Ill.
Ealing Corp., Cambridge, Mass.
Electrical Instr. Svc., Inc., Mt. Vernon, N.Y.
Gencom Div., Plainview, N.Y.
Heath Co., Benton Harbor, Mich.
Keithley Instrs., Inc., Cleveland, Ohio
Levell Electronics Ltd., High Barnet, Herts,, England
Millivac Instrs., Schenectady, N.Y.
Mura Corp., Jericho, N.Y.
Neutronic Corp., Bridgeton, Mo.
Philips Elctrn. Instrs., Mt. Vernon, N.Y.
Philmore Mfg. Co., Richmond Hill, N.Y.
Q.V.S., Inc., East Orange, N.J.
Sanwa Corp. America, Edison, N.J.
Scientific Educational Prods., N.Y., N.Y.
Shigoto Inds., Ltd., New York, N.Y.
State Labs, Inc., New York, N.Y.

Meters, VU

API Instrs. Co., Waltham,, Mass.
Beede Electrical Instr. Co., Inc., Penacook, N.H. ..... p 417
Dixson Inc., Grand Junction, Colo. p 430
Electro-Mechanical Instr. Div., Perkasie, Pa. ..... p 451
Hickok Elect. Instr., Cleveland, Ohio
Hoyt Elec. Instr. Works, Belmont, Mass. p 494,495
Larson Instr. Co., Inc., Orangeburg, N.Y. p 513
Modutec, Inc., Norwalk, Conn. ..... p 527
Sankyo Seiki Mfg. Co., Ltd., Tokyo, Japan
Simpson Elec. Co., Chicago, Ill..... p 556
Triplett Elec. Instr. Co., Bluffton, Ohio p 576
A & D Electrical Instrs., Glendale, N.Y.
A & M Instrument, Inc., Great Neck, N.Y.
Allied Elctrns. Corp., Chicago, Ill.
Altec, Anaheim, Calif.
Ammon Instrs., Inc., Manchester, N.H.
California Instrs. Co., San Diego, Cal.
Edison Elctrns. Div., Manchester, N.H.
Hickok Indicating Sys. Inc., Gardena, Cal.
Ideal Precision Meter Co., Inc., Brooklyn, N.Y.
Instrument Labs. Corp., Chicago, Ill.
Int'l. Instrs., Orange, Conn.
Jewell Electrical Instrs., Manchester, N.H.
Lab Electro-Acoustique, 92-Rueil, Malmaison, France
Mura Corp., Jericho, N.Y.
Northeast Elctrns. Corp., Concord, N.H.
Phaostron Instr. & Elctrn. Co., So. Pasadena, Cal.
Philmore Mfg. Co., Richmond Hill, N.Y.
Q.V.S., Inc., East Orange, N.J.
Shigoto Inds., Ltd., New York, N.Y.
Shurite Meters, New Haven, Conn.
Stark Elctrn. Instrs., Ltd., Ajax, Ont., Canada
State Labs, Inc., New York, N.Y.
Sun Electric Corp., Chicago, Ill.
Sunshine Sci. Instrs., Inc., Philadelphia, Pa.
Vu-data Corp., San Diego, Cal.
Weston Instruments, Inc., Newark, N.J.
Yewtec Corporation, Larchmont, N.Y.

Meters, Watt

API Instrs. Co., Waltham,, Mass.
Bell, F.W., Inc., Columbus, Ohio.... p 418
Bendix, Franklin, Ind. ..... p 1555
Bird Elctrn., Cleveland, Ohio..... p 421
Boonton Elctrns., Parsippany, N.J. p 422
Clarke - Hess, New York, N.Y. ..... p 426
Dranetz Engrg. Labs., Plainfield, N.J.
Fluke, John Mfg. Co., Inc., Seattle, Wash.
General Elec. Co., Schenectady, N.Y.
Hickok Elect. Instr., Cleveland, Ohio
Ind'l. Test Equip., Port Washington, N.Y.
ISC Magnetics Div., Huntington, N.Y.
Kratos Instrument Div., Pasadena, Cal p 510
Larson Instr. Co., Inc., Orangeburg, N.Y.
Marconi Instrs., Englewood, N.J... p 521
Microdot Inc., City of Industry, Cal.
Ohio Semitronics, Columbus, Ohio p 533
Scientific Columbus, Columbus, Ohio
Simpson Elec. Co., Chicago, Ill..... p 556
Triplett Elec. Instr. Co., Bluffton, Ohio
Westinghouse Elec. Corp., Newark, N.J.
A & M Instrument, Inc., Great Neck, N.Y.
A.O.I.P., 75/Paris 12eme, France
AUL Instrs., Inc., Flushng, N.Y.
Canadian Research Institute, Don Mills, Ont., Canada
Components Specialties, Inc., Freeport, N.Y.
Eico Electronic Instrument Co., Inc., Brooklyn, N.Y.
Electrical Instr. Svc., Inc., Mt. Vernon, N.Y.
Esterline Angus Div., Indianapolis, Ind.
Ferranti Elec., Inc., Plainview, N.Y.
Ferranti Ltd., Hollinwood, Lancs., England
General Microwave Corp., Farmingdale, N.Y.
General Radio Co., Concord, Mass.
Hallmark Standards, Inc., Mt. Vernon, N.Y.
Halmar Elctrns., Inc., Columbus, Ohio
Hickok Indicating Sys. Inc., Gardena, Cal.
NH Research, Inc., Santa Ana, Calif.
Optical Elctrns., Tucson, Ariz.
Parker Instr. Corp., Stamford, Conn.
Phaostron Instr. & Elctrn. Co., So. Pasadena, Cal.
Philco-Ford Corp., Washington, D.C.
Scientific Educational Prods., N.Y., N.Y.
Shigoto Inds., Ltd., New York, N.Y.
Stark Elctrn. Instrs., Ltd., Ajax, Ont., Canada
Sunshine Sci. Instrs., Inc., Philadelphia, Pa.
Weston Instruments, Inc., Newark, N.J.
Yewtec Corporation, Larchmont, N.Y.

Meters, Watt-Hour

General Elec. Co., Schenectady, N.Y.
Hickok Elect. Instr., Cleveland, Ohio
Sangamo Elec. Co., Pickens, S.C.
Ferranti Ltd., Hollinwood, Lancs., England
Hallmark Standards, Inc., Mt. Vernon, N.Y.
Halmar Elctrns., Inc., Columbus, Ohio
Siemens Corp., Comps. Div., Iselin, N.J.
Weston Instruments, Inc., Newark, N.J.
Yewtec Corporation, Larchmont, N.Y.

Meters, Watt-Var

Fluke, John Mfg. Co., Inc., Seattle, Wash.
Hickok Elect. Instr., Cleveland, Ohio
Kratos Instrument Div., Pasadena, Cal p 510
Sangamo Elec. Co., Pickens, S.C.
Scientific Columbus, Columbus, Ohio
Westinghouse Elec. Corp., Newark, N.J.
A & M Instrument, Inc., Great Neck, N.Y.
Esterline Angus Div., Indianapolis, Ind.
Ferranti Ltd., Hollinwood, Lancs., England
Hickok Indicating Sys. Inc., Gardena, Cal.
NH Research, Inc., Santa Ana, Calif.
Q.V.S., Inc., East Orange, N.J.
Weston Instruments, Inc., Newark, N.J.
Yewtec Corporation, Larchmont, N.Y.

Meters, Wave

Frequency Engrg. Labs., Farmingdale, N.J. .....p 604,605
Hewlett-Packard, Palo Alto, Cal.
Marconi Instrs., Englewood, N.J... p 521
General Microwave Corp., Farmingdale, N.Y.
MCS Corp., Monrovia, Calif.
Narda Microwave Corp., Plainview, N.Y.
PRD Elctrns., Inc., Westbury, N.Y.
Rohde & Schwarz Sls., Passaic, N.J.
Telonic Inds., Inc., Laguna Beach, Calif.

Meters, Waveguide—See Meters, Microwave

Meters, X-Ray Intensity

Victoreen Instr., Cleveland, Ohio
Materials Resch. Corp., Orangeburg, N.Y.
Nuclear Resch. Corp., Southampton, Pa.
Rank Precision Inds., W. Nyack, N.Y.
Soltec Corp., No. Hollywood, Cal.
Universal Transistor Prods., Copiague, N.Y.

Mica Glass Bonded—See Insulation Materials, Glass Bonded Mica—Vol 3

Microcircuit Production Equip.

Circon Corp., Goleta, Cal.
Sprague Elec. Co., No. Adams, Mass.
Baron-Blakeslee, Inc., Chicago, Ill.
Bendix, Rochester, N.Y.
Bycoski, Casmir T., Inc., Hartford, Conn.
CGS Units, Inc., Rochester, N.Y.
Communications Tech. Corp., Los Angeles, Cal.
Denton Vacuum, Inc., Cherry Hill, N.J.
Hadron Inc., Westbury, N.Y.
HLC Mfg. Co., Inc., Willow Grove, Pa.
HLS, Inc., Santa Clara, Cal.
Hughes Aircraft Co., Ind'l. Prods. Div., Oceanside, Cal.
Hull Corp., Hatboro, Pa.
IPT Corp., Mountain View, Cal.
Kahn & Co., Inc., Wethersfield, Conn.
Mann, David W. Co., Burlington, Mass.
Materials Resch. Corp., Orangeburg, N.Y.
Micro Tech. Mfg., Inc., Worcester, Mass.
Neutronic Corp., Bridgeton, Mo.
Optomechanisms, Inc., Plainview, N.Y.
Photo Tech. Prods., Garden City, N.Y.
Podgor, Joseph Co., Pennsauken, N.J.
Podgor, Joseph E. Co., Inc., Phila., Pa.
Unitek Corp., Monrovia, Calif.
Vacuum Equip. Div., Newton, Mass.

Microcircuits—See Circuits, Integrated; Circuits, Hybrid—Vol 2

Micro Film Retrieval Systems —See Vol 3

Micrometers, Electronic—See Vol 2

Micromosaic Optics—See Vol 2

Microphone Calibrators—See Calibrators, Microphone

Microphones, Aircraft Type

Primo Co., Ltd., Tokyo, Japan
Action Systems Co., Meriden, Conn.
Adec, Inc., Newark, N.J.
Altec, Anaheim, Calif.
Audiosears Corp., Stamford, N.Y.
Columbia Resch. Labs., Woodlyn, Pa.
Conrac Corp., Cedar Rapids, Iowa
Dyna Magnetic Devices, Inc., Hicksville, N.Y.
Electro-Voice, Inc., Buchanan, Mich.
ISC/Telephonics Div, Huntington, N.Y.
King Radio Corp., Olathe, Kans.
Narco Avionics, Ft. Washington, Pa.
Remler Co., San Francisco, Calif.
Roanwell Corp., New York, N.Y.
Shure Bros., Inc., Evanston, Ill.
Telex Comm. Div., Minneapolis, Minn.
Turner Microphone Co., Cedar Rapids, Iowa

Mircrophones, Carbon

Electrospace Corp., Westbury..... p 323
GC Elctrns., Rockford, Ill.
Primo Co., Ltd., Tokyo, Japan
Action Systems Co., Meriden, Conn.
Astatic Corp., Conneaut, Ohio
Audiosears Corp., Stamford, N.Y.
Bourns Security Sys., Smithtown, N.Y.
Components Specialties, Inc., Freeport, N.Y.
Conrac Corp., Cedar Rapids, Iowa
Electro-Voice, Inc., Buchanan, Mich.
ISC/Telephonics Div, Huntington, N.Y.
Philmore Mfg. Co., Richmond Hill, N.Y.
Roanwell Corp., New York, N.Y.
Shigoto Inds., Ltd., New York, N.Y.
Shure Bros., Inc., Evanston, Ill.
Telephone Dynamics Corp., N. Bellmore, N.Y.
Telex Comm. Div., Minneapolis, Minn.
Turner Microphone Co., Cedar Rapids, Iowa

Microphones, Cardioid

GC Elctrns., Rockford, Ill.
Primo Co., Ltd., Tokyo, Japan
RCA Elctrns. Comps., Harrison, N.J.
Sennheiser Elctrn. Corp., New York, NY
AKG, New York, N.Y.
Alcor, Inc., Ithaca, N.Y.
Allied Elctrns. Corp., Chicago, Ill.
Altec, Anaheim, Calif.
American Geloso Elctrns., Inc., New York, N.Y.
Ampex Corp., Redwood City, Calif.
Astatic Corp., Conneaut, Ohio
Bogen Div., Paramus, N.J.
Concord Elctrns., Los Angeles, Cal.
Conrac Corp., New York, N.Y.
Conrac Corp., Cedar Rapids, Iowa
Electro-Voice, Inc., Buchanan, Mich.
Ercona Corp., Bellmore, N.Y.
Executone, Inc., Long Island City, N.Y.
Fanon Elctrns., Hillside, N.J.
Gotham Audio Corp., New York, N.Y.
Holmin, W.A. Corp., Rockford, Ill.
Mura Corp., Jericho, N.Y.
Philmore Mfg. Co., Richmond Hill, N.Y.
R-Columbia Prods., Inc., Highland Park, Ill.
RCA Corp., Camden, N.J.
Roberts Div., Los Angeles, Cal.
Shure Bros., Inc., Evanston, Ill.
Stanford Int'l., San Carlos, Cal.
Turner Microphone Co., Cedar Rapids, Iowa
University Sound, Anaheim, Cal.
Vidaire Electronics Mfg. Corp., Freeport, N.Y.

Microphones, Ceramic

GC Elctrns., Rockford, Ill.
Primo Co., Ltd., Tokyo, Japan
Astatic Corp., Conneaut, Ohio
B & K Instrs., Inc., Cleveland, Ohio
Bogen Div., Paramus, N.J.
Bourns Security Sys., Smithtown, N.Y.
Chesapeake Instr. Corp., Shadyside, Md.
Components Specialties, Inc., Freeport, N.Y.
Conrac Corp., New York, N.Y.
Conrac Corp., Cedar Rapids, Iowa
Dyna Magnetic Devices, Inc., Hicksville, N.Y.
Electro-Voice, Inc., Buchanan, Mich.
Endevco, Pasadena, Calif.
General Radio Co., Concord, Mass.
Knowles Elctrns., Inc., Franklin Park, Ill.
Linden Labs., Inc., State College, Pa.
Philmore Mfg. Co., Richmond Hill, N.Y.
Shigoto Inds., Ltd., New York, N.Y.
Shure Bros., Inc., Evanston, Ill.
Sonotone Corp., Elmsford, N.Y.
Telex Comm. Div., Minneapolis, Minn.
Turner Microphone Co., Cedar Rapids, Iowa

Microphones, Condenser

Hewlett-Packard, Palo Alto, Cal.
Primo Co., Ltd., Tokyo, Japan ..... p 320
Sennheiser Elctrn. Corp., New York, NY
AKG, New York, N.Y.
Alcor, Inc., Ithaca, N.Y.
Altec, Anaheim, Calif.
Automatic Clerical Sys., Pasadena, Calif.
B & K Instrs., Inc., Cleveland, Ohio
Capps & Co., Inc., Valley Stream, N.Y.
Ercona Corp., Bellmore, N.Y.
General Radio Co., Concord, Mass.
Gordon Alan Entprs., N. Hollywood, Cal.
Gotham Audio Corp., New York, N.Y.
K West, Westminster, Calif.
Matsushita Comm. Ind'l. Co., Ltd., Yokohama, Japan
Mura Corp., Jericho, N.Y.
Roberts Div., Los Angeles, Cal.
Stanford Int'l., San Carlos, Cal.

Microphones, Contact

Primo Co., Ltd., Tokyo, Japan
Rye Inds., Inc., Mamaroneck, N.Y.
Sennheiser Elctrn. Corp., New York, NY
Altec, Anaheim, Calif.
Dyna Magnetic Devices, Inc., Hicksville, N.Y.
Electro-Voice, Inc., Buchanan, Mich.
Philmore Mfg. Co., Richmond Hill, N.Y.
Recoton Corp., Long Island City, N.Y.
Rystl Elctrns. Corp., N. Miami Beach, Fla.
Shigoto Inds., Ltd., New York, N.Y.

Microphones, Crystal

GC Elctrns., Rockford, Ill.
Primo Co., Ltd., Tokyo, Japan
Astatic Corp., Conneaut, Ohio
Bogen Div., Paramus, N.J.
Columbia Resch. Labs., Woodlyn, Pa.
Components Specialties, Inc., Freeport, N.Y.
Conrac Corp., New York, N.Y.
Conrac Corp., Cedar Rapids, Iowa
Electro-Voice, Inc., Buchanan, Mich.
Endevco, Pasadena, Calif.
Fanon Elctrns., Hillside, N.J.
Goldak Co., Inc., Glendale, Calif.
Gordon Alan Entprs., N. Hollywood, Cal.
Massa Div., Hingham, Mass.
Philmore Mfg. Co., Richmond Hill, N.Y.
RCA Corp., Camden, N.J.
Shigoto Inds., Ltd., New York, N.Y.
Shure Bros., Inc., Evanston, Ill.
Tandberg of America, Inc., Pelham, N.Y.
Turner Microphone Co., Cedar Rapids, Iowa

Microphones, Differential

Primo Co., Ltd., Tokyo, Japan
Action Systems Co., Meriden, Conn.
AKG, New York, N.Y.
Altec, Anaheim, Calif.
Electro-Voice, Inc., Buchanan, Mich.
ISC/Telephonics Div, Huntington, N.Y.
Roanwell Corp., New York, N.Y.
Shure Bros., Inc., Evanston, Ill.
Telex Comm. Div., Minneapolis, Minn.
Turner Microphone Co., Cedar Rapids, Iowa

Microphones, Dynamic

GC Elctrns., Rockford, Ill.
Primo Co., Ltd., Tokyo, Japan
RCA Elctrns. Comps., Harrison, N.J.
Rye Inds., Inc., Mamaroneck, N.Y.
p 2708
Sennheiser Elctrn. Corp., New York, NY
Action Systems Co., Meriden, Conn.
Adec, Inc., Newark, N.J.
AKG, New York, N.Y.
Alcor, Inc., Ithaca, N.Y.
Allied Elctrns. Corp., Chicago, Ill.
Altec, Anaheim, Calif.
American Geloso Elctrns., Inc., New York, N.Y.
Ampex Corp., Redwood City, Calif.
Astatic Corp., Conneaut, Ohio
Audiosears Corp., Stamford, N.Y.
Bogen Div., Paramus, N.J.
Components Specialties, Inc., Freeport, N.Y.
Concord Elctrns., Los Angeles, Cal.
Conrac Corp., New York, N.Y.
Conrac Corp., Cedar Rapids, Iowa
Dyna Magnetic Devices, Inc., Hicksville, N.Y.
EV/Game, Inc., Freeport, N.Y.
Electro-Voice, Inc., Buchanan, Mich.
Ercona Corp., Bellmore, N.Y.
Executone, Inc., Long Island City, N.Y.
Fanon Elctrns., Hillside, N.J.
Gordon Alan Entprs., N. Hollywood, Cal.
Holmin, W.A. Corp., Rockford, Ill.
ISC/Telephonics Div, Huntington, N.Y.
Matsushita Comm. Ind'l. Co., Ltd., Yokohama, Japan
Mura Corp., Jericho, N.Y.
Philmore Mfg. Co., Richmond Hill, N.Y.
R-Columbia Prods., Inc., Highland Park, Ill.
RCA Corp., Camden, N.J.
Roanwell Corp., New York, N.Y.
Roberts Div., Los Angeles, Cal.
Rystl Elctrns. Corp., N. Miami Beach, Fla.
Shigoto Inds., Ltd., New York, N.Y.
Shure Bros., Inc., Evanston, Ill.
Stanford Int'l., San Carlos, Cal.
Telephone Dynamics Corp., N. Bellmore, N.Y.
Telex Comm. Div., Minneapolis, Minn.
Turner Microphone Co., Cedar Rapids, Iowa
University Sound, Anaheim, Cal.
Vidaire Electronics Mfg. Corp., Freeport, N.Y.

Microphones, Handsets, Headsets—See Headsets

Microphones, Hearing Aid

Primo Co., Ltd., Tokyo, Japan
Rye Inds., Inc., Mamaroneck, N.Y.
Sennheiser Elctrn. Corp., New York, NY
Dyna Magnetic Devices, Inc., Hicksville, N.Y.
Knowles Elctrns., Inc., Franklin Park, Ill.
Shigoto Inds., Ltd., New York, N.Y.
Shure Bros., Inc., Evanston, Ill.
Sonotone Corp., Elmsford, N.Y.
Telex Comm. Div., Minneapolis, Minn.

Microphones, Interferometer —See Vol 2

Microphones, Lapel

GC Elctrns., Rockford, Ill.
RCA Elctrns. Comps., Harrison, N.J.
Rye Inds., Inc., Mamaroneck, N.Y.
Sennheiser Elctrn. Corp., New York, NY
AKG, New York, N.Y.
Altec, Anaheim, Calif.
American Geloso Elctrns., Inc., New York, N.Y.
Astatic Corp., Conneaut, Ohio
Components Specialties, Inc., Freeport, N.Y.
EV/Game, Inc., Freeport, N.Y.
Electro-Voice, Inc., Buchanan, Mich.
Ercona Corp., Bellmore, N.Y.
Gotham Audio Corp., New York, N.Y.
Mura Corp., Jericho, N.Y.
Philmore Mfg. Co., Richmond Hill, N.Y.
RCA Corp., Camden, N.J.
Recoton Corp., Long Island City, N.Y.
Shigoto Inds., Ltd., New York, N.Y.
Shure Bros., Inc., Evanston, Ill.
Stanford Int'l., San Carlos, Cal.
Unex Labs., Inc., Hathorne, Mass.

Microphones, Lavalier

GC Elctrns., Rockford, Ill.
RCA Elctrns. Comps., Harrison, N.J.
Sennheiser Elctrn. Corp., New York, NY
Astatic Corp., Conneaut, Ohio
Automatic Clerical Sys., Pasadena, Calif.
Conrac Corp., New York, N.Y.
Conrac Corp., Cedar Rapids, Iowa
EV/Game, Inc., Freeport, N.Y.
Electro-Voice, Inc., Buchanan, Mich.
Executone, Inc., Long Island City, N.Y.
Gotham Audio Corp., New York, N.Y.
Holmin, W.A. Corp., Rockford, Ill.
Mura Corp., Jericho, N.Y.
Philmore Mfg. Co., Richmond Hill, N.Y.
RCA Corp., Camden, N.J.
Roberts Div., Los Angeles, Cal.
Rystl Elctrns. Corp., N. Miami Beach, Fla.
Shure Bros., Inc., Evanston, Ill.
Stanford Int'l., San Carlos, Cal.
University Sound, Anaheim, Cal.

Microphones, LIP

Altec, Anaheim, Calif.
Audiosears Corp., Stamford, N.Y.
Roanwell Corp., New York, N.Y.

Microphones, Magnetic

Primo Co., Ltd., Tokyo, Japan
RCA Elctrns. Comps., Harrison, N.J.
Rye Inds., Inc., Mamaroneck, N.Y.
Sennheiser Elctrn. Corp., New York, NY
Action Systems Co., Meriden, Conn.
Adec, Inc., Newark, N.J.
Altec, Anaheim, Calif.
Bogen Div., Paramus, N.J.
Dyna Magnetic Devices, Inc., Hicksville, N.Y.
EV/Game, Inc., Freeport, N.Y.
Knowles Elctrns., Inc., Franklin Park, Ill.
Philmore Mfg. Co., Richmond Hill, N.Y.
Remler Co., San Francisco, Calif.
Roanwell Corp., New York, N.Y.
Shigoto Inds., Ltd., New York, N.Y.
Shure Bros., Inc., Evanston, Ill.
Sonotone Corp., Elmsford, N.Y.
Stanford Int'l., San Carlos, Cal.
Tandberg of America, Inc., Pelham, N.Y.
Unex Labs., Inc., Hathorne, Mass.

Microphones, Noise-Cancelling

Primo Co., Ltd., Tokyo, Japan
RCA Elctrns. Comps., Harrison, N.J.
Sennheiser Elctrn. Corp., New York, NY
Action Systems Co., Meriden, Conn.
Adec, Inc., Newark, N.J.
AKG, New York, N.Y.
Altec, Anaheim, Calif.
Astatic Corp., Conneaut, Ohio
Audiosears Corp., Stamford, N.Y.
Bourns Security Sys., Smithtown, N.Y.
Components Specialties, Inc., Freeport, N.Y.
Conrac Corp., New York, N.Y.
Conrac Corp., Cedar Rapids, Iowa
Dyna Magnetic Devices, Inc., Hicksville, N.Y.
Electro-Voice, Inc., Buchanan, Mich.
Heitz, Karl, Inc., New York, N.Y.
ISC/Telephonics Div, Huntington, N.Y.
R-Columbia Prods., Inc., Highland Park, Ill.
Roanwell Corp., New York, N.Y.
Sharpe Audio Div., Tonawanda, N.Y.
Shure Bros., Inc., Evanston, Ill.
Stanford Int'l., San Carlos, Cal.
Telephone Comps., Inc., Northport, N.Y.
Telex Comm. Div., Minneapolis, Minn.
Turner Microphone Co., Cedar Rapids, Iowa

Microphones, Pressure

Primo Co., Ltd., Tokyo, Japan
RCA Elctrns. Comps., Harrison, N.J.
Sennheiser Elctrn. Corp., New York, NY
AKG, New York, N.Y.
Altec, Anaheim, Calif.
B & K Instrs., Inc., Cleveland, Ohio
Columbia Resch. Labs., Woodlyn, Pa.
Kistler Instr. Co., Redmond, Wash.
Massa Div., Hingham, Mass.
RCA Corp., Camden, N.J.
Roanwell Corp., New York, N.Y.
Shure Bros., Inc., Evanston, Ill.
Sprengnether, W.F. Instr. Co., Inc., St. Louis, Mo.
Turner Microphone Co., Cedar Rapids, Iowa

Microphones, Ribbon

Primo Co., Ltd., Tokyo, Japan
RCA Elctrns. Comps., Harrison, N.J.
Altec, Anaheim, Calif.
Gordon Alan Entprs., N. Hollywood, Cal.
RCA Corp., Camden, N.J.
Shure Bros., Inc., Evanston, Ill.
Stanford Int'l., San Carlos, Cal.

Microphones, Sound-Powered

Action Systems Co., Meriden, Conn.
ISC/Telephonics Div, Huntington, N.Y.

Microphones, Throat

Rye Inds., Inc., Mamaroneck, N.Y.
p 2708
Sennheiser Elctrn. Corp., New York, NY
Sonotone Corp., Elmsford, N.Y.

Microphones, Transistorized

Hewlett-Packard, Palo Alto, Cal.
RCA Elctrns. Comps., Harrison, N.J.
Sennheiser Elctrn. Corp., New York, NY
Altec, Anaheim, Calif.
Automatic Clerical Sys., Pasadena, Calif.
Bourns Security Sys., Smithtown, N.Y.
Conrac Corp., New York, N.Y.
Conrac Corp., Cedar Rapids, Iowa
Dyna Magnetic Devices, Inc., Hicksville, N.Y.
Electro-Voice, Inc., Buchanan, Mich.
Ercona Corp., Bellmore, N.Y.
Gotham Audio Corp., New York, N.Y.
ISC/Telephonics Div, Huntington, N.Y.
Knowles Elctrns., Inc., Franklin Park, Ill.
Remler Co., San Francisco, Calif.
Roanwell Corp., New York, N.Y.
Shigoto Inds., Ltd., New York, N.Y.
Shure Bros., Inc., Evanston, Ill.
Stanford Int'l., San Carlos, Cal.
Telex Comm. Div., Minneapolis, Minn.
Turner Microphone Co., Cedar Rapids, Iowa

Microphones, Velocity

Primo Co., Ltd., Tokyo, Japan
Sennheiser Elctrn. Corp., New York, NY
Altec, Anaheim, Calif.
RCA Corp., Camden, N.J.
Shure Bros., Inc., Evanston, Ill.
Stanford Int'l., San Carlos, Cal.

Microphones, Wireless

Primo Co., Ltd., Tokyo, Japan
Sennheiser Elctrn. Corp., New York, NY
Solid State Elctrns., Sepulveda, Cal.
Automatic Clerical Sys., Pasadena, Calif.
Concord Elctrns., Los Angeles, Cal.
Dyna Magnetic Devices, Inc., Hicksville, N.Y.
Ercona Corp., Bellmore, N.Y.
Gordon Alan Entprs., N. Hollywood, Cal.
Mura Corp., Jericho, N.Y.
Port-O-Vox Enterprises, Corp., New York, N.Y.
RCA Corp., Camden, N.J.
Shigoto Inds., Ltd., New York, N.Y.

Microscopes-Also See Stereoscopes—See Vol 2

Microscopes, Electron— See Vol 2

Microscopes, Infrared— See Vol 2

Microscopes, Laser— See Vol 2

Microscopes, Measuring-Also See Machines, Measuring— See Vol 2

Microscopes, Ultraviolet— See Vol 2

Microwave Equipment—See Specific Types of Components & Equipment (As Modified By Microwave)

Microwave Line Stretchers— See Vol 2

Mirrors, Prism—See Vol 2

Mismatches, Microwave, Precision—See Vol 2

Mixer-Preamplifiers, Microwave—See Vol 2

Mixers, Audio

Melcor Elctrns. Corp., Farmingdale, N.Y.
Solid State Elctrns., Sepulveda, Cal.
Alcor, Inc., Ithaca, N.Y.
Altec, Anaheim, Calif.
American Geloso Elctrns., Inc., New York, N.Y.
Ampex Corp., Redwood City, Calif.
Amplifier Corp. America, Westbury, N.Y.
Astrolab Inc., Linden, N J
Audio Instr. Co., Union City, N.J.
Bogen Div., Paramus, N.J.
Bozak, R.T. Mfg. Co., Darien, Conn.
Collins Radio Co., Dallas, Tex.
Davis J.W. & Co., Dallas, Texas
Dorsett Elctrns., Tulsa, Okla.
Edison Elctrns. Div., Manchester, N.H.
Elctrn. Sys. Engrg., Cushing, Okla.
Gotham Audio Corp., New York, N.Y.
Hughes Aircraft Co, Fullerton, Cal.
Nelson-Hershfield Elctrns., Phoenix, Ariz.
Olektron Corp., Dudley, Mass.
Philips Elctrns. Inds., Ltd., Toronto 17, Can.
Philmore Mfg. Co., Richmond Hill, N.Y.
Ramsay Engrg. Co., Anaheim, Calif.
Shure Bros., Inc., Evanston, Ill.
Spectra Sonics, Ogden, Utah
Stancil-Hoffman Corp., Hollywood, Calif.

Mixers, For Epoxies—See Dispensers

Mixers, Microwave—See Vol 2

Mixers, R-F—See Vol 2

Mobile Equipment—See Receivers; Transmitters; etc.

Modems—See Modulator (Demodulators)

Modulation Indicators—See Indicators, Modulation

Modulation Transfer Analyzers—See Analyzers, Transfer Function

Modulator(Demodulators, Data

Almond Instrs. Co., Covina, Cal
Bulova Watch Co., Servo Prods. Elctrns. Div., Woodside, N.Y. .... p 1865
Control Technology Co., L.I.C., N.Y. p 1868
Data-Control Systems, Danbury, Conn. p 345
Dynamics Instr. Co., Monterey Pk., Cal.
Hybrid Sys. Corp., Burlington, Mass.
Multitech Data Prods., Monterey Pk., Cal. ..... p 363
Natel Engrg. Co., Canoga Pk., Cal. p 366
Seg Elctrns., Richmond Hill, N.Y.
Solid State Elctrns., Sepulveda, Cal.
Sonex, Inc., Bethayres, Pa..... p 955
Transmagnetics Inc., Farmingdale, N.Y.
A C Electronics Co., Santa Monica, Cal.
AMBAC Inds., Garden City, N.Y.
American Data Sys., Canoga Pk., Cal
Applied Digital Data Systems, Inc., Hauppauge, N.Y.
Aydin Data Systems, Ft. Washington, Pa
Bowmar/Ali, Inc., Acton, Mass.
Codex Corp., Newton, Mass.
Computer Conversions Corp., East Northport, N.Y.
Conductron Corp., St. Charles, Mo.
General Dynamics, San Diego, Cal.
General Elec., Lynchburg, Va.
General Microwave Corp., Farmingdale, N.Y.
GTE Lenkurt Inc., San Carlos, Calif.
GTE Sylvania Inc., Elctrn. Sys. Gp., Waltham, Mass.
Hughes Aircraft Co, Fullerton, Cal.
IBM Corp., New York, NY
Int'l. Comm., Miami, Fla.
Iso-Switch Corp., Costa Mesa, Cal.
Milgo Electrn. Corp., Miami, Fla.
Modex, Inc., Costa Mesa, Cal.
Mohawk Data Science, King of Prussia, Pa.
Nat'l. Midco Inds., Inc., Trenton, N.J.
Olektron Corp., Dudley, Mass.
Philco-Ford Corp., Washington, D.C.
Prentice Elctrns. Corp., Palo Alto, Calif.
RFL Inds., Comms. Div., Boonton, N.J.
Signatron, Inc., Lexington, Mass.
Silicon Gen'l., Inc., Westminster, Cal.
Singer - Tele-Signal, Woodbury, N.Y.
Western Telematic, Inc., Arcadia, Cal.

Modulator(Demodulators, Laser

RCA Elctrns. Comps., Harrison, N.J.
Bertan Assocs., Inc., Plainview, N.Y.
GTE Sylvania Inc., Elctrn. Sys. Gp., Waltham, Mass.
Harshaw Chem. Co., Cleveland, Ohio
Hughes Aircraft Co, Culver City, Cal.
Isomet Corp., Oakland, N.J.
Korad Mat'ls. Sys. Div., Santa Monica, Cal.
LAD Electro-Sys., Inc., Hicksville, N.Y.
Loral Elctrn. Sys., Bronx, N.Y.
Raytheon Co., Waltham, Mass.

Modulators, A-M

Clarke - Hess, New York, N.Y. ..... p 426
Control Technology Co., L.I.C., N.Y.
E & M Labs., Westlake Village, Cal.
General Magnetics, Bloomfield, N.J.
Hewlett-Packard, Palo Alto, Cal.
Hybrid Sys. Corp., Burlington, Mass.
Intronics, Inc., Newton, Mass.
Lorch Elctrns. Corp., Englewood, N.J.
Millen, James Mfg., Malden, Mass.
Polarad Elctrn. Instrs., Lake Success, N.Y.
Solid State Elctrns., Sepulveda, Cal.
Transmagnetics Inc., Farmingdale, N.Y.
Vari-L Co., Inc., Denver, Colo.
Watkins Johnson Co., Palo Alto, Cal.
Weinschel Engrg. Co., Gaithersburg, Md.
AMBAC Inds., Garden City, N.Y.
CCA Elctrns. Corp., Gloucester, N.J.
Collins Radio Co., Dallas, Tex.
Feedback, Inc., Berkeley Hghts., N.J.
General Microwave Corp., Farmingdale, N.Y.
GPS Instr. Co., Framingham, Mass.
Hughes Aircraft Co, Culver City, Cal.
Int'l. Comm., Miami, Fla.
Milgo Electrn. Corp., Miami, Fla.
Mini-Circuits Lab., Brooklyn, N.Y.
Motorola Semiconductor Prods., Phoenix, Ariz.
Neptune Elctrns. Co., New York, N.Y.
Olektron Corp., Dudley, Mass.
Philco-Ford Corp., Washington, D.C.
Philips Elctrns. Inds., Ltd., Toronto 17, Can.
Rantec Div., Calabasas, Calif.
RCA Govt. & Comm. Sys., Moorestown, N.J.
Relcom, Mt. View, Calif.
RHA-Audio Communications, W. New York, N.J.
Rohde & Schwarz Sls., Passaic, N.J.
Wilkinson Elctrns., Woodlyn, Pa.

Modulators, F-M

Almond Instrs. Co., Covina, Cal
Clarke - Hess, New York, N.Y. ..... p 426
Data-Control Systems, Danbury, Conn. p 345
Polarad Elctrn. Instrs., Lake Success, N.Y.
Solid State Elctrns., Sepulveda, Cal.
Sonex, Inc., Bethayres, Pa..... p 955
Watkins Johnson Co., Palo Alto, Cal.
AMBAC Inds., Garden City, N.Y.
GTE Lenkurt Inc., San Carlos, Calif.
Hughes Aircraft Co, Culver City, Cal.
Int'l. Comm., Miami, Fla.
Milgo Electrn. Corp., Miami, Fla.
Motorola Semiconductor Prods., Phoenix, Ariz.
Olektron Corp., Dudley, Mass.
Philco-Ford Corp., Washington, D.C.
Wilkinson Elctrns., Woodlyn, Pa.
Anzac Elctrns., Waltham, Mass.
Electromagnetic Sci., Inc., Atlanta, Ga.
Guide Inds., Inc., Sun Valley, Calif.
Herley Inds., Inc., Syosset, N.Y.
Hughes Aircraft Co, Culver City, Cal.
LAD Electro-Sys., Inc., Hicksville, N.Y.
Microwave Assocs., Inc., Burlington, Mass.
Microwave Development Labs., Inc., Needham Hgts., Mass.
Neptune Elctrns. Co., New York, N.Y.
Premier Microwave, Port Chester, N.Y.
Rantec Div., Calabasas, Calif.
Raytheon Co., Waltham, Mass.
Sedco Sys., Inc., Farmingdale, N.Y.
TRG Prods., E. Boston, Mass.

Modulators, Light—See Vol 2

Modulators, Magnetic—See Vol 2

Modulators, Microwave

American Elctrn. Labs., Inc., Lansdale, Pa.
Amp Inc., Elizabethtown, Pa.
Applied Microwave Lab., Andover, Mass. ..... p 599
Arra Inc., Bayshore, N.Y.
Cober Elctrns., Inc., Stamford, Conn. p 600
E & M Labs., Westlake Village, Cal.
Elctrn. Enterprises, Newark, N.J.
Hewlett-Packard, Palo Alto, Cal.
Kilovolt Corp., Hackensack, N.J.
Light Elec. Corp., Rancocas, N.J.
Microwave Cavity Labs., La Grange, Ill.
Multitech Power Sys., Costa Mesa, Cal. p 816
RHG Elctrns. Lab., Farmingdale, N.Y.
R L C Elctrns., Inc., Mt. Kisco, N.Y.
Vari-L Co., Inc., Denver, Colo. .... p 1568
Vega Precision Labs., Vienna, Va.
Watkins Johnson Co., Palo Alto, Cal.
Aircom, Inc., Union, N.H.
AMBAC Inds., Garden City, N.Y.
Anaren Microwave, Inc., Syracuse, N.Y.
Anzac Elctrns., Waltham, Mass.
Bertan Assocs., Inc., Plainview, N.Y.
Coax Devices Inc., Chelsea, Mass.
Collins Radio Co., Dallas, Tex.
E.F.E. Labs., Inc., Horsham, Pa.
Elctrn. Resources Div., Los Angeles, Cal.
Elctrn. Specialty, Thomaston, Conn.
Energy Systems, Palo Alto, Cal.
GAF Corp., New York, N.Y.
General Instr. Corp., Hicksville, N.Y.
General Microwave Corp., Farmingdale, N.Y.
GTE Lenkurt Inc., San Carlos, Calif.
Guide Inds., Inc., Sun Valley, Calif.
Herley Inds., Inc., Syosset, N.Y.
Hughes Aircraft Co, Culver City, Cal.
Hyletronics Corp., Littleton, Mass.
Int'l. Microwave, Cos Cob, Conn.
LAD Electro-Sys., Inc., Hicksville, N.Y.
Litton Inds., San Carlos, Calif.
Loral Elctrn. Sys., Bronx, N.Y.
Microlab/FXR, Livingston, N.J.
Microwave Assocs., Inc., Burlington, Mass.
Microwave Development Labs., Inc., Needham Hgts., Mass.
Microwave Div, Nashua, N.H.
Narda Microwave Corp., Plainview, N.Y.
Olektron Corp., Dudley, Mass.
Philco-Ford Corp., Washington, D.C.
Premier Microwave, Port Chester, N.Y.
Rantec Div., Calabasas, Calif.
Raytheon Co., Waltham, Mass.
Rohde & Schwarz Sls., Passaic, N.J.
Sage Labs. Inc., Natick, Mass.
Sanders Assocs., Nashua, N.H.
Scientific Communications, Garland, Tex.
Somerset Radiation Lab., Arlington, Va.
Special Microwave Devices Oper., Waltham, Mass.
Sperry Marine Sys., Charlottesville, Va.
Systron-Donner Microwave Div., Van Nuys, Cal.
TRG Prods., E. Boston, Mass.
Varian Assocs., Palo Alto, Cal.
Varian Assocs.Electron Tube & Device Grp., Palo Alto, Cal.
Varian, Beverly, Mass.
Vectronics Microwave Corp., Middlesex, N.J.
Victor Microwave, Inc., Wakefield, Mass.

Modulators, Phase

E & M Labs., Westlake Village, Cal.
Multitech Power Sys., Costa Mesa, Cal. p 816
Natel Engrg. Co., Canoga Pk., Cal. p 366
North Hills Elctrns., Inc., Glen Cove, N.Y. ..... p 1339
Aertech Inds., Sunnyvale, Calif.
AMBAC Inds., Garden City, N.Y.
Anzac Elctrns., Waltham, Mass.
Collins Radio Co., Dallas, Tex.
Computer Conversions Corp., East Northport, N.Y.
Engelmann Microwave, Montville, N.J.
General Instr. Corp., Hicksville, N.Y.
Glentek, Inc., Santa Monica, Calif.
Goodyear Aerospace Corp., Akron, Ohio
Hughes Aircraft Co, Culver City, Cal.
Hyletronics Corp., Littleton, Mass.
Microwave Development Labs., Inc., Needham Hgts., Mass.
Motorola Semiconductor Prods., Phoenix, Ariz.
Olektron Corp., Dudley, Mass.
Philco-Ford Corp., Washington, D.C.
Philips Elctrns. Inds., Ltd., Toronto 17, Can.
Rantec Div., Calabasas, Calif.
Servo Dev. Corp., Hicksville, N.Y.
Special Microwave Devices Oper., Waltham, Mass.
Spectran Elctrns., Pompano Beach, Fla.
Theta Instr. Corp., Fairfield, N.J.

Modulators, Pulse

Amp Inc., Elizabethtown, Pa.
Amp Inc., Harrisburg, Pa.
Applied Microwave Lab., Andover, Mass. ..... p 599
Bowmar Instr. Corp., Ft. Wayne, Ind.
Cober Elctrns., Inc., Stamford, Conn. p 600
Del Elctrns. Corp., Mt. Vernon, N.Y.
Hewlett-Packard, Palo Alto, Cal.
Kilovolt Corp., Hackensack, N.J.
Light Elec. Corp., Rancocas, N.J.
Microwave Cavity Labs., La Grange, Ill.
Multitech Power Sys., Costa Mesa, Cal. p 816
Polarad Elctrn. Instrs., Lake Success, N.Y.
RCA Elctrns. Comps., Harrison, N.J.
Solid State Elctrns., Sepulveda, Cal. p 2006
Tobe Deutschmann Labs., Inc., Canton, Mass.
Vari-L Co., Inc., Denver, Colo. .... p 1568
Vega Precision Labs., Vienna, Va. p 614
Venus Scientific, Farmingdale, N.Y. p 945
Advanced Kinetics, Costa Mesa, Calif.
Aerospace Resch. Inc., Boston, Mass.
AMBAC Inds., Garden City, N.Y.
Bertan Assocs., Inc., Plainview, N.Y.
Carco Elctrns., Menlo Park, Calif.
Collins Radio Co., Dallas, Tex.
Comdel, Inc., Beverly, Mass.
E.F.E. Labs., Inc., Horsham, Pa.
Elcom Sys., Deer Pk., N.Y.
Elctrn. Resources Div., Los Angeles, Cal.
Energy Systems, Palo Alto, Cal.
General Instr. Corp., Hicksville, N.Y.
General Microwave Corp., Farmingdale, N.Y.
Goodyear Aerospace Corp., Akron, Ohio
Harshaw Chem. Co., Cleveland, Ohio
Hughes Aircraft Co, Culver City, Cal.
Hyletronics Corp., Littleton, Mass.
Instr. Resch. Co., Lincoln, Mass.
Int'l. Comm., Miami, Fla.
LAD Electro-Sys., Inc., Hicksville, N.Y.
Litton Inds., San Carlos, Calif.
Milgo Electrn. Corp., Miami, Fla.
Narda Microwave Corp., Plainview, N.Y.
Neptune Elctrns. Co., New York, N.Y.
Olektron Corp., Dudley, Mass.
Philips Elctrns. Inds., Ltd., Toronto 17, Can.
Randam Elctrns., Inc., Cincinnati, Ohio
Relcom, Mt. View, Calif.
Special Microwave Devices Oper., Waltham, Mass.
Spectran Elctrns., Pompano Beach, Fla.
Trak Microwave, Tampa, Fla.
Varian Assocs., Palo Alto, Cal.
Varian Assocs.Electron Tube & Device Grp., Palo Alto, Cal.
Varian Assocs., Radiation Div., Palo Alto, Cal.
Velonex, Santa Clara, Calif.

Modulators, R-F

American Elctrn. Labs., Inc., Lansdale, Pa.
Amp Inc., Elizabethtown, Pa.
Applied Microwave Lab., Andover, Mass. ..... p 599
Arra Inc., Bayshore, N.Y.
Del Elctrns. Corp., Mt. Vernon, N.Y.
Elctrn. Enterprises, Newark, N.J.
General Magnetics, Bloomfield, N.J.
Hewlett-Packard, Palo Alto, Cal.
Hybrid Sys. Corp., Burlington, Mass.
Microwave Cavity Labs., La Grange, Ill.
Multitech Power Sys., Costa Mesa, Cal. p 816
RCA Elctrns. Comps., Harrison, N.J.
R L C Elctrns., Inc., Mt. Kisco, N.Y.
Solid State Elctrns., Sepulveda, Cal.
Summit Engrg. Corp., Bozeman, Mont.
Vari-L Co., Inc., Denver, Colo. .... p 1568
Aertech Inds., Sunnyvale, Calif.
AMBAC Inds., Garden City, N.Y.
Anaren Microwave, Inc., Syracuse, N.Y.
Anzac Elctrns., Waltham, Mass.
Artech Corp., Falls Church, Va.
CCA Elctrns. Corp., Gloucester, N.J.
Collins Radio Co., Dallas, Tex.
Defense Elctrns., Inc., Rockville, Md.
Dynair Elctrns. Inc., San Diego, Calif.
Elcom Sys., Deer Pk., N.Y.
Elctrn. Specialty, Thomaston, Conn.
Energy Systems, Palo Alto, Cal.
General Dynamics, San Diego, Cal.
General Instr. Corp., Hicksville, N.Y.
General Microwave Corp., Farmingdale, N.Y.
Goodyear Aerospace Corp., Akron, Ohio
GTE Lenkurt Inc., San Carlos, Calif.
Herley Inds., Inc., Syosset, N.Y.
Hughes Aircraft Co, Culver City, Cal.
Hyletronics Corp., Littleton, Mass.
Jerrold Elctrns. Corp., Philadelphia, Pa.
Jerrold/Watkins Div., Toronto, 395, Ont., Can.
Loral Elctrn. Sys., Bronx, N.Y.
Micro-Tel Corp., Baltimore, Md.
Microwave Assocs., Inc., Burlington, Mass.
Narda Microwave Corp., Plainview, N.Y.
Neptune Elctrns. Co., New York, N.Y.
Olektron Corp., Dudley, Mass.
Philco-Ford Corp., Washington, D.C.
Philips Elctrns. Inds., Ltd., Toronto 17, Can.
Piconics Inc., Tyngsboro, Mass.
Premier Microwave, Port Chester, N.Y.
Relcom, Mt. View, Calif.
RF Communications, Inc., Rochester, N.Y.
Rodelco, Deer Park, N.Y.
Rohde & Schwarz Sls., Passaic, N.J.
Special Microwave Devices Oper., Waltham, Mass.
Spectran Elctrns., Pompano Beach, Fla.
Tel-Instr. Elctrns. Corp., Carlstadt, N.J.
Varian Assocs., Palo Alto, Cal.
Varian Assocs.Electron Tube & Device Grp., Palo Alto, Cal.
Varian Assocs., Radiation Div., Palo Alto, Cal.

Modulators, Telemetering

Almond Instrs. Co., Covina, Cal
Data-Control Systems, Danbury, Conn. p 345
General Magnetics, Bloomfield, N.J.
Lorch-Adret Corp., Englewood, N.J.
Natel Engrg. Co., Canoga Pk., Cal.
Solid State Elctrns., Sepulveda, Cal.
Sonex, Inc., Bethayres, Pa. ..... p 955
Vega Precision Labs., Vienna, Va.
Aertech Inds., Sunnyvale, Calif.
AMBAC Inds., Garden City, N.Y.
Anaren Microwave, Inc., Syracuse, N.Y.
Aydin Data Systems, Ft. Washington, Pa
Elcom Sys., Deer Pk., N.Y.
General Dynamics, San Diego, Cal.
Hughes Aircraft Co, Culver City, Cal.
Lear Siegler, Inc., Santa Monica, Calif.
Noble Elctrns., Inc., Carpinteria, Calif.
Philco-Ford Corp., Washington, D.C.

Modulators, TV

RHG Elctrns. Lab., Farmingdale, N.Y.
Blonder-Tongue Labs., Inc., Old Bridge, N.J.
Dynair Elctrns. Inc., San Diego, Calif.
Electronics Missiles & Comms., White Haven, Pa.
Hughes Aircraft Co, Culver City, Cal.
Jerrold/Watkins Div., Toronto, 395, Ont., Can.
Multi Media Engrg., Inc., Rockville, Md.
Nelson-Hershfield Elctrns., Phoenix, Ariz.
Olektron Corp., Dudley, Mass.
Rodelco, Deer Park, N.Y.
Tel-Instr. Elctrns. Corp., Carlstadt, N.J.
VIKOA, Hoboken, N.J.
Olektron Corp., Dudley, Mass.

Modulators, Vibrating Capacitor

Dynamic Instr. Corp., Plainview, N.Y.
Stevens-Arnold, Inc., So. Boston, Mass.
Hughes Aircraft Co, Culver City, Cal.

Modules, Logic (Encapsulated)-Also See Cards; Circuits; Networks

A. D. Data Sys., Inc., Rochester, N.Y.
American Aerospace Controls, Farmingdale, N.Y.
Astrosystems, Lake Success, N.Y. p 333
Clairex Elctrns., Mt. Vernon, N.Y.
Columbia Components, Hempstead, N.Y.
Computer Devices, Commack, N.Y.
Computer Prods., Ft. Lauderdale, Fla. p 341
Datacom, Inc., Ft. Walton Bch., Fla.
DDC, Hicksville, N.Y. ..... p 347
Digital Equip. Corp., Maynard, Mass. p 348
Digitron Corp., Norristown, Pa.
Douglas Randall Div., Pawcatuck, Conn.
Dynage, Bloomfield, Conn.
Mepco, Inc., Morristown, N.J.
Penn Airborne Prods., Southampton, Pa.
Sealectro Corp., Mamaroneck, N.Y.
Solid State Elctrns., Sepulveda, Cal.
Sprague Elec. Co., No. Adams, Mass.
Tempo/UTI Div., Chatsworth, Cal.
Transmagnetics Inc., Farmingdale, N.Y.
Allegri-Tech, Inc., Nutley, N.J.
American Elec. Cable Co., Holyoke, Mass.
Analogic, Wakefield, Mass.
Atlantic Instrs. Corp., Watertown, Mass.
Aydin Data Systems, Ft. Washington, Pa
Barger Corp., Sunnyvale, Cal.
Beckman Instrs., Helipot Div., Fullerton, Cal.
Bell & Howell Co., Pasadena, Calif.
Burr-Brown Resch. Corp., Tucson, Ariz.
Control Logic, Natick, Mass.
Cordover, Carl & Co., Mineola, N.Y.
Data Technology Corp., Palo Alto, Cal.
De-Tec-Tronic Corp., Chicago, Ill.
Elctrn. Modules Corp., Timonium, Md.
Forbes & Wagner, Inc., Silver Creek, N.Y.
Goodyear Aerospace Corp., Akron, Ohio
Houston Scientific Inds., Inc., Houston, Tex
Hughes Aircraft Co, Culver City, Cal.
Instrumentation Tech. Corp., Northridge, Calif.
Iso-Switch Corp., Costa Mesa, Cal.
Isotech Inc., Westford, Mass.
ITT Semiconductors, W. Palm Beach, Fla.
Kentrox Inds., Inc., Portland, Ore.
Lear Siegler, Inc., Santa Monica, Calif.
Lecroy Resch. Sys. Corp., West Nyack, N.Y.
Lehigh Valley Elctrn., Inc., Fogelsville, Pa.
Loral Elctrn. Sys., Bronx, N.Y.
Matrix Sys. Corp., Chatsworth, Cal.
Midland Standard Inc., Elgin, Ill.
Monitor Sys., Inc., Ft. Washington, Pa.
Motorola Semiconductor Prods., Phoenix, Ariz.
Mullard, Inc., Farmingdale, N.Y.
National Acme, Cleveland, Ohio
PECO, Milpitas, Cal.
Sensor Corp., Greenwich, Conn.
Signetics Corp., Sunnyvale, Calif.
Singer-General Precision, Inc., Little Falls, N.J.
Standard Logic, Santa Ana, Cal.
Struthers-Dunn, Inc., Bettendorf, Iowa
Superior Elec., Bristol, Conn.
Tenor Co., Inc., New Berlin, Wisc.
Theta Instr. Corp., Fairfield, N.J.
Tyco Instr. Div., Waltham, Mass.
Varian Data Machines, Irvine, Cal.
Xerox Data Sys., El Segundo, Cal

Moisture Indicators—See Indicators, Moisture

Monitors, Frequency

Airpax Elctrns., Inc., Cambridge, Md.
American Time Products, Woodside, N.Y.
Austron, Inc., Austin, Tex.
Autronics Corp., Pasadena, Calif.
Bramco Controls, Piqua, Ohio .... p 1406
Bulova Watch Elctrns. Div. Amer. Time Prods., Woodside, N.Y.
Diversified Elctrns., Evansville, Ind
Douglas Randall Div., Pawcatuck, Conn.
Frequency Engrg. Labs., Farmingdale, N.J. ..... p 604
Hewlett-Packard, Palo Alto, Cal.
Hi-G, Windsor Locks, Conn. ..... p 1326
ISC Magnetics Div., Huntington, N.Y.
Kratos Instrument Div., Pasadena, Cal
Logitek, Inc., Farmingdale, N.Y. p 1338,1750,1759
LVC Ind's., Inc., Corona, N.Y.
Nelson Ross Elctrns., Lake Success, N.Y.
Polarad Elctrn. Instrs., Lake Success, N.Y.
Solid State Elctrns., Sepulveda, Cal.
A & M Instrument, Inc., Great Neck, N.Y.
Allied Elctrns. Corp., Chicago, Ill.
AMF Electical Prods., Alexandria, Va.
AMF Electrosystems Div., Vandalia, Ohio
Arco Systems Inc., Palo Alto, Cal
Automatic Switch Co., Florham Park, N.J.
CCA Elctrns. Corp., Gloucester, N.J.
Collins Radio Co., Dallas, Tex.
Dynalco Corp., Ft. Lauderdale, Fla.
Dynamic Controls Corp., S. Windsor, Conn.
Esterline Angus Div., Indianapolis, Ind.
General Microwave Corp., Farmingdale, N.Y.
General Radio Co., Concord, Mass.
Hughes Aircraft Co, Fullerton, Cal.
Lampkin Labs., Inc., Bradenton, Fla.
MCG Elctrns., Inc., Deer Park, N.Y.
Meson Elctrns. Co., Inc., Rochester, N.Y.
Metron Instrs., Inc., Denver, Colo.
Philco-Ford Corp., Washington, D.C.
RCA Corp., Camden, N.J.
Sola Elec. Div., Elk Grove Village, Ill.
Somerset Radiation Lab., Arlington, Va.
Spectral Dynamics Corp. San Diego, San Diego, Cal.
Struthers-Dunn, Inc., Bettendorf, Iowa
Tempo Instr., Plainview, N.Y.
Video Resch. Corp., Rockville, Md.
Wilkinson Elctrns., Woodlyn, Pa.
Zehntel, Inc., Berkeley, Calif.

Monitors, Humidity—See Indicators, Humidity

Monitors, Laser Energy

Dynarad, Inc., Norwood, Mass.
United Detector Tech., Santa Monica, Cal. ..... p 1639
Abtronics, Inc., Livermore, Calif.
Arco Systems Inc., Palo Alto, Cal
Brower Laboratories, Inc., Waltham, Mass.
Cintra Physics Int'l., Sunnyvale, Cal.
Datalight Inc., Bloomfield, Conn.
EG & G, Inc., Salem, Mass.
EG&G, Inc., Electro-Optics Div., Salem, Mass.
Electrophysics Corp., Nutley, N.J.
Gamma Sci., San Diego, Cal.
GCO, Inc., Ann Arbor, Mich
Hadron Inc., Westbury, N.Y.
Hughes Aircraft Co, Culver City, Cal.
International Light, Newburyport, Mass.
Korad Mat'ls. Sys. Div., Santa Monica, Cal.
Molectron Corp., Sunnyvale, Cal.
Photon Sources, Inc., Ann Arbor, Mich.
Quantronix Corp., Smithtown, N.Y.
Raytheon Co., Waltham, Mass.
Resalab Inc., Advanced Development Lab., Los Angeles, Cal.
Spectra-Physics, Inc., Mountain View, Calif.
TRW Instrs., El Segundo, Cal.

Monitors, Line & Program

LVC Ind's., Inc., Corona, N.Y.
Melcor Elctrns. Corp., Farmingdale, N.Y.
RCA Elctrns. Comps., Harrison, N.J. p 551
Veeder-Root, Hartford, Conn.
Altec, Anaheim, Calif.
Applied Systems Corp., Detroit, Mich
Collins Radio Co., Dallas, Tex.
Ferranti Ltd., Hollinwood, Lancs., England
Fiber Photics, Inc., Santa Cruz, Cal.
Iso-Switch Corp., Costa Mesa, Cal.
Private Tele-Comms., Inc., Chicago, Ill.
Stoelting Co., Chicago, Ill.
Wilkinson Elctrns., Woodlyn, Pa.

Monitors, Modulation

Hewlett-Packard, Palo Alto, Cal.
Marconi Instrs., Englewood, N.J... p 520
CCA Elctrns. Corp., Gloucester, N.J.
Collins Radio Co., Dallas, Tex.
Fairchild Electro-Metrics, Amsterdam, N.Y.
Hughes Aircraft Co, Culver City, Cal.
Lampkin Labs., Inc., Bradenton, Fla.
Metron Instrs., Inc., Denver, Colo.
Microwave/Sys., Inc., E. Syracuse, N.Y.
Sage Labs. Inc., Natick, Mass.
Wilkinson Elctrns., Woodlyn, Pa.

Monitors, Nuclear Radiation

General Elec. Co., Schenectady, N.Y.
(NES) Nationwide Elctrn. Sys., Itasca, Ill.
Victoreen Instr., Cleveland, Ohio
Abtronics, Inc., Livermore, Calif.
Avco Corp., Cincinnati, Ohio
Beckman Instrs., (AISSD), Fullerton, Cal.
Eberline Instr. Corp., Santa Fe, N.M.
Harshaw Chem. Co., Cleveland, Ohio
Hughes Aircraft Co, Malibu, Cal.
Johnston Labs., Inc., Cockeysville, Md.
Nuclear-Chicago, Des Plaines, Ill.
Nuclear Diodes, Prairie View, Ill.
Nuclear Equip. Chem. Corp., Farmingdale, N.Y.
Nuclear Meas. Corp., Indianapolis, Ind.
Rank Precision Inds., W. Nyack, N.Y.
Soltec Corp., No. Hollywood, Cal.
Universal Transistor Prods., Copiague, N.Y.
Westinghouse Elec. Corp., Pittsburgh, Pa.

Monitors, Phase-Angle

Betamite Electronic Devices, Culver City, Calif.
Calico Div., San Diego, Cal.
Dranetz Engrg. Labs., Plainfield, N.J. p 435,438
Hewlett-Packard, Palo Alto, Cal.
Lorch-Adret Corp., Englewood, N.J.
North Atlantic Inds., Plainview, N.Y. p 531
Ohio Semitronics, Columbus, Ohio p 533
RFL Inds., Instr. Div., Boonton, N.J.
Solid State Elctrns., Sepulveda, Cal.
Trio Labs, Inc., Plainview, N.Y.
Universal Ad-Yu Elctrns., Inc., Passaic, N.J. ..... p 579
A & M Instrument, Inc., Great Neck, N.Y.
AMF Electrosystems Div., Vandalia, Ohio
NH Research, Inc., Santa Ana, Calif.
Philips Elctrns. Inds., Ltd., Toronto 17, Can.
Rantec Div., Calabasas, Calif.
Spectral Dynamics Corp. San Diego, San Diego, Cal.
Theta Instr. Corp., Fairfield, N.J.
Video Resch. Corp., Rockville, Md.
Wiltron Co., Palo Alto, Calif.

Monitors, Phase Sequence & Loss

Associated Resch., Chicago, Ill.
Diversified Elctrns., Evansville, Ind p 1684
Hi-G, Windsor Locks, Conn. p 1326,1327
Logitek, Inc., Farmingdale, N.Y. p 1338,1750,1752,1757,1759
AMF Electrosystems Div., Vandalia, Ohio

Monitors, Power, A-C & D-C

American Aerospace Controls, Farmingdale, N.Y. .....p 1304,1305
Betamite Electronic Devices, Culver City, Calif.
Diversified Elctrns., Evansville, Ind p 1684
Hi-G, Windsor Locks, Conn. p 1328,1329
Ind'l. Test Equip., Port Washington, N.Y.
Kratos Instrument Div., Pasadena, Cal
Logitek, Inc., Farmingdale, N.Y. p 1338,1750,1751,1758
(NES) Nationwide Elctrn. Sys., Itasca, Ill.
Ohio Semitronics, Columbus, Ohio p 533

Rustrak Instr. Div., Manchester, N.H.
Scientific Columbus, Columbus, Ohio
Simpson Elec. Co., Chicago, Ill.
A & M Instrument, Inc., Great Neck, N.Y.
Active Control Instrumentation, E. Northport, NY
AMF Electrosystems Div., Vandalia, Ohio
Applied Control Co., Fairfield, N.J.
Applied Systems Corp., Detroit, Mich
Bogue Elec. Mfg. Co., Paterson, N.J.
Cal-Power Corp., El Segundo, Calif.
CGS Units, Inc., Rochester, N.Y.
Components Specialties, Inc., Freeport, N.Y.
Controlotron Corp., Farmingdale, N.Y.
Dynamic Controls Corp., S. Windsor, Conn.
Elctrns., Ltd., Marion, Iowa
Esterline Angus Div., Indianapolis, Ind.
Ferranti Elec., Inc., Plainview, N.Y.
Halmar Elctrns., Inc., Columbus, Ohio
Lark Elctrns., Inc., New York, N.Y.
MEKontrol Inc., Northboro, Mass.

Monitors, Power, A-F

Bulova Watch Co., Servo Prods. Elctrns. Div., Woodside, N.Y.
Dranetz Engrg. Labs., Plainfield, N.J.
ISC Magnetics Div., Huntington, N.Y.
Melcor Elctrns. Corp., Farmingdale, N.Y.
Multitech Communications, Monterey Pk., Cal. ..... p 324
AUL Instrs., Inc., Flushng, N.Y.
Collins Radio Co.; Dallas, Tex.
Halmar Elctrns., Inc., Columbus, Ohio
Nelson-Hershfield Elctrns., Phoenix, Ariz.
NH Research, Inc., Santa Ana, Calif.

Monitors, Power, R-F

Bendix, Franklin, Ind. ..... p 1555
Bird Elctrn., Cleveland, Ohio..... p 421
Hewlett-Packard, Palo Alto, Cal.
Astrolab Inc., Linden, N J
Aviel Electronics Inc, Burbank, Calif.
Collins Radio Co., Dallas, Tex.
Farinon Electric, San Carlos, Calif.
General Microwave Corp., Farmingdale, N.Y.
GRFF, Port Salerno, Fla.
Guide Inds., Inc., Sun Valley, Calif.
Hyletronics Corp., Littleton, Mass.
Maury Microwave Corp., Cucamonga, Calif.
Microwave Filter Co., Inc., East Syracuse, N.Y.
Pacific Meas., Inc., Palo Alto, Calif.
Philco-Ford Corp., Washington, D.C.
PRD Elctrns., Inc., Westbury, N.Y.
Rafec Elctrns., Temple City, Calif.
Rank Precision Inds., W. Nyack, N.Y.
Southern Avionics Co., Beaumont, Tex.
Struthers Elctrns. Corp., Mamaroneck, N.Y.
Telonic Inds., Inc., Laguna Beach, Calif.

Monitors, Pulse Code Modulation

(NES) Nationwide Elctrn. Sys., Itasca, Ill.
Sonex, Inc., Bethayres, Pa.
Aydin Data Systems, Ft. Washington, Pa
Wiltron Co., Palo Alto, Calif.

Monitors, Tape-Recorder

A. D. Data Sys., Inc., Rochester, N.Y.
Calico Div., San Diego, Cal.
Data-Control Systems, Danbury, Conn.
Auricord, Long Island City, N.Y.
Avionics Resch. Prods., Los Angeles, Calif.
California Instrs. Co., San Diego, Cal.
Computer Mate, Inc., San Clemento, Cal
Concord Elctrns., Los Angeles, Cal.
Echo Science Corp., Pasadena, Cal.
Lockheed Aircraft Svce., Special Devices Div., Ontario, Calif.
Merchant, Robert C. Co., Carmel Valley, Calif.
Video Resch. Corp., Rockville, Md.
Vu-data Corp., San Diego, Cal.
Wolff Industries, San Marino, Cal

Monitors, Temperature-Also See Controls, Temperature

—See Vol 2

Monitors, Video

Beta Instr., Newton Upper Falls, Mass.
Calico Div., San Diego, Cal.
Circon Corp., Goleta, Cal.
Gould, Inc., Cleveland, Ohio
Hewlett-Packard, Palo Alto, Cal.
Infodex, Inc., Waterbury, Conn.... p 498
Tektronix, Inc., Beaverton, Ore.
Ampex Corp., Redwood City, Calif.
Arco Systems Inc., Palo Alto, Cal
Audiotronics, N. Hollywood, Cal.
Aydin Data Systems, Ft. Washington, Pa
Cohu Elctrns., Inc., San Diego, Calif.
Concord Elctrns., Los Angeles, Cal.
Conrac Corp., New York, N.Y.
Conrac Div., Covina, Calif.
Edo Western Corp., Salt Lake City, Utah
Ferranti Elec., Inc., Plainview, N.Y.
Four-Phase Sys, Cupertino, Cal
GBC Closed Circuit TV Corp., New York, N.Y.
General Instr. Corp., Hicksville, N.Y.
Goodyear Aerospace Corp., Akron, Ohio
GTE Sylvania Inc., Seneca Falls, N.Y.
International Scanatron Sys., Wyandanch, N.Y.
ITI Electronics, Inc., Clifton, N.J.
Lear Siegler, Inc., Santa Monica, Calif.
Lear Siegler, Anaheim, Cal.
Link Div., Binghamton, N.Y.
Litton Inds., San Carlos, Calif.
Multi Media Engrg., Inc., Rockville, Md.
Nelson-Hershfield Elctrns., Phoenix, Ariz.
Philips Broadcast Equipment Corp., Montvale, N.J.
RCA Corp., Camden, N.J.
Rohde & Schwarz Sls., Passaic, N.J.
Shibaden Corp. Amer., Woodside, N.Y.
Thomson-CSF Inc., New York, N.Y.
VIKOA, Hoboken, N.J.
Vu-data Corp., San Diego, Cal.
Westinghouse Elec., Pittsburgh, Pa.

Monitors, Voltage

A. D. Data Sys., Inc., Rochester, N.Y.
Airpax Elctrns., Cambridge, Md.
Airpax Elctrns., Ft. Lauderdale, Fla. p 1308
American Aerospace Controls, Farmingdale, N.Y. ..... p 1306
API Instrs. Co., Waltham,, Mass.
Betamite Electronic Devices, Culver City, Calif.
Bulova Watch Co., Servo Prods. Elctrns. Div., Woodside, N.Y.
California Elctrn. Mfg. Co., Alamo, Calif. p 1315
Diversified Elctrns., Evansville, Ind p 1684,1685
Dranetz Engrg. Labs., Plainfield, N.J.
Hewlett-Packard, Palo Alto, Cal.
Hi-G, Windsor Locks, Conn.
ISC Magnetics Div., Huntington, N.Y.
Ithaco, Inc., Ithaca, N.Y. ..... p 1287
Logitek, Inc., Farmingdale, N.Y. p 1338,1750,1751,1758
(NES) Nationwide Elctrn. Sys., Itasca, Ill.
Ohio Semitronics, Columbus, Ohio
PPM, Inc., Bedford, Ohio
SRC Div., Newport Bch., Cal.
Tektronix, Inc., Beaverton, Ore.
Trio Labs, Inc., Plainview, N.Y.
A & M Instrument, Inc., Great Neck, N.Y.
Active Control Instrumentation, E. Northport, NY
AMF Electical Prods., Alexandria, Va.
AMF Electrosystems Div., Vandalia, Ohio
Amprobe Instr., Lynbrook, N.Y.
Automatic Switch Co., Florham Park, N.J.
Bogue Elec. Mfg. Co., Paterson, N.J.
Brower Laboratories, Inc., Waltham, Mass.
Components Specialties, Inc., Freeport, N.Y.
Controlotron Corp., Farmingdale, N.Y.
Delta-Tronics Corp., Tempe, Ariz.
Doric Sci. Corp., San Diego, Calif.
Dynamic Controls Corp., S. Windsor, Conn.
Elctrns., Ltd., Marion, Iowa
General Microwave Corp., Farmingdale, N.Y.
Gralex Inds., Inc., Farmingdale, N.Y.
Halmar Elctrns., Inc., Columbus, Ohio
Industrial Inventions, Inc., Monmouth Jct., N.J.
Mag-Con Engrg. Co., St. Paul, Minn.
Maytronics, Inc., Colorado Springs, Colo.
MCG Elctrns., Inc., Deer Park, N.Y.
Mennen-Greatbatch Elctrns., Inc., Clarence, N.Y.
Microlab/FXR, Livingston, N.J.
Microwave Magnetics Inc., Danvers, Mass.
NH Research, Inc., Santa Ana, Calif.
Princeton Applied Resch. Corp., Princeton, N.J.
Rochester Instr. Sys., Rochester, N.Y.
Sigma Instrs., Inc., Braintree, Mass.
Sola Elec. Div., Elk Grove Village, Ill.
Struthers-Dunn, Inc., Bettendorf, Iowa
Waber Elctrns., Inc., Philadelphia, Pa.

Monitors, Waveform—See Oscilloscopes

Mos Circuits—See Circuits, Integrated, Metal Oxide Silicon—Vol 2

Motion Simulators—See Simulators, Motion

Motor & Generator Armatures, Rotors, Stators —See Vol 2

Motor Electric Generator Sets

Bowmar Instr. Corp., Ft. Wayne, Ind. p 1582
CML-Macarr, Inc., Edison, N.J. ..... p 665
EEMCO Div., Los Angeles, Cal. .. p 1590
General Elec. Co., Schenectady, N.Y.
Georator Corp., Manassas, Va. p 722,723
HICO (Horizons Int'l.), Redwood City, Cal
Vernitron Corp., Deer Pk., N.Y.
Ajax Magnethermic Corp., Warren, Ohio
Allis-Chalmers, Milwaukee, Wisc.
Allis, Louis Co., Milwaukee, Wisc.
American Elctrns., Inc., Fullerton, Cal.
AMF Electrosystems Div., Vandalia, Ohio
Barger Corp., Sunnyvale, Cal.
Bludworth Marine Div., Linden, N.J.
Bogue Elec. Mfg. Co., Paterson, N.J.
Carter Motor Co., Chicago, Ill.
Century Elec. Co., St. Louis, Mo.
Clifton Div., Clifton Hgts., Pa.
Columbia Elec. Mfg. Co., Cleveland, Ohio
Continental Elec., Newark, N.J.
Detroit Diesel Allison Div., Detroit, Mich.
Electric Indicator Co., Inc., Wilton, Conn.
Electric Machinery Mfg. Co., Minneapolis, Minn.
Electro-Craft Corp, Hopkins, Minn
Elctrn. Specialty, Thomaston, Conn.
General Dynamics, San Diego, Cal.
Horlick, William I. Co., Inc., Boston, Mass.
Ideal Elec. & Mfg. Co., Mansfield, Ohio
Japanese Prods. Corp., New Rochelle, N.Y.
Kato Engrg. Co., Mankato, Minn.
Katolight Corp., Mankato, Minn.
Lear Siegler, Inc., Santa Monica, Calif.
Lincoln Elec. Co., Cleveland, Ohio
Motor Generator Div., Troy, Ohio
MPC Prods. Corp., Chicago, Ill.
Phoenix Materials Corp., Kittanning, Pa.
Porter, H.K. Co., Inc., Pittsburgh, Pa.
Rae Motor Corp., McHenry, Ill.
Reliance Elec. Co., Cleveland, Ohio
Singer Co., Somerville, N.J.
Singer-General Precision, Inc., Little Falls, N.J.
Task Corp., Anaheim, Calif.
Technical Mat'l., Mamaroneck, N.Y.
Teledyne Inet, Gardena, Cal.
Tocco Div., Cleveland, Ohio
Western Gear Corp., Pasadena, Cal.
Westinghouse Elec. Corp., Pittsburgh, Pa.
Westinghouse Elec. Corp., Pittsburgh, Pa.
Yaskawa Elec. America, Inc., Oak Brook, Ill.

Motor Speed Drives—See Controls, Motor Speed—Vol 2

Motor Tachometer Generators—See Tachometers, Electrical (Self-Generating)—Vol 2

Motor-Units, Multiple—See Vol 2

Motors, Brushless, D-C—See Vol 2

Motors, Clock & Timing—See Vol 2

Motors, Control—See Vol 2

Motors, Drag Cup—See Vol 2

Motors, Gearhead—See Vol 2

Motors, Gyro—See Vol 2

Motors, Hysteresis—See Vol 2

Motors, Incremental, Stepping —See Motors, Stepping—Vol 2

Motors, Induction—See Vol 2

Motors, Miniature—See Motors, Fractional Hp—Vol 2

Motors, Permanent Magnet—See Vol 2

Motors, Selsyn—See Motors, Synchronous—Vol 2

Motors, Servo Electric—See Vol 2

Motors, Squirrel Cage—See Vol 2

Motors, Stepping—See Vol 2

Motors, Synchronous—See Vol 2

Motors, Synchronous, Polarized—See Motors, Snychronous—Vol 2

Motors, Timing—See Motors, Clock & Timing—Vol 2

Motors, Torque—See Vol 2

Motors, Universal, A-C Or D-C Operation—See Vol 2

Motors, Vacuum—See Vol 2

Mounts, Antenna (Nonconsumer Applications)

American Elctrn. Labs., Inc., Lansdale, Pa.
Electro-Mechanics Co., Austin, Tex.
GC Elctrns., Rockford, Ill.
Geo Space Sys., Tampa, Fla. ..... p 608
Abalon Precision Mfg. Corp., Bronx, N.Y.
Adronics, Inc., Cedar Grove, N.J.
Aeroflex Labs., Plainview, N.Y.
Ainslie Corp., S. Braintree, Mass.
Barry Controls, Watertown, Mass.
Brooks & Perkins, Inc., Livonia, Mich.
Clifton Div., Clifton Hgts., Pa.
Collins Radio Co., Dallas, Tex.
Connor Spring & Mfg. Co., San Jose, Cal.
Craig Sys. Corp., Lawrence, Mass.
Decibel Prods., Inc., Dallas, Tex.
Fastex Div., Des Plaines, Ill.
Granite State Machine Co., Inc., Manchester, N.H.
Hughes Aircraft Co, Culver City, Cal.
Hughes Aircraft Co, Fullerton, Cal.
IE Mfg. Co., Chicago, Ill.
K-W Engrg. Works, Menomonee Falls, Wisc.
Lord Mfg. Co., Erie, Pa.
Master Mobile Mounts, Fort Myers, Fla.
Microflect Co., Salem, Ore.
Miller R.A. Inds., Inc., Grand Haven, Mich.
New-Tronics Corp., Brookpark, Ohio
Nurad, Inc., Baltimore, Md.
Phelps Dodge Comm., North Haven, Conn.
Philco-Ford Corp., Washington, D.C.
Premax Prods. Div., Niagara Falls, N.Y.
Prodelin, Inc., Hightstown, N.J.
R-Columbia Prods., Inc., Highland Park, Ill.
Radiation Sys., Inc., McLean, Va.
RF Systems, Inc., Cohasset, Mass.
Rohn Mfg. Co., Peoria, Ill.
S & A Elctrns., Inc., Toledo, Ohio
Scientific-Atlanta, Inc., Atlanta, Ga.
Sinclair Radio Labs., Maple, Ont., Can.

Sitco Antennas, Portland, Ore.
Struthers Elctrns. Corp., Mamaroneck, N.Y.
TACO Div., Sherburne, N.Y.
TRG Prods., E. Boston, Mass.
Tri-Ex Tower Corp., Visalia, Calif.
Victor Microwave, Inc., Wakefield, Mass.

Mounts, CRT & Accessories—
See Vol 2

Mounts, Crystal
American Elctrn. Labs., Inc., Lansdale, Pa.
E & M Labs., Westlake Village, Cal.
Electro/Data, Inc., Garland, Tex.
Hewlett-Packard, Palo Alto, Cal.
Waveline, Inc., W. Caldwell, N.J.
Accurate Elctrns. Corp., Elyria, Ohio
Aircom, Inc., Union, N.H.
CES Elctrns., Brooklyn, N.Y.
ESCA, Jupiter, Fla.
General Microwave Corp., Farmingdale, N.Y.
GRFF, Port Salerno, Fla.
Herley Inds., Inc., Syosset, N.Y.
Isotronics, Inc., New Bedford, Mass.
Maury Microwave Corp., Cucamonga, Calif.
MCS Corp., Monrovia, Calif.
MI-KRO Connector Div., Long Island City, N.Y.
Microlab/FXR, Livingston, N.J.
Microphase Corp., Cos Cob, Conn.
Microwave Assocs., Inc., Burlington, Mass.
Microwave Development Labs., Inc., Needham Hgts., Mass.
Microwave Labs. America, Brooklyn, N.Y.
Omega Labs., Inc., Rowley, Mass.
Pan American Trade Dev., New York, N.Y.
PRD Elctrns., Inc., Westbury, N.Y.
Premier Microwave, Port Chester, N.Y.
Robinson-Nugent, New Albany, Ind.
Struthers Elctrns. Corp., Mamaroneck, N.Y.
Thomson-CSF Electron Tubes, N.Y., N.Y.
TRG Prods., E. Boston, Mass.
Veritron West, Inc., Chatsworth, Calif.
Victor Microwave, Inc., Wakefield, Mass.
Waldom Elctrns., Inc., Chicago, Ill.

Mounts, Integrated Circuit—
See Sockets, Integrated Circuit—Vol 2

Mounts, Klystron—See Vol 2

Mounts, Microwave—
See Vol 2

Mounts, Mobile Antenna—See Mounts, Antenna

Mounts, Motor—See Vol 2

Mounts, Shock & Vibration—
See Vol 3

Mounts, Tape Head
Int'l. Electro-Magnetics, Palatine, Ill. p 310,311
Nortronics, Mpls., Minn.
Auricord, Long Island City, N.Y.

Mounts, Thermistor—
See Vol 2

Mounts, Transistor—See Pads, Transistor Mounting—Vol 2

MSI Circuits—See Circuits, Medium Scale Integration—Vol 2

Multiplexers (Excluding Hi-Fi)
A. D. Data Sys., Inc., Rochester, N.Y. p 328
Allen-Bradley Co., Milwaukee, Wisc.
American Astrionics, Hollywood, Cal
American Elctrn. Labs., Inc., Lansdale, Pa.
American Nucleonics Corp., Woodland Hills, Cal
Applied Research Inc., Port Washington, N.Y. p 1554
Astrosystems, Lake Success, N.Y. p 332
Beckman Instruments, Shiller Pk., Ill.
Bendix Environmtl. Sci., Baltimore, Md. p 336
Computer Labs, Greensboro, N.C. p 342,343
Computer Prods., Ft. Lauderdale, Fla.
Data-Control Systems, Danbury, Conn.
DDC, Hicksville, N.Y.
Digital Equip. Corp., Maynard, Mass.
E & M Labs., Westlake Village, Cal.
Eldorado Electrodata, Concord, Cal.
Frequency Engrg. Labs., Farmingdale, N.J. p 605
Hughes Aircraft Co., Mos Div., Newport Beach, Cal. p 1541
Hybrid Sys. Corp., Burlington, Mass.
Interstate Elctrns. Corp., Anaheim, Cal.
London Co., Cleveland, Ohio
Lorch Elctrns. Corp., Englewood, N.J.
Monitor Labs, Inc., San Diego, Cal.
Multitech Automation Prods., Monterey Pk., Cal. p 362
(NES) Nationwide Elctrn. Sys., Itasca, Ill.
PPM, Inc., Bedford, Ohio
Preston Scientific, Anaheim, Cal. p 373
Raytheon Computer, Santa Ana, Cal. p 374,375
Solid State Elctrns., Sepulveda, Cal.
Sonex, Inc., Bethayres, Pa. p 955
Tektronix, Inc., Beaverton, Ore.
Tempo/UTI Div., Chatsworth, Cal.
Transco Prods., Inc., Venice, Cal.
Trompeter Elctrns., Chatsworth, Cal.
Aerospace Resch. Inc., Boston, Mass.
American Data Sys., Canoga Pk., Cal
Analogic, Wakefield, Mass.
Applied Systems Corp., Detroit, Mich
Autocon Inds., Inc., St. Paul, Minn.
Automation Dynamics, Northvale, N.J.
Aydin Data Systems, Ft. Washington, Pa
Blonder-Tongue Labs., Inc., Old Bridge, N.J.
Burr-Brown Resch. Corp., Tucson, Ariz.
CGS/Datametrics, Watertown, Mass.
Codex Corp., Newton, Mass.
Cohu Elctrns., Inc., San Diego, Calif.
Collins Radio Co., Dallas, Tex.
Control Equip. Corp., New England, Lowell, Mass.
Data Technology Corp., Palo Alto, Cal.
Datum, Inc., Anaheim, Calif.
Dynalex, Inc., Burbank, Cal.
Elctrn. Comm., Inc., St. Petersburg, Fla.
Fairchild Semiconductor, Mountain View, Calif.
Ferranti Ltd., Hollinwood, Lancs., England
Fifth Dimension, Princeton, N.J.
General Devices, Inc., Princeton, N.J.
General Dynamics, San Diego, Cal.
General Instr. Corp., Hicksville, N.Y.
General Microwave Corp., Farmingdale, N.Y.
Gralex Inds., Inc., Farmingdale, N.Y.
Guide Inds., Inc., Sun Valley, Calif.
Gulton Inds., Albuquerque, N.M.
Harris Semiconductor, Melbourne, Fla.
Herley Inds., Inc., Syosset, N.Y.
Hughes Aircraft Co, Culver City, Cal.
Industrial Microwave, Scotch Plains, N.J.
ISC/Telephonics Div, Huntington, N.Y.
Iso-Switch Corp., Costa Mesa, Cal.
Lancer Elctrns. Corp., Norristown, Pa.
Lear Siegler, Inc., Santa Monica, Calif.
Lear Siegler, Anaheim, Cal.
Lehigh Valley Elctrn., Inc., Fogelsville, Pa.
Link Div., Binghamton, N.Y.
Lockheed Aircraft Svc., Ont., Cal.
Lockheed Aircraft Svce., Special Devices Div., Ontario, Calif.
Loral Elctrn. Sys., Bronx, N.Y.
Maury Microwave Corp., Cucamonga, Calif.
Merchant, Robert C. Co., Carmel Valley, Calif.
Microwave Development Labs., Inc., Needham Hgts., Mass.
Monitor Sys., Inc., Ft. Washington, Pa.
Nat'l. Midco Inds., Inc., Trenton, N.J.
Peninsula Microwave Labs., Mountain View, Cal.
Philco-Ford Corp., Washington, D.C.
Premier Microwave, Port Chester, N.Y.
Princeton Applied Resch. Corp., Princeton, N.J.
Rantec Div., Calabasas, Calif.
RCA Govt. & Comm. Sys., Moorestown, N.J.
REDCOR Corp., Woodland Hills, Cal.
Sage Labs. Inc., Natick, Mass.
Santa Barbara Resch. Ctr., Goleta, Calif.
Singer - Tele-Signal, Woodbury, N.Y.
Special Microwave Devices Oper., Waltham, Mass.
Systems Instrs. Resch., Inc., Atlanta, Ga.
Taft Electrosystems, Inc., Metuchen, N. J.
Telectro Sys. Corp., Corona, N.Y.
Teledyne Microwave, Sunnyvale, Cal.
Telonic Inds., Inc., Laguna Beach, Calif.
Teradyne, Inc., Boston, Mass.
Texscan Microwave Prods., Indianapolis, Ind.
Vetter, A.R., Co., Rebersburg, Pa
Video Resch. Corp., Rockville, Md.
Wavecom, Inc., Northridge, Cal.
Xerox Data Sys., El Segundo, Cal
Zeltex, Inc., Concord, Calif.
Zeta Labs., Inc., Mountain View, Calif.

Multipliers, Analog
American Aerospace Controls, Farmingdale, N.Y.
Clarke - Hess, New York, N.Y.
Elctrn. Assocs., W. Long Branch, N.J.
General Magnetics, Bloomfield, N.J. p 1318
Hybrid Sys. Corp., Burlington, Mass. p 1284
Intronics, Inc., Newton, Mass. .... p 1288
ISC Magnetics Div., Huntington, N.Y.
(NES) Nationwide Elctrn. Sys., Itasca, Ill.
Neff Instr. Corp., Duarte, Calif.
Precision Monolithics, Santa Clara, Cal.
Teledyne Philbrick, Dedham, Mass.
Transmagnetics Inc., Farmingdale, N.Y.
Analog Devices, Inc., Norwood, Mass.
Analogic, Wakefield, Mass.
Burr-Brown Resch. Corp., Tucson, Ariz.
Control Logic, Natick, Mass.
GPS Instr. Co., Framingham, Mass.
Moore Inds., Van Nuys, Cal.
Motorola Semiconductor Prods., Phoenix, Ariz.
Optical Elctrns., Tucson, Ariz.
Princeton Applied Resch. Corp., Princeton, N.J.
Silicon Gen'l., Inc., Westminster, Cal.
Zeltex, Inc., Concord, Calif.

Multipliers, Crystal
American Elctrn. Labs., Inc., Lansdale, Pa.
Hewlett-Packard, Palo Alto, Cal.
Lorch Elctrns. Corp., Englewood, N.J.
RHG Elctrns. Lab., Farmingdale, N.Y.
Collins Radio Co., Dallas, Tex.
Crystal Optics Resch., Inc., Ann Arbor, Mich.
General Microwave Corp., Farmingdale, N.Y.
Microlab/FXR, Livingston, N.J.
Microwave Development Labs., Inc., Needham Hgts., Mass.
Philips Elctrns. Inds., Ltd., Toronto 17, Can.
Sage Labs. Inc., Natick, Mass.
Trak Microwave, Tampa, Fla.
Zeta Labs., Inc., Mountain View, Calif.
Calabro Unitrack, Upper Darby, Pa.

Multipliers, Diode
American Elctrn. Labs., Inc., Lansdale, Pa.
Electro/Data, Inc., Garland, Tex.
Greenray Inds., Inc., Mechanicsburg, Pa.
Hewlett-Packard, Palo Alto, Cal.
Ind'l. Test Equip., Port Washington, N.Y.
RHG Elctrns. Lab., Farmingdale, N.Y.
Semtech Corp., Newbury Pk., Cal. p 1818
Transmagnetics Inc., Farmingdale, N.Y.
Anzac Elctrns., Waltham, Mass.
Applied Dynamics Computer Sys., Ann Arbor, Mich.
BF Elctrns., Solana Beach, Calif.
GPS Instr. Co., Framingham, Mass.
Guide Inds., Inc., Sun Valley, Calif.
Hyletronics Corp., Littleton, Mass.
Itek Corp., Lexington, Mass.
Microwave Assocs., Inc., Burlington, Mass.
Microwave Development Labs., Inc., Needham Hgts., Mass.
Microwave Prods., Inc., Chatsworth, Cal.
Olektron Corp., Dudley, Mass.
Relcom, Mt. View, Calif.
Sage Labs. Inc., Natick, Mass.
Special Microwave Devices Oper., Waltham, Mass.
Trak Microwave, Tampa, Fla.
Varian Assocs., Palo Alto, Cal.
Varian, Beverly, Mass.
Varo, Inc., Semiconductor Div., Garland, Tex.
Zeta Labs., Inc., Mountain View, Calif.

Multipliers, Frequency
American Elctrn. Labs., Inc., Lansdale, Pa.
Anadex Instrs., Inc., Van Nuys, Calif.
Applied Research Inc., Port Washington, N.Y. p 1554
Austron, Inc., Austin, Tex.
Bramco Controls, Piqua, Ohio
Electro/Data, Inc., Garland, Tex.
Frequency Elctrns., New Hyde Pk., N.Y.
Frequency Engrg. Labs., Farmingdale, N.J.
Frequency Sources, No. Chelmsford, Mass. p 1560
Greenray Inds., Inc., Mechanicsburg, Pa. p 607
Hewlett-Packard, Palo Alto, Cal.
Interstate Elctrns. Corp., Anaheim, Cal.
Lorch Elctrns. Corp., Englewood, N.J.
Matrix Corp., Beech Grove, Ind.
Meloy Laboratories, Springfield, Va.
Microwave Cavity Labs., La Grange, Ill.
Polarad Elctrn. Instrs., Lake Success, N.Y.
RHG Elctrns. Lab., Farmingdale, N.Y.
Sierra Sys., Mountain View, Cal.
Vari-L Co., Inc., Denver, Colo. .... p 1570
Addington Labs., Inc., Santa Clara, Calif.
Aerospace Resch. Inc., Boston, Mass.
Ajax Magnethermic Corp., Warren, Ohio
Anzac Elctrns., Waltham, Mass.
Applied Tech., Palo Alto, Cal.
Beukers Labs., Inc., Hauppauge, N.Y.
BF Elctrns., Solana Beach, Calif.
Collins Radio Co., Dallas, Tex.
Communication Elctrns., Rockville, Md.
Dittmore-Freimuth Corp., Milwaukee, Wisc.
Dynamic Precision Controls, Hagerstown, Ind.
Dynographic Elctrns. Corp., Hicksville, N.Y.
Electrac, Inc., Anaheim, Calif.
Elctrn. Svc., Verona, N.J.
Ferranti Ltd., Hollinwood, Lancs., England
FKS Comms., Inc., New Hyde Park, N.Y.
Guide Inds., Inc., Sun Valley, Calif.
Hughes Aircraft Co, Culver City, Cal.
Hughes Aircraft Co., Torrance, Cal.
Hyletronics Corp., Littleton, Mass.
Industrial Microwave, Scotch Plains, N.J.
Itek Corp., Lexington, Mass.
Koch Inds., Anaheim, Cal.
Korad Mat'ls. Sys. Div., Santa Monica, Cal.
Microcom Corp., Horsham, Pa.
Microlab/FXR, Livingston, N.J.
Micromega, Los Angeles, Cal.
Microwave Assocs., Inc., Burlington, Mass.
Microwave Development Labs., Inc., Needham Hgts., Mass.
Microwave Div, Nashua, N.H.
Microwave Filter Co., Inc., East Syracuse, N.Y.
Mini-Circuits Lab., Brooklyn, N.Y.
MITEQ, Inc., Hauppauge, N.Y.
Olektron Corp., Dudley, Mass.
Optical Elctrns., Tucson, Ariz.
Philco-Ford Corp., Washington, D.C.
PRD Elctrns., Inc., Westbury, N.Y.
Radiation Sys., Inc., McLean, Va.
Relcom, Mt. View, Calif.
RFL Inds., Comms. Div., Boonton, N.J.
Rohde & Schwarz Sls., Passaic, N.J.
Sage Labs. Inc., Natick, Mass.
Sanders Assocs., Nashua, N.H.
Scientific-Atlanta, Inc., Atlanta, Ga.
Special Microwave Devices Oper., Waltham, Mass.
Spectral Dynamics Corp. San Diego, San Diego, Cal.
Struthers Elctrns. Corp., Mamaroneck, N.Y.
Teledyne Inet, Gardena, Cal.
Teledyne Microwave, Sunnyvale, Cal.
Telonic Inds., Inc., Laguna Beach, Calif.
Trak Microwave, Tampa, Fla.
Varian Assocs., Palo Alto, Cal.

Varian Assocs.Electron Tube & Device Grp., Palo Alto, Cal.
Vectronics Microwave Corp., Middlesex, N.J.
Zeta Labs., Inc., Mountain View, Calif.

Multipliers, Hall—See Vol 2

Multipliers, Magnetic—See Vol 2

Multipliers, Meter

Del Elctrns. Corp., Mt. Vernon, N.Y. p 680
Mepco, Inc., Morristown, N.J.
Ross Engrg. Corp., Campbell, Cal.
Simpson Elec. Co., Chicago, Ill.
A & M Instrument, Inc., Great Neck, N.Y.
AMF Electical Prods., Alexandria, Va.
Edison Elctrns. Div., Manchester, N.H.
Esterline Angus Div., Indianapolis, Ind.
Hallmark Standards, Inc., Mt. Vernon, N.Y.
Philco-Ford Corp., Washington, D.C.
Sunshine Sci. Instrs., Inc., Philadelphia, Pa.
Weston Instruments, Inc., Newark, N.J.
Yewtec Corporation, Larchmont, N.Y.

Multipliers, Servo—See Vol 2

Nameplates—See Vol 3

Needles—See Styli

Networks, Crossover

Bulova Watch Co., Freq. Control Prods., Elctrns. Div., Woodside, N.Y.
Centralab, Elctrns., Milwaukee, Wisc.
Dale Elctrns., Inc., Columbus, Neb.
Frequency Engrg. Labs., Farmingdale, N.J.
Genisco Tech. Corp., Genistron Div., Compton, Cal.
Sennheiser Elctrn. Corp., New York, NY p 321
Standard Condenser Corp., Chicago, Ill.
TT Elctrns., Inc., Culver City, Cal.
Aerolite Electronics Corp., Union City, N.J.
Altec, Anaheim, Calif.
Bozak, R.T. Mfg. Co., Darien, Conn.
Dittmore-Freimuth Corp., Milwaukee, Wisc.
El-Rad Mfg. Co., Chicago, Ill.
Electro-Voice, Inc., Buchanan, Mich.
Forbes & Wagner, Inc., Silver Creek, N.Y.
Hartley Prods. Corp., Hohokus, N.J.
Hughes Aircraft Co, Culver City, Cal.
Hughes Aircraft Co, Fullerton, Cal.
Jensen Mfg. Div., Chicago, Ill.
Philmore Mfg. Co., Richmond Hill, N.Y.
Spectra Sonics, Ogden, Utah
University Sound, Anaheim, Cal.
Utah Elctrns., Huntington, Ind.
Y.T. & T. Corp., Roslyn Hgts., N.Y.

Networks, Directional Antenna Phasing

American Elctrn. Labs., Inc., Lansdale, Pa.
Artronic Instr. Co., Silver Spring, Md.
Frequency Engrg. Labs., Farmingdale, N.J.
Genisco Tech. Corp., Genistron Div., Compton, Cal.
Aerospace Resch. Inc., Boston, Mass.
Anaren Microwave, Inc., Syracuse, N.Y.
Anzac Elctrns., Waltham, Mass.
CCA Elctrns. Corp., Gloucester, N.J.
Collins Radio Co., Dallas, Tex.
Dittmore-Freimuth Corp., Milwaukee, Wisc.
GAF Corp., New York, N.Y.
Hughes Aircraft Co, Culver City, Cal.
Hughes Aircraft Co, Fullerton, Cal.
Merrimac Resch. & Dev., Inc., West Caldwell, N.J.
Microwave Development Labs., Inc., Needham Hgts., Mass.
Olektron Corp., Dudley, Mass.
Philco-Ford Corp., Washington, D.C.
Premier Microwave, Port Chester, N.Y.
Radiation Sys., Inc., McLean, Va.
Rantec Div., Calabasas, Calif.
RF Systems, Inc., Cohasset, Mass.
Rohde & Schwarz Sls., Passaic, N.J.
TACO Div., Sherburne, N.Y.
Zeta Labs., Inc., Mountain View, Calif.

Networks, Ladder—See Vol 2

Networks, LC—See Vol 2

Networks, Matching

Alford Mfg. Co., Winchester, Mass.
Balco Capacitors, Orange, N.J. p 1296,2347
Bulova Watch Co., Freq. Control Prods., Elctrns. Div., Woodside, N.Y.
Cal-R, Inc., Cal. Resistor Div., Santa Monica, Cal.
Cal-R, Inc., Capacitor Div., Santa Monica, Cal.
Cal-R, Inc., Thermonetics Div., Santa Monica, Cal.
Centralab, Elctrns., Milwaukee, Wisc.
Dale Elctrns., Inc., Columbus, Neb.
Data Delay Devices, Clifton, N.J.
Electro Cube, San Gabriel, Cal
Elctrn. Assocs., W. Long Branch, N.J. p 2381
Freed Transformer Co., Bklyn., N.Y.
Gamble, Charles T. Inds., Riverside, N.J. p 2852
General Resistance, Mt. Vernon, N.Y.
Genisco Tech. Corp., Genistron Div., Compton, Cal.
Julie Research Lab., New York, N.Y.
Mepco, Inc., Morristown, N.J.
Nytronics, Inc., Essex Elctrns. Div., Darlington, S.C.
RCL Elctrns., Inc., Irvington, N.J.
Resistance Prods., Harrisburg, Pa.
Sage Elctrns., Rochester, N.Y.
Sprague Elec. Co., No. Adams, Mass.
Standard Condenser Corp., Chicago, Ill.
Torotel, Inc., Grandview, Mo.
TT Elctrns., Inc., Culver City, Cal.
Vari-L Co., Inc., Denver, Colo.
Zaring Inds., Inc., Carmel, Ind.
Aerolite Electronics Corp., Union City, N.J.
Altec, Anaheim, Calif.
American Comps., Inc., Conshohocken, Pa.
American Trans-Coil Corp., Richmond Hill, N.Y.
Anzac Elctrns., Waltham, Mass.
Collins Radio Co., Dallas, Tex.
Consolidated Resistance Sls., Yonkers, N.Y.
Dittmore-Freimuth Corp., Milwaukee, Wisc.
Edison Elctrns. Div., Manchester, N.H.
Electra/Midland Corp., San Diego, Cal.
Elctrn. Precision Comps., Mt. Vernon, N.Y.
General Lab. Assocs., Norwich, N.Y.
Gold Line Connector, Inc., Norwalk, Conn.
Guide Inds., Inc., Sun Valley, Calif.
Hughes Aircraft Co, Culver City, Cal.
Hughes Aircraft Co, Fullerton, Cal.
Kahn Resch. Labs., Inc., Freeport, N.Y.
Kelvin, Van Nuys, Cal.
Marstan Resistor, Orange, N.J.
Materials Resch. Corp., Orangeburg, N.Y.
Olektron Corp., Dudley, Mass.
Philco-Ford Corp., Washington, D.C.
Pickard & Burns Inc., Lindenhurst, N.Y.
Polyphase Instr. Co., Bridgeport, Pa.
Premier Microwave, Port Chester, N.Y.
Pyrofilm Corp., Whippany, N.J.
Rantec Div., Calabasas, Calif.
Ultronix, Inc., Grand Junction, Colo.
Vanguard Elctrns., Inglewood, Cal.
Virginia Elctrns. Co., Inc., Falls Church, Va.
Y.T. & T. Corp., Roslyn Hgts., N.Y.
Zeta Labs., Inc., Mountain View, Calif.

Networks, Phase—See Vol 2

Networks, Pulse Forming

American Elctrn. Labs., Inc., Lansdale, Pa.
Amp Inc., Elizabethtown, Pa.
Amp Inc., Harrisburg, Pa.
Artronic Instr. Co., Silver Spring, Md.
Bowmar Instr. Corp., Ft. Wayne, Ind.
Cober Elctrns., Inc., Stamford, Conn.
Columbia Components, Hempstead, N.Y.
Computer Devices, Commack, N.Y.
Del Elctrns. Corp., Mt. Vernon, N.Y.
Erie Technological Prods. (EEM), Erie, Pa.
ESC Elctrns. Corp., Palisades Pk., N.J.
Freed Transformer Co., Bklyn., N.Y.
Frequency Engrg. Labs., Farmingdale, N.J.
Genisco Tech. Corp., Genistron Div., Compton, Cal.
Hipotronics, Inc., Brewster, N.Y. p 2415
Hisonic, Inc., Olathe, Kans.
Kappa Networks, Inc., Carteret, N.J.
Nytronics, Inc., Essex Elctrns. Div., Darlington, S.C.
Shallco, Inc., Smithfield, N.C.
Sprague Elec. Co., No. Adams, Mass.
Tobe Deutschmann Labs., Inc., Canton, Mass. p 2476
TT Elctrns., Inc., Culver City, Cal.
Vari-L Co., Inc., Denver, Colo.
American Trans-Coil Corp., Richmond Hill, N.Y.
Collins Radio Co., Dallas, Tex.
Condenser Prods. Corp., Brooksville, Fla.
Consolidated Resistance Sls., Yonkers, N.Y.
Custom Elctrns., Oneonta, N.Y.
Dittmore-Freimuth Corp., Milwaukee, Wisc.
Edison Elctrns. Div., Manchester, N.H.
E.F.E. Labs., Inc., Horsham, Pa.
El-Rad Mfg. Co., Chicago, Ill.
Elnetic Elctrns., Inc., Venice, Cal.
EMC Technology Inc, Philadelphia, Pa.
Forbes & Wagner, Inc., Silver Creek, N.Y.
General Instr. Corp., Chicopee, Mass.
General Lab. Assocs., Norwich, N.Y.
Hughes Aircraft Co, Culver City, Cal.
Hughes Aircraft Co, Fullerton, Cal.
Hyletronics Corp., Littleton, Mass.
Kelvin, Van Nuys, Cal.
LAD Electro-Sys., Inc., Hicksville, N.Y.
Lear Siegler, Inc., Santa Monica, Calif.
Loral Elctrn. Sys., Bronx, N.Y.
Maxwell Labs., Inc., San Diego, Calif.
Olektron Corp., Dudley, Mass.
Polyphase Instr. Co., Bridgeport, Pa.
Pulse Engrg., Inc., San Diego, Cal.
Randam Elctrns., Inc., Cincinnati, Ohio
Vanguard Elctrns., Inglewood, Cal.

Networks, Rejection—See Filters—Vol 2

Networks, RC—See Vol 2

Networks, Resistance—See Vol 2

Neutron Detection Tubes—See Tubes, Radiation Detection—Vol 2

Noise Analyzers—See Analyzers, Noise

Nuclear Equipment—See Specific Types

Nuclear Radiation Shielding—See Shields, Nuclear Radiation

Null Detectors—See Indicators, Null

Numeric Readouts—See Readouts-Also See Tubes, Readout—Vol 2

Nuts, Metal—See Fasteners, Metal—Vol 3

Nuts, Plastic—See Fasteners, Plastic—Vol 3

O-Rings—See Seals, Oil—Vol 3

Oceanographic Equip. (Electronic)

Austron, Inc., Austin, Tex.
Beckman Instrs., Cedar Grove, N.J.
Data-Control Systems, Danbury, Conn.
Datacom, Inc., Ft. Walton Bch., Fla.
Del Elctrns. Corp., Mt. Vernon, N.Y.
Digital Equip. Corp., Maynard, Mass.
Digitron Corp., Norristown, Pa.
Elctrn. Enterprises, Newark, N.J.
Ind'l. Control Co., Farmingdale, N.Y.
Ithaco, Inc., Ithaca, N.Y.
Aerospace Resch. Inc., Boston, Mass.
Alden Elctrn. & Impulse Record. Equip., Westboro, Mass.
AMF Electical Prods., Alexandria, Va.
Ampex Corp., Redwood City, Calif.
Beckman Instrs., Advanced Tech., Fullerton, Cal.
Beckman Instrs., (AISSD), Fullerton, Cal.
Beckman Instrs., Process Instrs., Fullerton, Cal.
Benthos, Inc., N. Falmouth, Mass.
Beukers Labs., Inc., Hauppauge, N.Y.
Bissett-Berman, San Diego, Cal.
Bludworth Marine Div., Linden, N.J.
Bunker-Ramo Corp., Westlake Village, Cal
Channel Inds., Santa Barbara, Cal.
Cole Instr., Costa Mesa, Cal.
Dittmore-Freimuth Corp., Milwaukee, Wisc.
Dynamic Sys. Elctrns. Corp., Tempe, Ariz.
Edo Western Corp., Salt Lake City, Utah
Eimac, San Carlos, Calif.
Exide Power Sys. Div., Philadelphia, Pa.
General Dynamics, San Diego, Cal.
General Oceanology, Inc., Cambridge, Mass.
Goodyear Aerospace Corp., Akron, Ohio
Guildline Instrs., Inc., Larchmont, N.Y.
Hermes Elctrns., Dartmouth N.S., Can.
Honeywell, Aerospace & Def., Minneapolis, Minn.
Hughes Aircraft Co, Culver City, Cal.
Hughes Aircraft Co, Fullerton, Cal.
Integrated Elctrns., Huntington Station, N.Y.
International Scanatron Sys., Wyandanch, N.Y.
InterOcean Systems, San Diego, Cal.
Lear Siegler, Inc., Santa Monica, Calif.
NUS Corp., Paramus, N.J.
Plessey Elctrns. Corp., Farmingdale, N.Y.
Prodelin, Inc., Hightstown, N.J.
Ramsay Engrg. Co., Anaheim, Calif.
Raytheon Co., Lexington, Mass.
RCA Govt. & Comm. Sys., Moorestown, N.J.
Relco Prods., Denver, Colo.
Sanders Assocs., Ocean Sys., So. Nashua, N.H.
Schneider Instr. Co., Cincinnati, Ohio
Schoeffel Instr. Corp., Westwood, N.J.
Sprengnether, W.F. Instr. Co., Inc., St. Louis, Mo.
Straza Inds., El Cajon, Calif.
TACO Div., Sherburne, N.Y.
Technical Mat'l., Mamaroneck, N.Y.
Tracor, Inc., Austin, Tex.
Westinghouse Elec. Corp., Pittsburgh, Pa.
Wolfson, P.J. Co., New Rochelle, N.Y.

Oils—See Lubricants—Vol 3

Open-Short Locators—See Locators, Open-Short

Optical Coded Discs—See Coded Discs, Optical

Optical Comparators—See Comparators, Optical—Vol 2

Optical Image Expanders—See Vol 2

Optics, Fiber—See Fiber Optic Bundles; Fiber Optic Inspection Equip.—Vol 2

Optics, Micromosaic—See Micromosaic Optics—Vol 2

Oscillators, Adjustable—See Oscillators (As Modified)—Vol 2

Oscillators, Audio

Accutronics, Inc., Geneva, Ill. p 1354,1356
Allen Elctrns. Div., Macungie, Pa. p 2481
American Time Products, Woodside, N.Y. p 1366
Arra Inc., Bayshore, N.Y.
Austron, Inc., Austin, Tex.
Behlman Div., San Diego, Cal
Bramco Controls, Piqua, Ohio .... p 1406
Bulova Watch Elctrns. Div. Amer. Time Prods., Woodside, N.Y. p 1366
Bulova Watch Co., Freq. Control Prods., Elctrns. Div., Woodside, N.Y. p 1365
Calico Div., San Diego, Cal.
Clarke - Hess, New York, N.Y.
Connor-Winfield Corp., Winfield, Ill. p 1376,1377
CTS Corp, Elkhart, Ind.
Data Delay Devices, Clifton, N.J. p 2745
Douglas Randall Div., Pawcatuck, Conn.
Dranetz Engrg. Labs., Plainfield, N.J.
Electro Sci. Inds., Portland, Ore.
Elctrn. Assocs., W. Long Branch, N.J.

Electronic Research Co., Shawnee Mission, Kans. ..... p 1384
Elgar Corp., San Diego, Cal. ..... p 703
Elin Div., San Diego, Cal.
Exact Elctrns., Inc., Hillsboro, Ore.
Ferwalt, W.H., Inc., Lapwai, Idaho p 1385
Fork Standards, W. Chicago, Ill. p 1387-1389
Frequency Control, Inc., Austin, Tex. p 1386
Frequency Elctrns., New Hyde Pk., N.Y.
Gibbs Mfg. & Resch., Janesville, Wisc. p 1399,1400
Greenray Inds., Inc., Mechanicsburg, Pa. ..... p 1392,1393
Hewlett-Packard, Palo Alto, Cal.
Hickok Elect. Instr., Cleveland, Ohio
Ind'l. Test Equip., Port Washington, N.Y.
Interstate Elctrns. Corp., Anaheim, Cal.
Kay Elemetrics, Pine Brook, N.J.
Krohn-Hite, Cambridge, Mass. ..... p 512
London Co., Cleveland, Ohio
Marconi Instrs., Englewood, N.J... p 520
McCoy Elctrns. Co., Mt. Holly Springs, Pa.
Meloy Laboratories, Springfield, Va. p 1407
M F Elctrns. Corp., New York, N.Y. p 1413
Microdot Inc., City of Industry, Cal. p 522
Monitor Prods., S. Pasadena, Cal. p 1414
Motorola Communications & Electrns., Chicago, Ill. ..... p 1417
North Hills Elctrns., Inc., Glen Cove, N.Y.
Opamp Labs., Los Angeles, Cal.
Precision Monolithics, Santa Clara, Cal.
Quindar Elctrns., Inc., Springfield, N.J.
Reeves-Hoffman Div., Carlisle, Pa. p 1427
Rockland Sys. Corp., Blauvelt, N.Y.
Solid State Elctrns., Sepulveda, Cal.
Wavetek, San Diego, Cal. ..... p 584
AGAC-Derritron, Inc., Alexandria, Va.
Arbor Sys., Inc., Ann Arbor, Mich.
Armec Corp., Huntington Sta., N.Y.
B & K Instrs., Inc., Cleveland, Ohio
BAC Elctrns., Pennsauken, N.J.
Barker & Williamson, Bristol, Pa.
BECO Solid State Systems, Salem, Va.
Behlman Engrg. Corp., Santa Barbara, Cal.
Bergen Labs., Inc., Paterson, N.J.
B.H. Inds., Los Angeles, Cal.
Bowmar/Ali, Inc., Acton, Mass.
Burr-Brown Resch. Corp., Tucson, Ariz.
California Instrs. Co., San Diego, Cal.
Central Scientific Co., Chicago, Ill.
Coast Elctrns., Manhattan Beach, Cal.
Collins Radio Co., Cedar Rapids, Iowa
Collins Radio Co., Dallas, Tex.
Dittmore-Freimuth Corp., Milwaukee, Wisc.
Dorsett Elctrns., Tulsa, Okla.
Dynamic Precision Controls, Hagerstown, Ind.
Eico Electronic Instrument Co., Inc., Brooklyn, N.Y.
Entron Inc., Morganville, N.J.
General Radio Co., Concord, Mass.
Heath Co., Benton Harbor, Mich.
Hope Elctrns., Clifton, N.J.
Hughes Aircraft Co, Fullerton, Cal.
Instrument Labs. Corp., Chicago, Ill.
Kikusui Elctrns. Corp., Kawasaki City, Kanagawa-Pref., Japan
Kinetic Tech., Inc., Santa Clara, Cal.
Lab Electro-Acoustique, 92-Rueil, Malmaison, France
Levell Electronics Ltd., High Barnet, Herts,, England
Matsushita Comm. Ind'l. Co., Ltd., Yokohama, Japan
McKee-Pedersen Instrs., Danville, Calif.
Mennen-Greatbatch Elctrns., Inc., Clarence, N.Y.
Muirhead, Inc., Mountainside, N.J.
Nelson-Hershfield Elctrns., Phoenix, Ariz.
Neptune Elctrns. Co., New York, N.Y.
Northeast Elctrns. Corp., Concord, N.H.
Optimation, Inc., Sun Valley, Calif.
Philips Elctrns. Inds., Ltd., Toronto 17, Can.
Princeton Applied Resch. Corp., Princeton, N.J.
Ramsay Engrg. Co., Anaheim, Calif.
RFL Inds., Comms. Div., Boonton, N.J.
Riverbank Labs., Geneva, Ill.
Rohde & Schwarz Sls., Passaic, N.J.
Siemens Corp., Comps. Div., Iselin, N.J.
Siemens Corp., Comm. Eq. Div., Iselin, N.J.
Spectral Dynamics Corp. San Diego, San Diego, Cal.
Tel-Instr. Elctrns. Corp., Carlstadt, N.J.
Transducer Systems, Inc., Willow Grove, Pa.
Transystems Elctrn. Co., Fort Lee, N.J.
Trepac Corp. America, Englewood, N.J.
Unholtz-Dickie Corp., Hamden, Conn.
Waveforms, No. Hollywood, Cal.

Oscillators, Beat Frequency (BFO)

Bulova Watch Co., Freq. Control Prods., Elctrns. Div., Woodside, N.Y.
Frequency Elctrns., New Hyde Pk., N.Y.
Hewlett-Packard, Palo Alto, Cal.
Kay Elemetrics, Pine Brook, N.J.
Marconi Instrs., Englewood, N.J.
Solid State Elctrns., Sepulveda, Cal.
Watkins Johnson Co., Palo Alto, Cal.
American Trans-Coil Corp., Richmond Hill, N.Y.
Anritsu Electric Co., Ltd., Tokyo, Japan
B & K Instrs., Inc., Cleveland, Ohio
Collins Radio Co., Cedar Rapids, Iowa
Collins Radio Co., Dallas, Tex.
Communication Elctrns., Rockville, Md.
Dittmore-Freimuth Corp., Milwaukee, Wisc.
General Radio Co., Concord, Mass.
Hope Elctrns., Clifton, N.J.
Morey Corp, Downers Grove, Ill.
Neptune Elctrns. Co., New York, N.Y.
Philips Elctrns. Inds., Ltd., Toronto 17, Can.
RFL Inds., Comms. Div., Boonton, N.J.
Siemens Corp., Comm. Eq. Div., Iselin, N.J.

Oscillators, Bias

Arra Inc., Bayshore, N.Y.
Nortronics, Mpls., Minn.
Opamp Labs., Los Angeles, Cal.
Solid State Elctrns., Sepulveda, Cal.
Kenton Engrg. Corp., Skokie, Ill.

Oscillators, Bridge

Dranetz Engrg. Labs., Plainfield, N.J.
General Resistance, Mt. Vernon, N.Y.
Hewlett-Packard, Palo Alto, Cal.
Ind'l. Test Equip., Port Washington, N.Y.
Behlman Engrg. Corp., Santa Barbara, Cal.
General Radio Co., Concord, Mass.
Levell Electronics Ltd., High Barnet, Herts,, England
Ramsay Engrg. Co., Anaheim, Calif.
Rohde & Schwarz Sls., Passaic, N.J.

Oscillators, Cavity

Applied Microwave Lab., Andover, Mass. ..... p 599
Arra Inc., Bayshore, N.Y.
Frequency Engrg. Labs., Farmingdale, N.J.
Frequency Sources, No. Chelmsford, Mass. ..... p 1561
General Elec. Co., Schenectady, N.Y.
Greenray Inds., Inc., Mechanicsburg, Pa. ..... p 607
Microdot Inc., City of Industry, Cal.
Microwave Cavity Labs., La Grange, Ill. p 610
Polarad Elctrn. Instrs., Lake Success, N.Y.
RCA Elctrns. Comps., Harrison, N.J.
Addington Labs., Inc., Santa Clara, Calif.
Aircom, Inc., Union, N.H.
Collins Radio Co., Cedar Rapids, Iowa
Collins Radio Co., Dallas, Tex.
Dittmore-Freimuth Corp., Milwaukee, Wisc.
GAF Corp., New York, N.Y.
Guide Inds., Inc., Sun Valley, Calif.
Hope Elctrns., Clifton, N.J.
Hughes Aircraft Co, Fullerton, Cal.
Int'l. Microwave, Cos Cob, Conn.
MITEQ, Inc., Hauppauge, N.Y.
RFD, Inc., Tampa, Fla.
Sage Labs. Inc., Natick, Mass.
Scientific-Atlanta, Inc., Atlanta, Ga.
Struthers Elctrns. Corp., Mamaroneck, N.Y.
Trak Microwave, Tampa, Fla.
Varian, Beverly, Mass.
Wand Elctrns., Inc., Old Bethpage, N.Y.

Oscillators, Crystal-Controlled

Accutronics, Inc., Geneva, Ill. ..... p 1358
American Elctrn. Labs., Inc., Lansdale, Pa.
Arra Inc., Bayshore, N.Y.
Arvin Frequency Devices, Columbus, Ind. ..... p 1361
Atomichron, Inc., New Hyde Park, N.Y. p 469
Austron, Inc., Austin, Tex.
Behlman Div., San Diego, Cal
Bliley Electric, Erie, Pa. ..... p 1367
Bulova Watch Co., Freq. Control Prods., Elctrns. Div., Woodside, N.Y. p 1365
Connor-Winfield Corp., Winfield, Ill. p 1376
CTS Corp, Elkhart, Ind. ..... p 1374
Damon Corp., Needham Hgts., Mass. p 1379
Electronic Research Co., Shawnee Mission, Kans. ..... p 1384
Erie Frequency Control, Carlisle, Pa. p 1383
Erie Technological Prods. (EEM), Erie, Pa. ..... p 1383
Ferwalt, W.H., Inc., Lapwai, Idaho p 1385
Fork Standards, W. Chicago, Ill. p 1387-1390
Frequency Control, Inc., Austin, Tex.
Frequency Elctrns., New Hyde Pk., N.Y. p 469
Frequency Sources, No. Chelmsford, Mass. ..... p 1561
General Elec. Co., Schenectady, N.Y.
Geo Space Sys., Tampa, Fla.
Gibbs Mfg. & Resch., Janesville, Wisc. p 1397-1400
Greenray Inds., Inc., Mechanicsburg, Pa. ..... p 1392
Hewlett-Packard, Palo Alto, Cal.
Hughes Aircraft Co., Frequency Control Devices, Newport Bch., Cal.
Ind'l. Test Equip., Port Washington, N.Y.
Lorch-Adret Corp., Englewood, N.J.
McCoy Elctrns. Co., Mt. Holly Springs, Pa. ..... p 1411
Meloy Laboratories, Springfield, Va. p 1407
M F Elctrns. Corp., New York, N.Y. p 1413
Monitor Prods., S. Pasadena, Cal. p 1414,1415
Motorola Communications & Electrns., Chicago, Ill. ..... p 1417
Northern Engrg. Labs., Burlington, Wisc. ..... p 1419
Ovenaire, Inc., Charlottesville, Va. p 1421-1423
Reeves-Hoffman Div., Carlisle, Pa. p 1427
Sierra Sys., Mountain View, Cal.
Snelgrove, C. R. Ltd., Don Mills, Ont. Can. ..... p 1428
Solid State Elctrns., Sepulveda, Cal. p 954
Sonex, Inc., Bethayres, Pa.
Spectrum Technology, Goleta, Cal. p 1429
TMC Systems (Ariz.), Tempe, Ariz. p 1430
Torotel, Inc., Grandview, Mo. ..... p 1432
Vectron Labs., Inc., Norwalk, Conn. p 1433
Addington Labs., Inc., Santa Clara, Calif.
Aertech Inds., Sunnyvale, Calif.
AMBAC Inds., Garden City, N.Y.
Anritsu Electric Co., Ltd., Tokyo, Japan
Applied Tech., Palo Alto, Cal.
A.R.F. Products, Inc., Boulder, Colo.
A.R.F. Products, Inc., Raton, N.M.
Arvin Sys., Inc., Dayton, Ohio
Barden Co., Div. Interdyne Co., Los Angeles, Cal.
Behlman Engrg. Corp., Santa Barbara, Cal.
BF Elctrns., Solana Beach, Calif.
California Instrs. Co., San Diego, Cal.
Collins Radio Co., Cedar Rapids, Iowa
Collins Radio Co., Dallas, Tex.
Collins Radio Co., Newport Beach, Calif.
Consolidated Resistance Sls., Yonkers, N.Y.
Crystal Network Prods. Corp., Erie, Pa.
Digital Displays, Mendham, N.J.
Dittmore-Freimuth Corp., Milwaukee, Wisc.
Dorsett Elctrns., Tulsa, Okla.
Edison Elctrns. Div., Manchester, N.H.
Elctrn. Svc., Verona, N.J.
General Radio Co., Concord, Mass.
Guide Inds., Inc., Sun Valley, Calif.
Heath Co., Benton Harbor, Mich.
Hope Elctrns., Clifton, N.J.
Itek Corp., Lexington, Mass.
Kahn Resch. Labs., Inc., Freeport, N.Y.
Micro-Tel Corp., Baltimore, Md.
Microwave/Sys., Inc., E. Syracuse, N.Y.
MITEQ, Inc., Hauppauge, N.Y.
Monitor Sys., Inc., Ft. Washington, Pa.
MSE, Inc., Westlake, Ohio
Neptune Elctrns. Co., New York, N.Y.
Northeast Elctrns. Corp., Concord, N.H.
Oklahoma Aerotronics, Hartshorne, Okla.
Optimation, Inc., Sun Valley, Calif.
Pan American Trade Dev., New York, N.Y.
Philco-Ford Corp., Washington, D.C.
Racal Communications, Rockville, Md.
Radio Resch. Co., Rockaway, N.J.
Rodelco, Deer Park, N.Y.
Sage Labs. Inc., Natick, Mass.
Sensor Corp., Greenwich, Conn.
Somerset Radiation Lab., Arlington, Va.
Standard Crystal Corp., Alhambra, Cal.
Systems Elctrns., Cleveland, Ohio
Technical Mat'l., Mamaroneck, N.Y.
Tedford Crystal Labs., Cincinnati, Ohio
Tel-Instr. Elctrns. Corp., Carlstadt, N.J.
Tracor, Inc., Austin, Tex.
Trak Microwave, Tampa, Fla.
Transystems Elctrn. Co., Fort Lee, N.J.
Varian, Beverly, Mass.
Wand Elctrns., Inc., Old Bethpage, N.Y.
Winslow Tele-Tronics, Inc., Eatontown, N.J.
Xerox Data Sys., El Segundo, Cal
Zeta Labs., Inc., Mountain View, Calif.

Oscillators, Decade

Accutronics, Inc., Geneva, Ill.
Behlman Div., San Diego, Cal
Elgar Corp., San Diego, Cal.
Exact Elctrns., Inc., Hillsboro, Ore.
Frequency Elctrns., New Hyde Pk., N.Y.
Hewlett-Packard, Palo Alto, Cal.
Krohn-Hite, Cambridge, Mass. ..... p 512
Torotel, Inc., Grandview, Mo.
Avantek, Inc., Santa Clara, Cal.
Behlman Engrg. Corp., Santa Barbara, Cal.
California Instrs. Co., San Diego, Cal.
Digital Displays, Mendham, N.J.
General Radio Co., Concord, Mass.
Hope Elctrns., Clifton, N.J.
Hughes Aircraft Co, Culver City, Cal.
Kikusui Elctrns. Corp., Kawasaki City, Kanagawa-Pref., Japan
Levell Electronics Ltd., High Barnet, Herts,, England
Muirhead, Inc., Mountainside, N.J.
Optimation, Inc., Sun Valley, Calif.
Racal Communications, Rockville, Md.

Oscillators, Grid Dip—See Meters, Grid-Dip—Vol 2

Oscillatos, Kystron—See Tubes, Klystron—Vol 2

Oscillators, Magnetron—See Tubes, Magnetron—Vol 2

Oscillators, Microwave—See Vol 2

Oscillators, Power

Accutronics, Inc., Geneva, Ill.
Applied Microwave Lab., Andover, Mass. ..... p 599
Arra Inc., Bayshore, N.Y.
Austron, Inc., Austin, Tex.
Behlman Div., San Diego, Cal. ..... p 671
Calico Div., San Diego, Cal.
Clarke - Hess, New York, N.Y. ..... p 426
CML-Macarr, Inc., Edison, N.J. p 661-663
Elctrn. Enterprises, Newark, N.J.
Elgar Corp., San Diego, Cal. ..... p 703
Elin Div., San Diego, Cal. ..... p 671
Fork Standards, W. Chicago, Ill.
Frequency Control, Inc., Austin, Tex.
Frequency Elctrns., New Hyde Pk., N.Y.
Frequency Sources, No. Chelmsford, Mass. ..... p 1560
General Elec. Co., Schenectady, N.Y.

Gibbs Mfg. & Resch., Janesville, Wisc.
Ind'l. Test Equip., Port Washington, N.Y. p 733
Krohn-Hite, Cambridge, Mass.
Marconi Instrs., Englewood, N.J... p 520
Microdot Inc., City of Industry, Cal. p 522
Microwave Cavity Labs., La Grange, Ill. p 611
Polarad Elctrn. Instrs., Lake Success, N.Y.
RCA Elctrns. Comps., Harrison, N.J.
Ryka Scientific, Inc., Sunnyvale, Cal. p 1564
Vector Engrg., Springfield, N.J. .... p 943
Watkins Johnson Co., Palo Alto, Cal.
Addington Labs., Inc., Santa Clara, Calif.
AIL, Div. Cutler-Hammer, Inc., Deer Park, N.Y.
Aperco Co., East Meadow, N.Y.
Behlman Engrg. Corp., Santa Barbara, Cal.
Bertan Assocs., Inc., Plainview, N.Y.
California Instrs. Co., San Diego, Cal.
CCA Elctrns. Corp., Gloucester, N.J.
Collins Radio Co., Cedar Rapids, Iowa
Collins Radio Co., Dallas, Tex.
Dittmore-Freimuth Corp., Milwaukee, Wisc.
EMF Systems, Inc., State College, Pa.
Energy Systems, Palo Alto, Cal.
Engineering Assocs., Dayton, Ohio
General Instr. Corp., Hicksville, N.Y.
General Microwave Corp., Farmingdale, N.Y.
Hope Elctrns., Clifton, N.J.
Ling Elctrns., Anaheim, Calif.
Litton Inds., San Carlos, Calif.
Microdot Inc., S. Pasadena, Calif.
Microwave Div, Nashua, N.H.
Optimation, Inc., Sun Valley, Calif.
Philco-Ford Corp., Washington, D.C.
RFD, Inc., Tampa, Fla.
RHA-Audio Communications, W. New York, N.J.
Rohde & Schwarz Sls., Passaic, N.J.
Sage Labs. Inc., Natick, Mass.
Sanders Assocs., Nashua, N.H.
Tel-Instr. Elctrns. Corp., Carlstadt, N.J.
Trak Microwave, Tampa, Fla.
Transystems Elctrn. Co., Fort Lee, N.J.
Varian Assocs., Beverly, Mass.
Wand Elctrns., Inc., Old Bethpage, N.Y.
Waveforms, No. Hollywood, Cal.
Zeta Labs., Inc., Mountain View, Calif.

Oscillators, Pulse

Accutronics, Inc., Geneva, Ill.
Applied Microwave Lab., Andover, Mass. .... p 599
Arra Inc., Bayshore, N.Y.
Austron, Inc., Austin, Tex.
Bliley Electric, Erie, Pa. .... p 1367
Bulova Watch Co., Freq. Control Prods., Elctrns. Div., Woodside, N.Y.
Cober Elctrns., Inc., Stamford, Conn.
Connor-Winfield Corp., Winfield, Ill. p 1377
Elctrn. Enterprises, Newark, N.J.
Exact Elctrns., Inc., Hillsboro, Ore.
Ferwalt, W.H., Inc., Lapwai, Idaho p 1385
Frequency Control, Inc., Austin, Tex.
Frequency Sources, No. Chelmsford, Mass. .... p 1560
General Elec. Co., Schenectady, N.Y.
Gibbs Mfg. & Resch., Janesville, Wisc.
Greenray Inds., Inc., Mechanicsburg, Pa. ....p 1392,1393
Hewlett-Packard, Palo Alto, Cal.
Krohn-Hite, Cambridge, Mass. ..... p 512
McCoy Elctrns. Co., Mt. Holly Springs, Pa.
Meloy Laboratories, Springfield, Va. p 1407
Microwave Cavity Labs., La Grange, Ill. p 611
Polarad Elctrn. Instrs., Lake Success, N.Y.
Solid State Elctrns., Sepulveda, Cal.
Vectron Labs., Inc., Norwalk, Conn. p 1433
Watkins Johnson Co., Palo Alto, Cal.
Addington Labs., Inc., Santa Clara, Calif.
Agastat Div., Elizabeth, N.J.
AMBAC Inds., Garden City, N.Y.
Arenberg Ultrasonic Lab., Inc., Jamaica Plain, Mass.
Bertan Assocs., Inc., Plainview, N.Y.
Collins Radio Co., Cedar Rapids, Iowa
Collins Radio Co., Dallas, Tex.
Consolidated Resistance Sls., Yonkers, N.Y.
Davidson Elctrn. Dev. Co., Erie, Pa.
Dittmore-Freimuth Corp., Milwaukee, Wisc.
General Instr. Corp., Hicksville, N.Y.
General Radio Co., Concord, Mass.
Hope Elctrns., Clifton, N.J.
Hughes Aircraft Co, Fullerton, Cal.
Litton Inds., San Carlos, Calif.
Microwave Assocs., Inc., Burlington, Mass.
Microwave Div, Nashua, N.H.
Neptune Elctrns. Co., New York, N.Y.
Nuclear-Chicago, Des Plaines, Ill.
Omni-Spectra, Inc., Scottsdale, Ariz.
Philips Elctrns. Inds., Ltd., Toronto 17, Can.
Private Tele-Comms., Inc., Chicago, Ill.
RFD, Inc., Tampa, Fla.
Sanders Assocs., Nashua, N.H.
Special Microwave Devices Oper., Waltham, Mass.
Trak Microwave, Tampa, Fla.
Transystems Elctrn. Co., Fort Lee, N.J.
Varian Assocs., Beverly, Mass.
Wand Elctrns., Inc., Old Bethpage, N.Y.

Oscillators, Reed

Biddle, James G., Plymouth Meeting, Pa.
Bramco Controls, Piqua, Ohio .... p 1406
Frequency Control, Inc., Austin, Tex.
Meson Elctrns. Co., Inc., Rochester, N.Y.

Oscillators, R-F

Applied Microwave Lab., Andover, Mass. .... p 599
Arra Inc., Bayshore, N.Y.
Arvin Frequency Devices, Columbus, Ind. .... p 1361
Bliley Electric, Erie, Pa. .... p 1367
Bulova Watch Co., Freq. Control Prods., Elctrns. Div., Woodside, N.Y. p 1365
CTS Corp, Elkhart, Ind..... p 1374
Dranetz Engrg. Labs., Plainfield, N.J.
Elctrn. Enterprises, Newark, N.J.
Electronic Research Co., Shawnee Mission, Kans. .... p 1384
Ferwalt, W.H., Inc., Lapwai, Idaho p 1385
Fork Standards, W. Chicago, Ill. p 1387-1389
Frequency Control, Inc., Austin, Tex.
Frequency Elctrns., New Hyde Pk., N.Y.
Frequency Sources, No. Chelmsford, Mass. ....p 1560,1561
General Elec. Co., Schenectady, N.Y.
Gibbs Mfg. & Resch., Janesville, Wisc. p 1397,1398,1400
Greenray Inds., Inc., Mechanicsburg, Pa. ....p 1392,1393
Hewlett-Packard, Palo Alto, Cal.
Kay Elemetrics, Pine Brook, N.J.
Krohn-Hite, Cambridge, Mass. ..... p 512
Marconi Instrs., Englewood, N.J... p 520
Microdot Inc., City of Industry, Cal. p 522
Microwave Cavity Labs., La Grange, Ill. p 611
Monitor Prods., S. Pasadena, Cal. p 1414
Ovenaire, Inc., Charlottesville, Va. p 1423
Polarad Elctrn. Instrs., Lake Success, N.Y.
RHG Elctrns. Lab., Farmingdale, N.Y.
Ryka Scientific, Inc., Sunnyvale, Cal. p 1564
Sierra Sys., Mountain View, Cal.
Solid State Elctrns., Sepulveda, Cal.
Systron-Donner Kruse Elctrns. Sub., Mountain View, Cal.
TMC Systems (Ariz.), Tempe, Ariz. p 1430
Vectron Labs., Inc., Norwalk, Conn. p 1433
Watkins Johnson Co., Palo Alto, Cal.
Wavetek, San Diego, Cal. .... p 584
Weinschel Engrg. Co., Gaithersburg, Md.
Addington Labs., Inc., Santa Clara, Calif.
AIL, Div. Cutler-Hammer, Inc., Deer Park, N.Y.
AMBAC Inds., Garden City, N.Y.
American Trans-Coil Corp., Richmond Hill, N.Y.
Anritsu Electric Co., Ltd., Tokyo, Japan
Aperco Co., East Meadow, N.Y.
Arenberg Ultrasonic Lab., Inc., Jamaica Plain, Mass.
A.R.F. Products, Inc., Boulder, Colo.
Astrolab Inc., Linden, N J
Avantek, Inc., Santa Clara, Cal.
Barker & Williamson, Bristol, Pa.
CCA Elctrns. Corp., Gloucester, N.J.
Collins Radio Co., Cedar Rapids, Iowa
Collins Radio Co., Dallas, Tex.
Consolidated Resistance Sls., Yonkers, N.Y.
Dittmore-Freimuth Corp., Milwaukee, Wisc.
Eico Electronic Instrument Co., Inc., Brooklyn, N.Y.
Engineering Assocs., Dayton, Ohio
General Instr. Corp., Hicksville, N.Y.
General Microwave Corp., Farmingdale, N.Y.
General Radio Co., Concord, Mass.
Heath Co., Benton Harbor, Mich.
Hope Elctrns., Clifton, N.J.
Hughes Aircraft Co, Fullerton, Cal.
Int'l. Microwave, Cos Cob, Conn.
Leader Instr. Corp., Long Island City, N.Y.
Lehighton Elctrns., Inc., Lehighton, Pa.
Linell Engrg. Corp., Chicago, Ill.
Litton Inds., San Carlos, Calif.
Micro-Power, Inc., Long Island City, N.Y.
Micromega, Los Angeles, Cal.
Microwave Assocs., Inc., Burlington, Mass.
Microwave Development Labs., Inc., Needham Hgts., Mass.
Microwave Div, Nashua, N.H.
MITEQ, Inc., Hauppauge, N.Y.
Morey Corp, Downers Grove, Ill.
Neptune Elctrns. Co., New York, N.Y.
Omni-Spectra, Inc., Scottsdale, Ariz.
Optimation, Inc., Sun Valley, Calif.
Philips Elctrns. Inds., Ltd., Toronto 17, Can.
PRD Elctrns., Inc., Westbury, N.Y.
Princeton Applied Resch. Corp., Princeton, N.J.
Racal Communications, Rockville, Md.
Radio Resch. Co., Rockaway, N.J.
RFD, Inc., Tampa, Fla.
Rodelco, Deer Park, N.Y.
Rohde & Schwarz Sls., Passaic, N.J.
Sage Labs. Inc., Natick, Mass.
Smallwood, S.G., Ltd., Kitchener, Ont., Canada
Special Microwave Devices Oper., Waltham, Mass.
Technical Mat'l., Mamaroneck, N.Y.
Tel-Instr. Elctrns. Corp., Carlstadt, N.J.
Telonic Inds., Inc., Laguna Beach, Calif.
Tocco Div., Cleveland, Ohio
Trak Microwave, Tampa, Fla.
Varian Assocs., Palo Alto, Cal.
Varian Assocs., Beverly, Mass.
Varian, Beverly, Mass.
Wand Elctrns., Inc., Old Bethpage, N.Y.
Wiltron Co., Palo Alto, Calif.
Zeta Labs., Inc., Mountain View, Calif.

Oscillators, Sinusoidal

Accutronics, Inc., Geneva, Ill. p 1354-1360
Allen Elctrns. Div., Macungie, Pa. p 2481
Arnold Magnetics, Culver City, Cal.
Arvin Frequency Devices, Columbus, Ind. .... p 1361
Austron, Inc., Austin, Tex.
Behlman Div., San Diego, Cal
Bliley Electric, Erie, Pa. .... p 1367
Bulova Watch Co., Freq. Control Prods., Elctrns. Div., Woodside, N.Y.
Clarke - Hess, New York, N.Y.
CML-Macarr, Inc., Edison, N.J. p 662,663
Connor-Winfield Corp., Winfield, Ill. p 1377
CTS Corp, Elkhart, Ind..... p 1374
Data Delay Devices, Clifton, N.J. p 2745
Dranetz Engrg. Labs., Plainfield, N.J.
Electronic Research Co., Shawnee Mission, Kans. .... p 1384
Elgar Corp., San Diego, Cal. ..... p 703
Elin Div., San Diego, Cal.
Exact Elctrns., Inc., Hillsboro, Ore.
Ferwalt, W.H., Inc., Lapwai, Idaho p 1385
Fork Standards, W. Chicago, Ill. p 1387-1390
Frequency Control, Inc., Austin, Tex.
Frequency Elctrns., New Hyde Pk., N.Y.
General Magnetics, Bloomfield, N.J.
Gibbs Mfg. & Resch., Janesville, Wisc. p 1397,1399,1400
Greenray Inds., Inc., Mechanicsburg, Pa. ....p 1392,1393
Hewlett-Packard, Palo Alto, Cal.
Hughes Aircraft Co., Frequency Control Devices, Newport Bch., Cal.
Ind'l. Test Equip., Port Washington, N.Y.
Interstate Elctrns. Corp., Anaheim, Cal.
Krohn-Hite, Cambridge, Mass. ..... p 512
Marconi Instrs., Englewood, N.J... p 520
McCoy Elctrns. Co., Mt. Holly Springs, Pa. .... p 1411
Meloy Laboratories, Springfield, Va. p 1407
M F Elctrns. Corp., New York, N.Y. p 1412,1413
Microdot Inc., City of Industry, Cal. p 522
Monitor Prods., S. Pasadena, Cal. p 1415
Opamp Labs., Los Angeles, Cal.
Ovenaire, Inc., Charlottesville, Va. p 1423
Polarad Elctrn. Instrs., Lake Success, N.Y.
Rockland Sys. Corp., Blauvelt, N.Y.
Solid State Elctrns., Sepulveda, Cal.
Vectron Labs., Inc., Norwalk, Conn. p 1433
Wavetek, San Diego, Cal. .... p 584
AMBAC Inds., Garden City, N.Y.
Armec Corp., Huntington Sta., N.Y.
Arvin Sys., Inc., Dayton, Ohio
BAC Elctrns., Pennsauken, N.J.
Barden Co., Div. Interdyne Co., Los Angeles, Cal.
BECO Solid State Systems, Salem, Va.
Behlman Engrg. Corp., Santa Barbara, Cal.
Burr-Brown Resch. Corp., Tucson, Ariz.
California Instrs. Co., San Diego, Cal.
Collins Radio Co., Dallas, Tex.
Consolidated Resistance Sls., Yonkers, N.Y.
Dorsett Elctrns., Tulsa, Okla.
Dynamic Precision Controls, Hagerstown, Ind.
Esterline Angus Div., Indianapolis, Ind.
Feedback, Inc., Berkeley Hghts., N.J.
General Radio Co., Concord, Mass.
Heath Co., Benton Harbor, Mich.
Hope Elctrns., Clifton, N.J.
Instrument Labs. Corp., Chicago, Ill.
Kikusui Elctrns. Corp., Kawasaki City, Kanagawa-Pref., Japan
Kinetic Tech., Inc., Santa Clara, Cal.
Lab Electro-Acoustique, 92-Rueil, Malmaison, France
Leader Instr. Corp., Long Island City, N.Y.
Levell Electronics Ltd., High Barnet, Herts,, England
Mennen-Greatbatch Elctrns., Inc., Clarence, N.Y.
Muirhead, Inc., Mountainside, N.J.
Neptune Elctrns. Co., New York, N.Y.
Omni-Spectra, Inc., Scottsdale, Ariz.
Optimation, Inc., Sun Valley, Calif.
Princeton Applied Resch. Corp., Princeton, N.J.
Radio Resch. Co., Rockaway, N.J.
Ramsay Engrg. Co., Anaheim, Calif.
Rohde & Schwarz Sls., Passaic, N.J.
Siemens Corp., Comm. Eq. Div., Iselin, N.J.
Spectral Dynamics Corp. San Diego, San Diego, Cal.
Systems Elctrns., Cleveland, Ohio
Tel-Instr. Elctrns. Corp., Carlstadt, N.J.
Transducer Systems, Inc., Willow Grove, Pa.
Transystems Elctrn. Co., Fort Lee, N.J.
Trepac Corp. America, Englewood, N.J.
Unholtz-Dickie Corp., Hamden, Conn.
Wand Elctrns., Inc., Old Bethpage, N.Y.
Waveforms, No. Hollywood, Cal.

Oscillators, Square-Wave

Accutronics, Inc., Geneva, Ill. p 1353-1360
American Time Products, Woodside, N.Y. .... p 1366
Arnold Magnetics, Culver City, Cal.
Arvin Frequency Devices, Columbus, Ind. .... p 1361
Austron, Inc., Austin, Tex.
Bliley Electric, Erie, Pa. .... p 1367
Bulova Watch Elctrns. Div. Amer. Time Prods., Woodside, N.Y. .... p 1366

Bulova Watch Co., Freq. Control Prods., Elctrns. Div., Woodside, N.Y. p 1365
Clarke - Hess, New York, N.Y.
Connor-Winfield Corp., Winfield, Ill. p 1376
CTS Corp, Elkhart, Ind. p 1374
Electronic Research Co., Shawnee Mission, Kans. p 1384
Exact Elctrns., Inc., Hillsboro, Ore.
Ferwalt, W.H., Inc., Lapwai, Idaho p 1385
Fork Standards, W. Chicago, Ill. p 1387-1390
Frequency Control, Inc., Austin, Tex. p 1386
Gibbs Mfg. & Resch., Janesville, Wisc. p 1397-1400
Greenray Inds., Inc., Mechanicsburg, Pa. p 1392,1393
Hewlett-Packard, Palo Alto, Cal.
Hughes Aircraft Co., Frequency Control Devices, Newport Bch., Cal.
Interstate Elctrns. Corp., Anaheim, Cal.
Krohn-Hite, Cambridge, Mass. p 512
McCoy Elctrns. Co., Mt. Holly Springs, Pa. p 1411
Meloy Laboratories, Springfield, Va. p 1407
Microdot Inc., City of Industry, Cal. p 522
Monitor Prods., S. Pasadena, Cal. p 1414
Ovenaire, Inc., Charlottesville, Va. p 1422,1423
Polarad Elctrn. Instrs., Lake Success, N.Y.
Solid State Elctrns., Sepulveda, Cal.
Spectrum Technology, Goleta, Cal. p 1429
Vectron Labs., Inc., Norwalk, Conn. p 1433
Wavetek, San Diego, Cal. p 584
Weinschel Engrg. Co., Gaithersburg, Md.
AMBAC Inds., Garden City, N.Y.
Armec Corp., Huntington Sta., N.Y.
Arvin Sys., Inc., Dayton, Ohio
BAC Elctrns., Pennsauken, N.J.
Barden Co., Div. Interdyne Co., Los Angeles, Cal.
BECO Solid State Systems, Salem, Va.
Behlman Engrg. Corp., Santa Barbara, Cal.
B.H. Inds., Los Angeles, Cal.
Broadview Inds. Corp., Hempstead, N.Y.
Dorsett Elctrns., Tulsa, Okla.
Esterline Angus Div., Indianapolis, Ind.
General Radio Co., Concord, Mass.
Heath Co., Benton Harbor, Mich.
Hope Elctrns., Clifton, N.J.
Kikusui Elctrns. Corp., Kawasaki City, Kanagawa-Pref., Japan
Leader Instr. Corp., Long Island City, N.Y.
Levell Electronics Ltd., High Barnet, Herts,, England
Mennen-Greatbatch Elctrns., Inc., Clarence, N.Y.
Optimation, Inc., Sun Valley, Calif.
Signetics Corp., Sunnyvale, Calif.
Spectral Dynamics Corp. San Diego, San Diego, Cal.
Systems Elctrns., Cleveland, Ohio
Telonic Inds., Inc., Laguna Beach, Calif.
Transducer Systems, Inc., Willow Grove, Pa.
Transystems Elctrn. Co., Fort Lee, N.J.
Waveforms, No. Hollywood, Cal.

Oscillators, Sweep

Clarke - Hess, New York, N.Y.
E-H Resch. Labs., Inc., Oakland, Cal.
Electro/Data, Inc., Garland, Tex.
Exact Elctrns., Inc., Hillsboro, Ore.
Hewlett-Packard, Palo Alto, Cal.
Hickok Elect. Instr., Cleveland, Ohio
Ind'l. Control Co., Farmingdale, N.Y.
Interstate Elctrns. Corp., Anaheim, Cal.
Kay Elemetrics, Pine Brook, N.J.
Microdot Inc., City of Industry, Cal.
Polarad Elctrn. Instrs., Lake Success, N.Y.
Singer Instrumentation Palo Alto Oper., Palo Alto, Cal.
Solid State Elctrns., Sepulveda, Cal.
Systron-Donner Kruse Elctrns. Sub., Mountain View, Cal.
Texscan Corp., Indianapolis, Ind.
Watkins Johnson Co., Palo Alto, Cal.
Wavetek, San Diego, Cal.
AIL, Div. Cutler-Hammer, Inc., Deer Park, N.Y.
Anritsu Electric Co., Ltd., Tokyo, Japan
Blonder-Tongue Labs., Inc., Old Bridge, N.J.
Dittmore-Freimuth Corp., Milwaukee, Wisc.
Eico Electronic Instrument Co., Inc., Brooklyn, N.Y.
EMF Systems, Inc., State College, Pa.
Hope Elctrns., Clifton, N.J.
Leader Instr. Corp., Long Island City, N.Y.
Matsushita Comm. Ind'l. Co., Ltd., Yokohama, Japan
Micro-Now Instr., Chicago, Ill.
Micro-Power, Inc., Long Island City, N.Y.
Narda Microwave Corp., Plainview, N.Y.
Neptune Elctrns. Co., New York, N.Y.
Northeast Elctrns. Corp., Concord, N.H.
Omni-Spectra, Inc., Scottsdale, Ariz.
Radio Resch. Co., Rockaway, N.J.
RFD, Inc., Tampa, Fla.
Rohde & Schwarz Sls., Passaic, N.J.
Scientific Communications, Garland, Tex.
Servo Corp. America, Hicksville, N.Y.
Siemens Corp., Comps. Div., Iselin, N.J.
Siemens Corp., Comm. Eq. Div., Iselin, N.J.
Spectral Dynamics Corp. San Diego, San Diego, Cal.
Systems Resch. Labs., Dayton, Ohio
Tel-Instr. Elctrns. Corp., Carlstadt, N.J.
Telonic Inds., Inc., Laguna Beach, Calif.
Transystems Elctrn. Co., Fort Lee, N.J.
Unholtz-Dickie Corp., Hamden, Conn.
Wand Elctrns., Inc., Old Bethpage, N.Y.
Waveforms, No. Hollywood, Cal.
Wiltron Co., Palo Alto, Calif.

Oscillators, Telemetry

Accutronics, Inc., Geneva, Ill.
Almond Instrs. Co., Covina, Cal
Arra Inc., Bayshore, N.Y.
Austron, Inc., Austin, Tex.
Avtel Corp., Covina, Cal.
Bramco Controls, Piqua, Ohio p 1406
CTS Corp, Elkhart, Ind.
Data-Control Systems, Danbury, Conn.
Exact Elctrns., Inc., Hillsboro, Ore.
Ferwalt, W.H., Inc., Lapwai, Idaho
Fork Standards, W. Chicago, Ill.
Frequency Control, Inc., Austin, Tex.
Frequency Elctrns., New Hyde Pk., N.Y. p 1391
Frequency Sources, No. Chelmsford, Mass. p 1560,1561
General Elec. Co., Schenectady, N.Y.
Gibbs Mfg. & Resch., Janesville, Wisc.
Greenray Inds., Inc., Mechanicsburg, Pa. p 1393
Hughes Aircraft Co., Mos Div., Newport Beach, Cal.
Kay Elemetrics, Pine Brook, N.J.
M F Elctrns. Corp., New York, N.Y. p 1413
Polarad Elctrn. Instrs., Lake Success, N.Y.
Quindar Elctrns., Inc., Springfield, N.J.
Solid State Elctrns., Sepulveda, Cal.
Sonex, Inc., Bethayres, Pa. p 955
Vectron Labs., Inc., Norwalk, Conn.
Watkins Johnson Co., Palo Alto, Cal.
Wavetek, San Diego, Cal.
AMBAC Inds., Garden City, N.Y.
Aydin Data Systems, Ft. Washington, Pa
Beukers Labs., Inc., Hauppauge, N.Y.
Collins Radio Co., Cedar Rapids, Iowa
Collins Radio Co., Dallas, Tex.
Defense Elctrns., Inc., Rockville, Md.
Dorsett Elctrns., Tulsa, Okla.
Dynamic Precision Controls, Hagerstown, Ind.
EMF Systems, Inc., State College, Pa.
General Devices, Inc., Princeton, N.J.
General Instr. Corp., Hicksville, N.Y.
Hughes Aircraft Co, Culver City, Cal.
Hughes Aircraft Co, Fullerton, Cal.
Lansdale Microelectronics Div., Metuchen, N.J.
Lear Siegler, Inc., Santa Monica, Calif.
Micromega, Los Angeles, Cal.
Microwave Div, Nashua, N.H.
OMNI Spectra, Farmington, Mich.
Ramsay Engrg. Co., Anaheim, Calif.
RFD, Inc., Tampa, Fla.
Sage Labs. Inc., Natick, Mass.
Scientific-Atlanta, Inc., Atlanta, Ga.
Special Microwave Devices Oper., Waltham, Mass.
Trak Microwave, Tampa, Fla.
Transystems Elctrn. Co., Fort Lee, N.J.
Trepac Corp. America, Englewood, N.J.
Video Resch. Corp., Rockville, Md.
Wand Elctrns., Inc., Old Bethpage, N.Y.

Oscillators, Temperature Compensated

Arra Inc., Bayshore, N.Y.
Arvin Frequency Devices, Columbus, Ind. p 1361
Atomichron, Inc., New Hyde Park, N.Y. p 469
Austron, Inc., Austin, Tex.
Bliley Electric, Erie, Pa. p 1367
Bulova Watch Co., Freq. Control Prods., Elctrns. Div., Woodside, N.Y. p 1365
CTS Corp, Elkhart, Ind. p 1374
Electronic Research Co., Shawnee Mission, Kans. p 1384
Erie Frequency Control, Carlisle, Pa. p 1383
Erie Technological Prods. (EEM), Erie, Pa. p 1383
Ferwalt, W.H., Inc., Lapwai, Idaho p 1385
Fork Standards, W. Chicago, Ill. p 1387,1388
Frequency Elctrns., New Hyde Pk., N.Y. p 469
General Elec. Co., Schenectady, N.Y.
Gibbs Mfg. & Resch., Janesville, Wisc. p 1400
Greenray Inds., Inc., Mechanicsburg, Pa. p 1392,1393
Hewlett-Packard, Palo Alto, Cal.
McCoy Elctrns. Co., Mt. Holly Springs, Pa. p 1411
M F Elctrns. Corp., New York, N.Y. p 1413
Monitor Prods., S. Pasadena, Cal. p 1415
Motorola Communications & Electrns., Chicago, Ill. p 1417
Ovenaire, Inc., Charlottesville, Va. p 1422
Polarad Elctrn. Instrs., Lake Success, N.Y.
Snelgrove, C. R. Ltd., Don Mills, Ont. Can. p 1428
Spectrum Technology, Goleta, Cal. p 1429
TMC Systems (Ariz.), Tempe, Ariz. p 1430
Vectron Labs., Inc., Norwalk, Conn. p 1433
Addington Labs., Inc., Santa Clara, Calif.
Arvin Sys., Inc., Dayton, Ohio
Avantek, Inc., Santa Clara, Cal.
Behlman Engrg. Corp., Santa Barbara, Cal.
California Instrs. Co., San Diego, Cal.
Collins Radio Co., Newport Beach, Calif.
Hughes Aircraft Co, Culver City, Cal.
Omni-Spectra, Inc., Scottsdale, Ariz.
Ramsay Engrg. Co., Anaheim, Calif.
Tedford Crystal Labs., Cincinnati, Ohio
Trak Microwave, Tampa, Fla.
Wand Elctrns., Inc., Old Bethpage, N.Y.

Oscillators, Test

Austron, Inc., Austin, Tex.
Behlman Div., San Diego, Cal
Computer Devices, Commack, N.Y. p 2739
CTS Corp, Elkhart, Ind.
Data-Control Systems, Danbury, Conn.
Dranetz Engrg. Labs., Plainfield, N.J.
Exact Elctrns., Inc., Hillsboro, Ore.
Fork Standards, W. Chicago, Ill. p 1387
Frequency Control, Inc., Austin, Tex.
Frequency Elctrns., New Hyde Pk., N.Y.
Gibbs Mfg. & Resch., Janesville, Wisc.
Hewlett-Packard, Palo Alto, Cal.
Hickok Elect. Instr., Cleveland, Ohio
Krohn-Hite, Cambridge, Mass. p 512
McCoy Elctrns. Co., Mt. Holly Springs, Pa. p 1411
Meloy Laboratories, Springfield, Va. p 1407
M F Elctrns. Corp., New York, N.Y. p 1413
Microdot Inc., City of Industry, Cal. p 522
Polarad Elctrn. Instrs., Lake Success, N.Y.
Preston Scientific, Anaheim, Cal.
Solid State Elctrns., Sepulveda, Cal.
Vectron Labs., Inc., Norwalk, Conn. p 1433
Wavetek, San Diego, Cal.
BAC Elctrns., Pennsauken, N.J.
Behlman Engrg. Corp., Santa Barbara, Cal.
California Instrs. Co., San Diego, Cal.
Collins Radio Co., Dallas, Tex.
Consolidated Resistance Sls., Yonkers, N.Y.
Dorsett Elctrns., Tulsa, Okla.
EMF Systems, Inc., State College, Pa.
Esterline Angus Div., Indianapolis, Ind.
General Radio Co., Concord, Mass.
Heath Co., Benton Harbor, Mich.
Instrument Labs. Corp., Chicago, Ill.
Int'l. Microwave, Cos Cob, Conn.
Leader Instr. Corp., Long Island City, N.Y.
Microdot Inc., S. Pasadena, Calif.
Muirhead, Inc., Mountainside, N.J.
Northeast Elctrns. Corp., Concord, N.H.
Omni-Spectra, Inc., Scottsdale, Ariz.
Optimation, Inc., Sun Valley, Calif.
Radio Resch. Co., Rockaway, N.J.
Sage Labs. Inc., Natick, Mass.
Siemens Corp., Comps. Div., Iselin, N.J.
Spencer-Kennedy Labs., Inc., Winchester, Mass.
Technical Mat'l., Mamaroneck, N.Y.
Tel-Instr. Elctrns. Corp., Carlstadt, N.J.
Telonic Inds., Inc., Laguna Beach, Calif.
Unholtz-Dickie Corp., Hamden, Conn.
Waveforms, No. Hollywood, Cal.
Winatic Corp., Vestal, N.Y.

Oscillators, Tuning-Fork Controlled

Accutronics, Inc., Geneva, Ill.
American Time Products, Woodside, N.Y. p 1366
Biddle, James G., Plymouth Meeting, Pa.
Bramco Controls, Piqua, Ohio
Bulova Watch Elctrns. Div. Amer. Time Prods., Woodside, N.Y. p 1366
Fork Standards, W. Chicago, Ill. p 1387-1389
Frequency Control, Inc., Austin, Tex.
Ind'l. Test Equip., Port Washington, N.Y.
Meloy Laboratories, Springfield, Va. p 1407
Philamon, Inc., Westbury, N.Y. p 1424
Solid State Elctrns., Sepulveda, Cal.
Spectrum Technology, Goleta, Cal. p 1429
Torotel, Inc., Grandview, Mo.
Weinschel Engrg. Co., Gaithersburg, Md.
Barden Co., Div. Interdyne Co., Los Angeles, Cal.
Behlman Engrg. Corp., Santa Barbara, Cal.
California Instrs. Co., San Diego, Cal.
Collins Radio Co., Dallas, Tex.
HB Engrg. Corp., Silver Spring, Md.
Meson Elctrns. Co., Inc., Rochester, N.Y.
Muirhead, Inc., Mountainside, N.J.
Riverbank Labs., Geneva, Ill.
Tel-Instr. Elctrns. Corp., Carlstadt, N.J.

Oscillators, UHF, VHF

Accutronics, Inc., Geneva, Ill.
Applied Microwave Lab., Andover, Mass. p 599
Arvin Frequency Devices, Columbus, Ind. p 1361
Bliley Electric, Erie, Pa.
Bulova Watch Co., Freq. Control Prods., Elctrns. Div., Woodside, N.Y.
Electro/Data, Inc., Garland, Tex.
Frequency Elctrns., New Hyde Pk., N.Y.
Frequency Engrg. Labs., Farmingdale, N.J.
Frequency Sources, No. Chelmsford, Mass. p 1560,1561
General Elec. Co., Schenectady, N.Y.
Hewlett-Packard, Palo Alto, Cal.
Hughes Aircraft Co., Mos Div., Newport Beach, Cal.
Kay Elemetrics, Pine Brook, N.J.
Marconi Instrs., Englewood, N.J. p 520
McCoy Elctrns. Co., Mt. Holly Springs, Pa. p 1411
Microdot Inc., City of Industry, Cal. p 522

Microwave Cavity Labs., La Grange, Ill. p 611
Ovenaire, Inc., Charlottesville, Va. p 1423
Polarad Elctrn. Instrs., Lake Success, N.Y.
RHG Elctrns. Lab., Farmingdale, N.Y.
Ryka Scientific, Inc., Sunnyvale, Cal. p 1564
Vectron Labs., Inc., Norwalk, Conn. p 1433
Watkins Johnson Co., Palo Alto, Cal.
Wavetek, San Diego, Cal.
Addington Labs., Inc., Santa Clara, Calif.
AMBAC Inds., Garden City, N.Y.
Anritsu Electric Co., Ltd., Tokyo, Japan
A.R.F. Products, Inc., Boulder, Colo.
Arvin Sys., Inc., Dayton, Ohio
AUL Instrs., Inc., Flushng, N.Y.
Avantek, Inc., Santa Clara, Cal.
CCA Elctrns. Corp., Gloucester, N.J.
Collins Radio Co., Cedar Rapids, Iowa
Collins Radio Co., Dallas, Tex.
EMF Systems, Inc., State College, Pa.
Energy Systems, Palo Alto, Cal.
Engineering Assocs., Dayton, Ohio
General Instr. Corp., Hicksville, N.Y.
General Radio Co., Concord, Mass.
Hope Elctrns., Clifton, N.J.
HRB-Singer, Inc., State College, Pa.
Hughes Aircraft Co, Culver City, Cal.
Hughes Aircraft Co, Fullerton, Cal.
Itek Corp., Lexington, Mass.
Leader Instr. Corp., Long Island City, N.Y.
Litton Inds., San Carlos, Calif.
Micro-Tel Corp., Baltimore, Md.
Microdot Inc., S. Pasadena, Calif.
Micromega, Los Angeles, Cal.
Microwave Div, Nashua, N.H.
MITEQ, Inc., Hauppauge, N.Y.
OMNI Spectra, Farmington, Mich.
Omni-Spectra, Inc., Scottsdale, Ariz.
Philips Elctrns. Inds., Ltd., Toronto 17, Can.
Radio Resch. Co., Rockaway, N.J.
Rodelco, Deer Park, N.Y.
Rohde & Schwarz Sls., Passaic, N.J.
Sage Labs. Inc., Natick, Mass.
Sanders Assocs., Nashua, N.H.
Scientific-Atlanta, Inc., Atlanta, Ga.
Scientific Communications, Garland, Tex.
Somerset Radiation Lab., Arlington, Va.
Special Microwave Devices Oper., Waltham, Mass.
Systems Elctrns., Cleveland, Ohio
Tel-Instr. Elctrns. Corp., Carlstadt, N.J.
Telonic Inds., Inc., Laguna Beach, Calif.
Trak Microwave, Tampa, Fla.
Wand Elctrns., Inc., Old Bethpage, N.Y.
Wiltron Co., Palo Alto, Calif.
Zeta Labs., Inc., Mountain View, Calif.

Oscillators, Ultra-Low-Frequency

Accutronics, Inc., Geneva, Ill. p 1354,1356
American Time Products, Woodside, N.Y. p 1366
Austron, Inc., Austin, Tex.
Bliley Electric, Erie, Pa. p 1367
Bulova Watch Elctrns. Div. Amer. Time Prods., Woodside, N.Y. p 1366
Bulova Watch Co., Freq. Control Prods., Elctrns. Div., Woodside, N.Y. p 1365
Clarke - Hess, New York, N.Y.
Computer Devices, Commack, N.Y. p 2739
Connor-Winfield Corp., Winfield, Ill.
CTS Corp, Elkhart, Ind.
Exact Elctrns., Inc., Hillsboro, Ore.
Ferwalt, W.H., Inc., Lapwai, Idaho p 1385
Fork Standards, W. Chicago, Ill. p 1387-1389
Frequency Control, Inc., Austin, Tex.
Frequency Elctrns., New Hyde Pk., N.Y. p 1391
Gibbs Mfg. & Resch., Janesville, Wisc. p 1397,1399,1400
Greenray Inds., Inc., Mechanicsburg, Pa. p 1392,1393
Hewlett-Packard, Palo Alto, Cal.
Hughes Aircraft Co., Frequency Control Devices, Newport Bch., Cal.
Interstate Elctrns. Corp., Anaheim, Cal.
J-B-T Instrs., Inc., New Haven, Conn.
Kay Elemetrics, Pine Brook, N.J.
Krohn-Hite, Cambridge, Mass. p 512
McCoy Elctrns. Co., Mt. Holly Springs, Pa. p 1411
Monitor Prods., S. Pasadena, Cal. p 1414
Ovenaire, Inc., Charlottesville, Va.
Polarad Elctrn. Instrs., Lake Success, N.Y.
Rockland Sys. Corp., Blauvelt, N.Y.
Solid State Elctrns., Sepulveda, Cal.
Wavetek, San Diego, Cal.
Agastat Div., Elizabeth, N.J.
Arvin Sys., Inc., Dayton, Ohio
Behlman Engrg. Corp., Santa Barbara, Cal.
Collins Radio Co., Dallas, Tex.
Esterline Angus Div., Indianapolis, Ind.
General Radio Co., Concord, Mass.
HB Engrg. Corp., Silver Spring, Md.
Hughes Aircraft Co, Fullerton, Cal.
Muirhead, Inc., Mountainside, N.J.
Optimation, Inc., Sun Valley, Calif.
Riverbank Labs., Geneva, Ill.
Rohde & Schwarz Sls., Passaic, N.J.
Special Microwave Devices Oper., Waltham, Mass.
Spectral Dynamics Corp. San Diego, San Diego, Cal.
Telonic Inds., Inc., Laguna Beach, Calif.
Trepac Corp. America, Englewood, N.J.
Waveforms, No. Hollywood, Cal.
Weston Instruments, Inc., Newark, N.J.

Oscillators, Ultrasonic

Behlman Div., San Diego, Cal
Data Delay Devices, Clifton, N.J.
Dranetz Engrg. Labs., Plainfield, N.J.
Elctrn. Enterprises, Newark, N.J.
Hewlett-Packard, Palo Alto, Cal.
Kay Elemetrics, Pine Brook, N.J.
Krohn-Hite, Cambridge, Mass. p 512
Wavetek, San Diego, Cal.
Advanced Patent Technology, Inc., Las Vegas, Nev.
AMBAC Inds., Garden City, N.Y.
Aperco Co., East Meadow, N.Y.
Arenberg Ultrasonic Lab., Inc., Jamaica Plain, Mass.
Behlman Engrg. Corp., Santa Barbara, Cal.
E.B.L. Co, East Hartford, Conn.
Hope Elctrns., Clifton, N.J.
Hughes Aircraft Co, Culver City, Cal.
Optimation, Inc., Sun Valley, Calif.
Ramsay Engrg. Co., Anaheim, Calif.
TAC Tech. Instr. Corp., Trenton, N.J.
Telonic Inds., Inc., Laguna Beach, Calif.
Waveforms, No. Hollywood, Cal.

Oscillators, Voltage Controlled

Accutronics, Inc., Geneva, Ill. p 1360
Almond Instrs. Co., Covina, Cal
Applied Microwave Lab., Andover, Mass.
Arra Inc., Bayshore, N.Y.
Arvin Frequency Devices, Columbus, Ind. p 1361
Austron, Inc., Austin, Tex.
Avtel Corp., Covina, Cal.
Bliley Electric, Erie, Pa.
Bulova Watch Co., Freq. Control Prods., Elctrns. Div., Woodside, N.Y. p 1365
Clarke - Hess, New York, N.Y.
CML-Macarr, Inc., Edison, N.J.
CTS Corp, Elkhart, Ind. p 1374
Damon Corp., Needham Hgts., Mass. p 1379
Data-Control Systems, Danbury, Conn.
Electro/Data, Inc., Garland, Tex.
Electronic Research Co., Shawnee Mission, Kans. p 1364
Erie Frequency Control, Carlisle, Pa. p 1383
Erie Technological Prods. (EEM), Erie, Pa. p 1383
Exact Elctrns., Inc., Hillsboro, Ore.
Ferwalt, W.H., Inc., Lapwai, Idaho p 1385
Fork Standards, W. Chicago, Ill. p 1387
Frequency Elctrns., New Hyde Pk., N.Y.
Frequency Sources, No. Chelmsford, Mass.
Gibbs Mfg. & Resch., Janesville, Wisc.
Greenray Inds., Inc., Mechanicsburg, Pa. p 1392,1393
Hewlett-Packard, Palo Alto, Cal.
Hughes Aircraft Co., Frequency Control Devices, Newport Bch., Cal.
Hughes Aircraft Co., Mos Div., Newport Beach, Cal.
Interstate Elctrns. Corp., Anaheim, Cal.
Kay Elemetrics, Pine Brook, N.J.
Matrix Corp., Beech Grove, Ind.
McCoy Elctrns. Co., Mt. Holly Springs, Pa. p 1411
M F Elctrns. Corp., New York, N.Y. p 1412
Monitor Prods., S. Pasadena, Cal. p 1414
Ovenaire, Inc., Charlottesville, Va. p 1422
Reeves-Hoffman Div., Carlisle, Pa. p 1427
RHG Elctrns. Lab., Farmingdale, N.Y.
Ryka Scientific, Inc., Sunnyvale, Cal. p 1564
Snelgrove, C. R. Ltd., Don Mills, Ont. Can.
Solid State Elctrns., Sepulveda, Cal. p 954
Sonex, Inc., Bethayres, Pa. p 955
Systron-Donner Kruse Elctrns. Sub., Mountain View, Cal.
Texscan Corp., Indianapolis, Ind.
TMC Systems (Ariz.), Tempe, Ariz. p 1430
Vectron Labs., Inc., Norwalk, Conn. p 1433
Watkins Johnson Co., Palo Alto, Cal.
Wavetek, San Diego, Cal.
Addington Labs., Inc., Santa Clara, Calif.
AMBAC Inds., Garden City, N.Y.
Anritsu Electric Co., Ltd., Tokyo, Japan
Arvin Sys., Inc., Dayton, Ohio
Avantek, Inc., Santa Clara, Cal.
Behlman Engrg. Corp., Santa Barbara, Cal.
Beukers Labs., Inc., Hauppauge, N.Y.
Burr-Brown Resch. Corp., Tucson, Ariz.
Collins Radio Co., Dallas, Tex.
Consolidated Resistance Sls., Yonkers, N.Y.
Dorsett Elctrns., Tulsa, Okla.
EMF Systems, Inc., State College, Pa.
FKS Comms., Inc., New Hyde Park, N.Y.
General Radio Co., Concord, Mass.
Hope Elctrns., Clifton, N.J.
Int'l. Microwave, Cos Cob, Conn.
ITT Electron Tube, Easton, Pa.
Kikusui Elctrns. Corp., Kawasaki City, Kanagawa-Pref., Japan
Lansdale Microelectronics Div., Metuchen, N.J.
Lear Siegler, Inc., Santa Monica, Calif.
Lear Siegler, Anaheim, Cal.
Micro-Power, Inc., Long Island City, N.Y.
Microcom Corp., Horsham, Pa.
Microwave Development Labs., Inc., Needham Hgts., Mass.
Microwave Div, Nashua, N.H.
Microwave/Sys., Inc., E. Syracuse, N.Y.
MITEQ, Inc., Hauppauge, N.Y.
OMNI Spectra, Farmington, Mich.
Omni-Spectra, Inc., Scottsdale, Ariz.
Physical Elctrn. Labs., Menlo Park, Calif.
Radio Resch. Co., Rockaway, N.J.
Ramsay Engrg. Co., Anaheim, Calif.
Rodelco, Deer Park, N.Y.
Scientific Communications, Garland, Tex.
Signal Analysis Inds. Corp., Hauppauge, N.Y.
Signetics Corp., Sunnyvale, Calif.
Singer - Tele-Signal, Woodbury, N.Y.
Special Microwave Devices Oper., Waltham, Mass.
Technical Mat'l., Mamaroneck, N.Y.
Trak Microwave, Tampa, Fla.
Transystems Elctrn. Co., Fort Lee, N.J.
Vidar Corp., Mountain View, Cal.
Video Resch. Corp., Rockville, Md.
Wand Elctrns., Inc., Old Bethpage, N.Y.
Waveforms, No. Hollywood, Cal.

Oscillographs, Direct Writing

Computer Instrs., Hempstead, N.Y.
Dixson Inc., Grand Junction, Colo.
Gould, Inc., Cleveland, Ohio p 588,589
Hewlett-Packard, Palo Alto, Cal.
Honeywell, Denver, Colo. p 590
Teledyne Geotech, Dallas, Tex.
Beckman Instrs., (AISSD), Fullerton, Cal.
Bell & Howell Co., Pasadena, Calif.
BLH Elctrns., Inc., Waltham, Mass.
Dixson, Inc., Grand Junction, Colo.
Esterline Angus Div., Indianapolis, Ind.
Geo Space, Houston, Tex.
Gordon Alan Entprs., N. Hollywood, Cal.
Hallmark Standards, Inc., Mt. Vernon, N.Y.
Japanese Prods. Corp., New Rochelle, N.Y.
Mechanics For Elctrns., Inc., Wilmington, Mass.
Mennen-Greatbatch Elctrns., Inc., Clarence, N.Y.
Photron Instr. Co., Cleveland, Ohio
San-ei Instrument Co., Ltd., Shinjuku-ku, Tokyo 160, Japan
Soltec Corp., No. Hollywood, Cal.
Varian Data Machines, Palo Alto, Cal.
Yewtec Corporation, Larchmont, N.Y.

Oscillographs, Direct Writing, Multichannel

Gould, Inc., Cleveland, Ohio p 588,589
Hathaway Comps., Denver, Colo.
Hewlett-Packard, Palo Alto, Cal.
Honeywell, Denver, Colo. p 590
Teledyne Geotech, Dallas, Tex.
Beckman Instrs., (AISSD), Fullerton, Cal.
Bell & Howell Co., Pasadena, Calif.
BLH Elctrns., Inc., Waltham, Mass.
Dixson, Inc., Grand Junction, Colo.
Esterline Angus Div., Indianapolis, Ind.
Geo Space, Houston, Tex.
Gordon Alan Entprs., N. Hollywood, Cal.
Hallmark Standards, Inc., Mt. Vernon, N.Y.
Japanese Prods. Corp., New Rochelle, N.Y.
Mechanics For Elctrns., Inc., Wilmington, Mass.
Photron Instr. Co., Cleveland, Ohio
San-ei Instrument Co., Ltd., Shinjuku-ku, Tokyo 160, Japan
Soltec Corp., No. Hollywood, Cal.
Stoelting Co., Chicago, Ill.
Yewtec Corporation, Larchmont, N.Y.

Oscillographs, Portable

Gould, Inc., Cleveland, Ohio p 588,589
Hewlett-Packard, Palo Alto, Cal.
Honeywell, Denver, Colo.
Beckman Instrs., (AISSD), Fullerton, Cal.
Bell & Howell Co., Pasadena, Calif.
BLH Elctrns., Inc., Waltham, Mass.
Dixson, Inc., Grand Junction, Colo.
Esterline Angus Div., Indianapolis, Ind.
Geo Space, Houston, Tex.
Gordon Alan Entprs., N. Hollywood, Cal.
Hallmark Standards, Inc., Mt. Vernon, N.Y.
Japanese Prods. Corp., New Rochelle, N.Y.
Mechanics For Elctrns., Inc., Wilmington, Mass.
Mennen-Greatbatch Elctrns., Inc., Clarence, N.Y.
Photron Instr. Co., Cleveland, Ohio
San-ei Instrument Co., Ltd., Shinjuku-ku, Tokyo 160, Japan
Soltec Corp., No. Hollywood, Cal.
Yewtec Corporation, Larchmont, N.Y.

Oscilloscope Amplifier Plug-Ins

Electro/Data, Inc., Garland, Tex. p 1559
Hewlett-Packard, Palo Alto, Cal.
Hickok Elect. Instr., Cleveland, Ohio
Millen, James Mfg., Malden, Mass. p 523
Tektronix, Inc., Beaverton, Ore.
Telequipment, Ltd., Beaverton, Ore.
Texscan Corp., Indianapolis, Ind.
BAC Elctrns., Pennsauken, N.J.
Dumont Oscilloscope Labs., Inc., W. Caldwell, N.J.
General Atronics, Elctrn. Instr., Philadelphia, Pa.
Heath Co., Benton Harbor, Mich.
Integrated Controls, San Diego, Cal.
Leader Instr. Corp., Long Island City, N.Y.

Oscilloscope Cameras—See Cameras, Oscilloscope—Vol 2

Oscilloscope Image Expanders—See Vol 2

Oscilloscope Oscillator Plug-Ins

Austron, Inc., Austin, Tex.
Vector Engrg., Springfield, N.J.
Vector Engrg., Springfield, N.J. p 943

Oscilloscope Preamplifier Plug-Ins

American Elctrn. Labs., Inc., Lansdale, Pa.
Hewlett-Packard, Palo Alto, Cal.
Hickok Elect. Instr., Cleveland, Ohio
Millen, James Mfg., Malden, Mass. p 523
Tektronix, Inc., Beaverton, Ore.
Telequipment, Ltd., Beaverton, Ore.
BAC Elctrns., Pennsauken, N.J.
Dumont Oscilloscope Labs., Inc., W. Caldwell, N.J.
Integrated Controls, San Diego, Cal.
Leader Instr. Corp., Long Island City, N.Y.
Wolff Industries, San Marino, Cal

Oscilloscope Probes

Circon Corp., Goleta, Cal.
E-H Resch. Labs., Inc., Oakland, Cal.
E-Z Hook, Test Prods., Arcadia, Cal. p 2623
Hewlett-Packard, Palo Alto, Cal.
Hickok Elect. Instr., Cleveland, Ohio
Millen, James Mfg., Malden, Mass. p 523
Tektronix, Inc., Beaverton, Ore.
Telequipment, Ltd., Beaverton, Ore.
Texscan Corp., Indianapolis, Ind.
Active Control Instrumentation, E. Northport, NY
BAC Elctrns., Pennsauken, N.J.
Dumont Oscilloscope Labs., Inc., W. Caldwell, N.J.
Dynascan Corp., Chicago, Ill.
Eico Electronic Instrument Co., Inc., Brooklyn, N.Y.
Fairlane Electronics, Inc., Long Valley, N.J.
Heath Co., Benton Harbor, Mich.
Leader Instr. Corp., Long Island City, N.Y.
Matsushita Comm. Ind'l. Co., Ltd., Yokohama, Japan
Philips Elctrn. Instrs., Mt. Vernon, N.Y.
Projects Unlimited, Inc., Dayton, Ohio
Raytheon Instrs., Lexington, Mass.
Robertson Instr., Azusa, Cal.
Walden Elctrns. Corp., Waltham, Mass.
Waterman Instr. Corp., Hatboro, Pa.

Oscilloscope Time-Base Generator Plug-Ins

Accutronics, Inc., Geneva, Ill.
Hewlett-Packard, Palo Alto, Cal.
Tektronix, Inc., Beaverton, Ore.
Telequipment, Ltd., Beaverton, Ore.
Texscan Corp., Indianapolis, Ind.
Dumont Oscilloscope Labs., Inc., W. Caldwell, N.J.
Heath Co., Benton Harbor, Mich.

Oscilloscopes, Digital Readout

Automated Meas., Oakland, Calif.
Tektronix, Inc., Beaverton, Ore.

Oscilloscopes, General Purpose

Hewlett-Packard, Palo Alto, Cal.
Hickok Elect. Instr., Cleveland, Ohio p 489
Infodex, Inc., Waterbury, Conn.... p 498
Millen, James Mfg., Malden, Mass. p 523
RCA Elctrns. Comps., Harrison, N.J. p 551
Simpson Elec. Co., Chicago, Ill.
Tektronix, Inc., Beaverton, Ore..... p 566
Telequipment, Ltd., Beaverton, Ore. p 566
Texscan Corp., Indianapolis, Ind.
AUL Instrs., Inc., Flushng, N.Y.
BAC Elctrns., Pennsauken, N.J.
Central Scientific Co., Chicago, Ill.
Dumont Oscilloscope Labs., Inc., W. Caldwell, N.J.
Dynascan Corp., Chicago, Ill.
Ealing Corp., Cambridge, Mass.
Eico Electronic Instrument Co., Inc., Brooklyn, N.Y.
Electronic Meas. Corp., New York, N.Y.
Entron Inc., Morganville, N.J.
Fairlane Electronics, Inc., Long Valley, N.J.
General Atronics, Elctrn. Instr., Philadelphia, Pa.
Heath Co., Benton Harbor, Mich.
Indofex, Inc., Waterbury, Conn.
ITI Electronics, Inc., Clifton, N.J.
Kikusui Elctrns. Corp., Kawasaki City, Kanagawa-Pref., Japan
Leader Instr. Corp., Long Island City, N.Y.
Matsushita Comm. Ind'l. Co., Ltd., Yokohama, Japan
Philips Elctrn. Instrs., Mt. Vernon, N.Y.
Raytheon Instrs., Lexington, Mass.
Robertson Instr., Azusa, Cal.
Soltec Corp., No. Hollywood, Cal.
Stark Elctrn. Instrs., Ltd., Ajax, Ont., Canada
Telonic Inds., Inc., Laguna Beach, Calif.
Viz Mfg. Co., Philadelphia, Pa.
Vu-data Corp., San Diego, Cal.
Waterman Instr. Corp., Hatboro, Pa.

Oscilloscopes, High Frequency

Automated Meas., Oakland, Calif. p 444,445
E-H Resch. Labs., Inc., Oakland, Cal. p 444,445
Hewlett-Packard, Palo Alto, Cal.
Infodex, Inc., Waterbury, Conn..... p 498
RCA Elctrns. Comps., Harrison, N.J.
Tektronix, Inc., Beaverton, Ore..... p 566
Telequipment, Ltd., Beaverton, Ore. p 566
Texscan Corp., Indianapolis, Ind.
Dumont Oscilloscope Labs., Inc., W. Caldwell, N.J.
Dynascan Corp., Chicago, Ill.
Entron Inc., Morganville, N.J.
General Atronics, Elctrn. Instr., Philadelphia, Pa.
Indofex, Inc., Waterbury, Conn.
Matsushita Comm. Ind'l. Co., Ltd., Yokohama, Japan
Philips Elctrn. Instrs., Mt. Vernon, N.Y.
Raytheon Instrs., Lexington, Mass.
Vu-data Corp., San Diego, Cal.

Oscilloscopes, Low Frequency

Behlman Div., San Diego, Cal
Calico Div., San Diego, Cal.
Hewlett-Packard, Palo Alto, Cal.
Hickok Elect. Instr., Cleveland, Ohio p 489
Infodex, Inc., Waterbury, Conn..... p 498
Tektronix, Inc., Beaverton, Ore.
Telequipment, Ltd., Beaverton, Ore.
Texscan Corp., Indianapolis, Ind.
BAC Elctrns., Pennsauken, N.J.
California Instrs. Co., San Diego, Cal.
Communication Elctrns., Rockville, Md.
Dumont Oscilloscope Labs., Inc., W. Caldwell, N.J.
Eico Electronic Instrument Co., Inc., Brooklyn, N.Y.
Entron Inc., Morganville, N.J.
General Atronics, Elctrn. Instr., Philadelphia, Pa.
Heath Co., Benton Harbor, Mich.
Indofex, Inc., Waterbury, Conn.
Kikusui Elctrns. Corp., Kawasaki City, Kanagawa-Pref., Japan
Leader Instr. Corp., Long Island City, N.Y.
Matsushita Comm. Ind'l. Co., Ltd., Yokohama, Japan
Philips Elctrn. Instrs., Mt. Vernon, N.Y.
Robertson Instr., Azusa, Cal.
Telonic Inds., Inc., Laguna Beach, Calif.
Vu-data Corp., San Diego, Cal.
Waterman Instr. Corp., Hatboro, Pa.

Oscilloscopes, Medical

Calico Div., San Diego, Cal. ..... p 424
Gould, Inc., Cleveland, Ohio
Hewlett-Packard, Palo Alto, Cal.
Hickok Elect. Instr., Cleveland, Ohio
Honeywell, Denver, Colo.
Infodex, Inc., Waterbury, Conn..... p 498
Tektronix, Inc., Beaverton, Ore.
Texscan Corp., Indianapolis, Ind.
AUL Instrs., Inc., Flushng, N.Y.
Automation Inds., Los Angeles, Cal.
BAC Elctrns., Pennsauken, N.J.
Beckman Instrs., (AISSD), Fullerton, Cal.
Bio-Medical Elctrns., Inc., Rockville, Md.
Biocom, Inc., Culver City, Cal.
California Instrs. Co., San Diego, Cal.
Essential Elctrns. Corp., Cleveland, Ohio
Heath Co., Benton Harbor, Mich.
Indofex, Inc., Waterbury, Conn.
Leader Instr. Corp., Long Island City, N.Y.
Mennen-Greatbatch Elctrns., Inc., Clarence, N.Y.
Philips Elctrn. Instrs., Mt. Vernon, N.Y.
San-ei Instrument Co., Ltd., Shinjuku-ku, Tokyo 160, Japan
Telonic Inds., Inc., Laguna Beach, Calif.
Vu-data Corp., San Diego, Cal.
Waterman Instr. Corp., Hatboro, Pa.
Wolff Industries, San Marino, Cal

Oscilloscopes, Multi-Beam

Calico Div., San Diego, Cal.
Tektronix, Inc., Beaverton, Ore.
Telequipment, Ltd., Beaverton, Ore.
California Instrs. Co., San Diego, Cal.
Dumont Oscilloscope Labs., Inc., W. Caldwell, N.J.
Heath Co., Benton Harbor, Mich.
Leader Instr. Corp., Long Island City, N.Y.
Philips Elctrn. Instrs., Mt. Vernon, N.Y.
Telonic Inds., Inc., Laguna Beach, Calif.

Oscilloscopes, Multiple Channel

American Elctrn. Labs., Inc., Lansdale, Pa.
Automated Meas., Oakland, Calif.
Calico Div., San Diego, Cal. ..... p 424
Hewlett-Packard, Palo Alto, Cal.
Hickok Elect. Instr., Cleveland, Ohio
Precision Standards Corp., Santa Ana, Cal. ..... p 543
Tektronix, Inc., Beaverton, Ore.
Telequipment, Ltd., Beaverton, Ore.
Texscan Corp., Indianapolis, Ind.
Applied Magnetics Corp., Goleta, Calif.
Beckman Instrs., (AISSD), Fullerton, Cal.
California Instrs. Co., San Diego, Cal.
Dumont Oscilloscope Labs., Inc., W. Caldwell, N.J.
Ealing Corp., Cambridge, Mass.
General Atronics, Elctrn. Instr., Philadelphia, Pa.
Leader Instr. Corp., Long Island City, N.Y.
Matsushita Comm. Ind'l. Co., Ltd., Yokohama, Japan
Philips Elctrn. Instrs., Mt. Vernon, N.Y.
Raytheon Instrs., Lexington, Mass.
Stark Elctrn. Instrs., Ltd., Ajax, Ont., Canada
Systems Resch. Labs., Dayton, Ohio
Telonic Inds., Inc., Laguna Beach, Calif.
Voltex Co., Inc., Farmingdale, N.Y.
Vu-data Corp., San Diego, Cal.
Waterman Instr. Corp., Hatboro, Pa.

Oscilloscopes, Portable, Battery Operated

American Elctrn. Labs., Inc., Lansdale, Pa.
Electro/Data, Inc., Garland, Tex. p 1559
Infodex, Inc., Waterbury, Conn..... p 498
Tektronix, Inc., Beaverton, Ore..... p 566
Telequipment, Ltd., Beaverton, Ore. p 566
Texscan Corp., Indianapolis, Ind.
AUL Instrs., Inc., Flushng, N.Y.
Automation Inds., Los Angeles, Cal.
Biocom, Inc., Culver City, Cal.
Dumont Oscilloscope Labs., Inc., W. Caldwell, N.J.
Eico Electronic Instrument Co., Inc., Brooklyn, N.Y.
General Atronics, Elctrn. Instr., Philadelphia, Pa.
Indofex, Inc., Waterbury, Conn.
Leader Instr. Corp., Long Island City, N.Y.
Matsushita Comm. Ind'l. Co., Ltd., Yokohama, Japan
Philips Elctrn. Instrs., Mt. Vernon, N.Y.
Raytheon Instrs., Lexington, Mass.
Robertson Instr., Azusa, Cal.
Viz Mfg. Co., Philadelphia, Pa.
Vu-data Corp., San Diego, Cal.

Oscilloscopes, Programmable

Automated Meas., Oakland, Calif.
Hewlett-Packard, Palo Alto, Cal.
Tektronix, Inc., Beaverton, Ore.
Philips Elctrn. Instrs., Mt. Vernon, N.Y.

Oscilloscopes, Sampling

Automated Meas., Oakland, Calif.p 444,445
E-H Resch. Labs., Inc., Oakland, Cal.p 444,445
Hewlett-Packard, Palo Alto, Cal.
Tektronix, Inc., Beaverton, Ore.
Philips Elctrn. Instrs., Mt. Vernon, N.Y.

Oscilloscopes, Storage

Hewlett-Packard, Palo Alto, Cal.
Tektronix, Inc., Beaverton, Ore.
Applied Magnetics Corp., Goleta, Calif.
Hughes Aircraft Co., Ind'l. Prods. Div., Oceanside, Cal.
Hughes Aircraft Co., Ind'l. Prods. Div. Display Sys., Oceanside, Calif.
Matsushita Comm. Ind'l. Co., Ltd., Yokohama, Japan

Oscilloscopes, Three-Dimensional

Tektronix, Inc., Beaverton, Ore.
Optical Elctrns., Tucson, Ariz.
Telonic Inds., Inc., Laguna Beach, Calif.

Oscilloscopes, Wide-Band

American Elctrn. Labs., Inc., Lansdale, Pa.
Automated Meas., Oakland, Calif. p 444,445
E-H Resch. Labs., Inc., Oakland, Cal. p 444,445
Hewlett-Packard, Palo Alto, Cal.
Hickok Elect. Instr., Cleveland, Ohio p 489
Infodex, Inc., Waterbury, Conn..... p 498
RCA Elctrns. Comps., Harrison, N.J.
Simpson Elec. Co., Chicago, Ill.
Tektronix, Inc., Beaverton, Ore..... p 566
Telequipment, Ltd., Beaverton, Ore. p 566
Arco Systems Inc., Palo Alto, Cal
Dumont Oscilloscope Labs., Inc., W. Caldwell, N.J.
Dynascan Corp., Chicago, Ill.
Eico Electronic Instrument Co., Inc., Brooklyn, N.Y.
Electronic Meas. Corp., New York, N.Y.
General Atronics, Elctrn. Instr., Philadelphia, Pa.
Indofex, Inc., Waterbury, Conn.
Leader Instr. Corp., Long Island City, N.Y.
Philips Elctrn. Instrs., Mt. Vernon, N.Y.
Raytheon Instrs., Lexington, Mass.
Robertson Instr., Azusa, Cal.
Stark Elctrn. Instrs., Ltd., Ajax, Ont., Canada
Vu-data Corp., San Diego, Cal.
Waterman Instr. Corp., Hatboro, Pa.

Ovens, Crystal & Component

Accutronics, Inc., Geneva, Ill.
Atomichron, Inc., New Hyde Park, N.Y. p 469
Austron, Inc., Austin, Tex.
Bliley Electric, Erie, Pa. ..... p 1372
Blue M Engrg. Co., Blue Island, Ill.
Bulova Watch Co., Freq. Control Prods., Elctrns. Div., Woodside, N.Y. p 1363
Cox & Co., Inc., New York, N.Y... p 1968
Croven, Ltd., Whitby, Ont., Can... p 1378
CTS Corp, Elkhart, Ind..... p 1375
Electronic Research Co., Shawnee Mission, Kans. ..... p 1384
Erie Frequency Control, Carlisle, Pa. p 1383
Erie Technological Prods. (EEM), Erie, Pa. ..... p 1383
Frequency Elctrns., New Hyde Pk., N.Y. p 469
Gibbs Mfg. & Resch., Janesville, Wisc.
Kahle Engrg. Co., Union City, N.J.
McCoy Elctrns. Co., Mt. Holly Springs, Pa.
Monitor Prods., S. Pasadena, Cal. p 1415
Northern Engrg. Labs., Burlington, Wisc. ..... p 1419
Oven Inds., Mechanicsburg, Pa. p 1394
Ovenaire, Inc., Charlottesville, Va. p 1420
Reeves-Hoffman Div., Carlisle, Pa.
Snelgrove, C. R. Ltd., Don Mills, Ont. Can. ..... p 1428
Alpha-Monarch Corp., Dallas, Tex.
Aremco Prods., Inc., Briarcliff Manor, N.Y.
A.R.F. Products, Inc., Boulder, Colo.
A.R.F. Products, Inc., Raton, N.M.
Baron-Blakeslee, Inc., Chicago, Ill.
Clark Crystal, Marlborough, Mass.
Collins Radio Co., Dallas, Tex.
Crystal Technology, Mountain View, Cal
Dittmore-Freimuth Corp., Milwaukee, Wisc.
Entron Inc., Morganville, N.J.

Glentronics, Glendora, Cal.
Glo-Quartz Elec. Heater Co., Mentor, Ohio
Hope Elctrns., Clifton, N.J.
Hotpack Corp., Phila., Pa.
Isomet Corp., Oakland, N.J.
Isotemp Research, Inc., Charlottesville, Va.
Laser Technology, Inc., N. Hollywood, Calif.
Master Appliance Corp., Racine, Wisc.
Materials Resch. Corp., Orangeburg, N.Y.
Petersen Radio, Council Bluffs, Iowa
Technical Mat'l., Mamaroneck, N.Y.
Texas Instruments, Dallas, Tex.
Thermal Sys., Los Angeles, Cal.
Winslow Tele-Tronics, Inc., Eatontown, N.J.

Ovens, Electric—See Furnaces, Electric

Ovens, Infrared Drying

Blue M Engrg. Co., Blue Island, Ill.
Bowmar Instr. Corp., Ft. Wayne, Ind.
BTU Engrg. Corp., Waltham, Mass.
Cahnman Hugo N. Assocs., Kew Gardens, N.Y.
Caig Labs., Inc., Westbury, N.Y.
Despatch Oven Co., Minneapolis, Minn.
De Vilbiss Co., The, Toledo, Ohio
Etchomatic, Inc., Waltham, Mass.
Forma Scientific, Marietta, Ohio
Fostoria-Fannon, Inc., Fostoria, Ohio
Glo-Quartz Elec. Heater Co., Mentor, Ohio
Hotpack Corp., Phila., Pa.
Kepro Cir. Sys., Inc., St. Louis, Mo.
Lab-Line Instrs., Inc., Melrose Park, Ill.
Lehighton Elctrns., Inc., Lehighton, Pa.
Merco Prods. Co., Inc., Eugene, Ore.
Miskella Infra-Red Co., Cleveland, Ohio
OAL Assocs., Inc., Westbury, N.Y.
Podgor, Joseph Co., Pennsauken, N.J.
Precision Sci. Co., Chicago, Ill.
Research, Inc., Minneapolis, Minn.
Ross Engrg. Div., New Brunswick, N.J.
Selas Corp. America, Dresher, Pa.
Trent, Inc., Philadelphia, Pa.
Wiegand, Edwin L. Co., Pittsburgh, Pa.

Ovens, Laboratory

Associated Testing Labs., Inc., Wayne, N.J. ..... p 388
Blue M Engrg. Co., Blue Island, Ill. p 389
Watkins Johnson Co., Palo Alto, Cal.
Alpha-Monarch Corp., Dallas, Tex.
American Instr. Co., Silver Spring, Md.
Aremco Prods., Inc., Briarcliff Manor, N.Y.
Baron-Blakeslee, Inc., Chicago, Ill.
BTU Engrg. Corp., Waltham, Mass.
Caig Labs., Inc., Westbury, N.Y.
Custom Sci. Instrs., Inc., Whippany, N.J.
Delta Design, La Mesa, Cal
Despatch Oven Co., Minneapolis, Minn.
Feco, Cleveland, Ohio
Fisher Sci. Co., Pittsburgh, Pa.
Forma Scientific, Marietta, Ohio
Fostoria-Fannon, Inc., Fostoria, Ohio
Glo-Quartz Elec. Heater Co., Mentor, Ohio
Gruenberg Elec. Co., Inc., Williamsport, Pa.
Hotpack Corp., Phila., Pa.
Hydor Therme Corp., Pennsauken, N.J.
Jersey Tech. Consits., Morristown, N.J.
Kirk & Blum Mfg. Co., Cincinnati, Ohio
Lab-Line Instrs., Inc., Melrose Park, Ill.
Laser Technology, Inc., N. Hollywood, Calif.
Lindberg Hevi-Duty, Chicago, Ill.
Master Appliance Corp., Racine, Wisc.
N.Y. Testing Labs., Inc., Westbury, N.Y.
Nuclear Equip. Chem. Corp., Farmingdale, N.Y.
OAL Assocs., Inc., Westbury, N.Y.
Precision Sci. Co., Chicago, Ill.
Ross Engrg. Div., New Brunswick, N.J.
Sara Scientific Co., San Francisco, Calif.
Trent, Inc., Philadelphia, Pa.
Vacuum Equip. Div., Newton, Mass.
VWR Scientific, San Francisco, Cal.

Ovens, Microwave

Bowmar Instr. Corp., Ft. Wayne, Ind.
Nippon Electric/NEC America, N.Y., N.Y.
Barth Elctrns., Inc., Cleveland, Ohio
Bowmar/TIC, Inc., Newbury Park, Calif.
Despatch Oven Co., Minneapolis, Minn.
Feco, Cleveland, Ohio
La Rose, W.T. & Assocs., Troy, N.Y.
Reeve Elctrns., Inc., Chicago, Ill.

Ovens, Vacuum

Blue M Engrg. Co., Blue Island, Ill. p 389
Kahle Engrg. Co., Union City, N.J.
Oven Inds., Mechanicsburg, Pa.
Watkins Johnson Co., Palo Alto, Cal.
Watkins-Johnson Co., Scotts Valley, Cal.
Atlas Engrg. Corp., W. Hartford, Conn.
Baker Co., Inc., Biddeford, Me.
Central Scientific Co., Chicago, Ill.
Denton Vacuum, Inc., Cherry Hill, N.J.
Fisher Sci. Co., Pittsburgh, Pa.
Forma Scientific, Marietta, Ohio
Granville-Phillips Co., Boulder, Colo.
High Vacuum Equip. Corp., Hingham, Mass.
Hotpack Corp., Phila., Pa.
Hull Corp., Hatboro, Pa.
Hydor Therme Corp., Pennsauken, N.J.
Lab-Line Instrs., Inc., Melrose Park, Ill.
Leybold-Heraeus, Monroeville, Pa.
Lindberg Hevi-Duty, Chicago, Ill.
Norton Co., Newton, Mass.
Pennwalt Corp., Phila., Pa.
Precision Sci. Co., Chicago, Ill.
Red Point Corp., Burbank, Calif.
Standard Cabinet Co., Inc., Totowa, N.J.
T-M Vacuum Prods., Riverton, N.J.
Ultek Div., Palo Alto, Calif.
Vacuum Equip. Div., Newton, Mass.
Varian Assocs., Palo Alto, Cal.
Veeco Instrs., Inc., Plainview, N.Y.
VWR Scientific, San Francisco, Cal.

Oxide, Aluminum—See Insulating Materials, Powdered Metal Oxide—Vol 3

Oxides, Magnetic—See Magnetic Iron Oxides—Vol 3

Oxygen Indicators—See Indicators, Oxygen / Ozone

Packages, Integrated Circuit —See Vol 2

Packages, Semiconductor—See Cans, Semiconductor—Vol 3

Packaging, Cushioning

Air-O-Plastik Corp., Carlstadt, N.J.
Applied Design Co., Inc., Tonawanda, N.Y.
Blocksom & Co., Michigan City, Ind.
Corning Glass Works, Tech. Prods. Div., Corning, N.Y.
Dow Chemical Co., Midland, Mich.
Environmental Container Sys., Union City, Calif.
Panta-Pak Packaging Div., N. Y., 10017
Press-On Prods., Addison, Ill.
Sealed Air Corp, Fair Lawn, N.J.
Western Coil & Elec. Co., Racine, Wisc.
Zero Mfg. Co., Burbank, Cal.

Pads, L & T—See Attenuators

Pads, Transistor Mounting—See Vol 2

Paging Systems—See Comm. Systems, Selective Paging

Paints, Conductive, Electric—See Coatings, Conductive, Electric—Vol 3

Paints, Fluorescent—See Coatings, Fluorescent—Vol 3

Paints, Luminous—See Vol 3

Paints, Metallic—See Vol 3

Paints, Radioactive—See Coatings, Radioactive—Vol 3

Paints, Reflective—See Vol 3

Paints, Resistive Also See Inks For Thick-Film Microcircuits—See Vol 3

Panel Equipment—See Dials; Connectors; Jacks; Lights; etc.—Vol 2

Panel Marking Kits—See Kits, Marking (Dial, Instrument, Equipment, etc.)—Vol 2

Panels, Electroluminescent—See Vol 2

Panels, Fuse—See Vol 2

Panels, Jack—See Vol 3

Panels, Metal—See Cabinets & Accessories, Metal—Vol 3

Panels, Meter—See Cases, Equipment, Instrument, Meter —Vol 3

Panels, Patch—See Panels, Jack—Vol 3

Panels, Power Bus

Anchor Specialty Mfg., Teterboro, N.J.
Cam-Lok Div., Cincinnati, Ohio
Chem Aero, Inc., Wilmington, Cal.
Control Prods. Corp., Chicago, Ill.
Cutler-Hammer, Milwaukee, Wisc.
Golding Mfg. Co., N. Arlington, N.J.
Graphtex Inc., Lodi, NJ
Hartman Electrical Mfg., Mansfield, Ohio
Kolton Elec. Mfg. Co., Newark, N.J.
Malco Mfg. Co., Chicago, Ill.
Mechanical Engraving Co., Inc., Bronx, N.Y.
Methode Elctrns., Inc., Chicago, Ill.
Waber Elctrns., Inc., Philadelphia, Pa.

Panels, Relay Rack—See Vol 3

Panoramic Adapters—See Receivers, Panoramic

Paper Insulation—See Insulation Materials, Paper—Vol 3

Paper Shredders—See Vol 3

Paper, Graphic Recording

API Instrs. Co., Waltham,, Mass.
Computer Instrs., Hempstead, N.Y.
Dranetz Engrg. Labs., Plainfield, N.J.
General Elec. Co., Schenectady, N.Y.
Hewlett-Packard, Palo Alto, Cal.
Honeywell, Denver, Colo.
Houston Instr., Bellaire, Tex.
Rustrak Instr. Div., Manchester, N.H.
AGFA-Gevaert, Inc., Teterboro, N.J.
Alden Elctrn. & Impulse Record. Equip., Westboro, Mass.
Alfax Paper & Engrg., Westboro, Mass.
Beckman Instrs., (AISSD), Fullerton, Cal.
Bell & Howell Co., Pasadena, Calif.
Bludworth Marine Div., Linden, N.J.
Bristol Div, Waterbury, Conn
Calibrated Charts, Batavia, N.Y.
California Computer Prods., Anaheim, Cal
Dietzgen, Eugene Co., Chicago, Ill.
Dixson, Inc., Grand Junction, Colo.
E.I. DuPont DeNemours & Co., Wilmington, Del.
Esterline Angus Div., Indianapolis, Ind.
Fischer & Porter Co., Warminster, Pa.
Fitchburg Coated Products, Scranton, Pa.
Foxboro Co., Foxboro, Mass.
Graphic Controls Corp., Buffalo, N.Y.
Gubelman Chart Div., Newark, N.J.
Hallmark Standards, Inc., Mt. Vernon, N.Y.
Honeywell, Ft. Washington, Pa.
Instr. & Control Sys., Inc., Addison, Ill.
International Scanatron Sys., Wyandanch, N.Y.
Keuffel & Esser Co., Morristown, N.J.
Laboratory Data Control, Riviera Beach, Fla.
Leeds & Northrup Corp., No. Wales, Pa.
Ludlow Corp., Ware, Mass.
Mechanics For Elctrns., Inc., Wilmington, Mass.
Mennen-Greatbatch Elctrns., Inc., Clarence, N.Y.
Muirhead, Inc., Mountainside, N.J.
Nuclear Equip. Chem. Corp., Farmingdale, N.Y.
Nuclear Supply Co., Washington, D.C.
Pyco, Inc., Penndel, Pa.
Schweitzer, Peter J. Div., Lee, Mass.
Soltec Corp., No. Hollywood, Cal.
Telautograph Corp., Los Angeles, Cal.
Texas Instruments, Inc., Houston, Tex.
3M Co., St. Paul, Minn.
Varian Aerograph, Walnut Creek, Calif.
Varian Data Machines, Palo Alto, Cal.

Passive Reflectors—See Antenna Reflectors

Patch Boards—See Boards, Plug-In; Boards, Programming —Vol 3

Patch Cords—See Cords, Patch—Vol 3

Pedestals, Radar

Geo Space Sys., Tampa, Fla. ..... p 608
Aeroflex Labs., Plainview, N.Y.
Amecom Div., College Park, Md.
Andrew Corp., Orland Pk., Ill.
Bendix Aerospace-Elctrns., Teterboro, N.J.
Brooks & Perkins, Inc., Livonia, Mich.
Chu Assocs., Inc., Littleton, Mass.
Dittmore-Freimuth Corp., Milwaukee, Wisc.
Emerson & Cuming, Inc., Canton, Mass.
Granite State Machine Co., Inc., Manchester, N.H.
Hughes Aircraft Co, Fullerton, Cal.
Par-Metal Prods. Div., Brooklyn, N.Y.
RF Systems, Inc., Cohasset, Mass.
Scientific-Atlanta, Inc., Atlanta, Ga.
Teledyne Micronetics, San Diego, Calif.

Perforators, Paper Tape (Electrically Powered)

A. D. Data Sys., Inc., Rochester, N.Y.
Burroughs Corp., Los Angeles, Cal.
Remex Elctrns., Santa Ana, Cal. .. p 377
A C Electronics Co., Santa Monica, Cal.
Digitronics Corp., Albertson, N.Y.
Facit-Odhner, Inc., Secaucus, N.J.
Friden Div., San Leandro, Calif.
Honeywell Information Systems, Wellesley Hills, Mass
McElroy Elctrns. Corp., Shirley, Mass.
Mohawk Data Sciences Corp., Herkimer, N.Y.
O E M Prods., Carlstadt, N.J.
Ohr-Tronics, King of Prussia, Pa.
Potter Instr. Co., Melville, N.Y.
Rohde & Schwarz Sls., Passaic, N.J.
Teletype Corp., Skokie, Ill.
Texas Instruments, Inc., Houston, Tex.
United Sys. Corp., Dayton, Ohio

Perforators, Paper Tape (Manually Operated)

Burroughs Corp., Los Angeles, Cal.
Remex Elctrns., Santa Ana, Cal. .. p 377
Mohawk Data Sciences Corp., Herkimer, N.Y.
Ohr-Tronics, King of Prussia, Pa.
Robins Inds. Corp., Flushing, N Y

Permeameters—See Meters, Permeameter

Phase & Voltage Analyzers—See Analyzers, Phase & Voltage

Phase Comparators—See Comparators, Phase

Phase Indicators—See Indicators, Phase

Phase-Lock Frequency Stabilizers—See Stabilizers, Frequency

Phase Shifters—See Shifters, Phase

Phones—See Headphones & Headsets

Phonograph Arms, Playback

Astatic Corp., Conneaut, Ohio
CCA Elctrns. Corp., Gloucester, N.J.
Components Specialties, Inc., Freeport, N.Y.
EV/Game, Inc., Freeport, N.Y.
Gray Resch. & Dev. Co., E. Hartford, Conn.

Philmore Mfg. Co., Richmond Hill, N.Y.
Shigoto Inds., Ltd., New York, N.Y.
Shure Bros., Inc., Evanston, Ill.

Phonograph Arms, Transcription
Astatic Corp., Conneaut, Ohio
Empire Scientific Corp., Garden City, N.Y.
Gray Resch. & Dev. Co., E. Hartford, Conn.

Phonograph Parts & Accessories
GC Elctrns., Rockford, Ill.
Components Specialties, Inc., Freeport, N.Y.
Duotone Co., Inc., S. Miami, Fla.
EV/Game, Inc., Freeport, N.Y.
Electro-Voice, Inc., Buchanan, Mich.
Electronic Engrs., Inc., Chicago, Ill.
Empire Scientific Corp., Garden City, N.Y.
Fidelitone, Inc., Chicago,, Ill
Gray Resch. & Dev. Co., E. Hartford, Conn.
Major Elctrns. Corp., Brooklyn, N.Y.
Norelcom Inds., Inc., Farmingdale, N.Y.
Recoton Corp., Long Island City, N.Y.
Shigoto Inds., Ltd., New York, N.Y.

Phonographs
Nippon Electric/NEC America, N.Y., N.Y.
Audiotronics, N. Hollywood, Cal.
Components Specialties, Inc., Freeport, N.Y.
Electron Enterprises, Inc., Berwyn, Ill.
Gray Resch. & Dev. Co., E. Hartford, Conn.
GTE Sylvania Inc., Batavia, N Y
Major Elctrns. Corp., Brooklyn, N.Y.
MP Audio Corp., Fairfield, Conn.
Newcomb Audio Prods. Co., Sylmar, Calif.
Shigoto Inds., Ltd., New York, N.Y.
V-M Corp., Benton Harbor, Mich.

Phosphors—See Fluorescent Compounds—Vol 3

Photo Emulsions, Stencil
Crimpco Engrg., Cangoga Park, Calif.
Naz-Dar Int'l., Chicago, Ill.
Podgor, Joseph Co., Pennsauken, N.J.
Podgor, Joseph E. Co., Inc., Phila., Pa.

Photocells & Phototubes—See Cells, Photoconductive, etc.-Also See Tubes, Photomultiplier—Vol 2

Photoelectric Equipment—See Alarms; Controls; Counters; etc.—Vol 2

Photoflash Equipment, Electronic—See Vol 2

Photographic Equip.—See Cameras, etc.—Vol 2

Photometers—See Meters, Light

Photomultiplier Power Supplies—See Power Supplies, Photomultiplier

Photomultiplier Tube Housings—See Vol 2

Photomultipliers—See Tubes, Photomultiplier—Vol 2

Physiological Equipment—See Specific Types

Pickup Cartidges—See Cartidges, Phono

Pickups, Industrial—See Transducers—Vol 2

Pickups, Magnetic—See Transducers—Vol 2

Pickups, Phonograph—See Phonograph Arms, Playback

Pickups, Proximity—See Transducers, Displacement—Vol 2

Pickups, Telephone (For Recording)
GC Elctrns., Rockford, Ill.
Microtran Co., Valley Stream, N.Y. p 2963
Rye Inds., Inc., Mamaroneck, N.Y.
Altec, Anaheim, Calif.
A.P.W. Co., Inc., Rockaway, N.J.
Bergen Labs., Inc., Paterson, N.J.
Components Specialties, Inc., Freeport, N.Y.
Electrocom Inds., So. Bend, Indiana
Philmore Mfg. Co., Richmond Hill, N.Y.
Roberts Div., Los Angeles, Cal.
Rystl Elctrns. Corp., N. Miami Beach, Fla.
Shigoto Inds., Ltd., New York, N.Y.

Pickups, Torque—See Transducers, Torque—Vol 2

Pickups, Vibration—See Transducers, Vibration; Accelerometers—Vol 2

Piezoelectric Crystals—See Crystals, Piezoelectric

Pilot Lamps—See Lamps, Dial & Pilot—Vol 2

Pin Straighteners, Connector—See Vol 3

Pin Straighteners, Tube—See Vol 2

Pins, Cotter, Dowel, Taper, etc.—See Pins, Mechanical—Vol 3

Pins, Electrically Conductive—See Vol 3

Pins, Mechanical—See Vol 3

Pitch—See Insulting Compounds, Asphalt & Pitch—Vol 3

Pitch & Tempo Regulators—See Regulators, Pitch & Tempo

Plastic Films, Rods, Sheets, etc.—See Vol 3

Plastic Filters; Pumps; Valves—See Filters, Fluid, Nonmetallic; Pumps, Nonmetallic; Valves, Nonmetallic

Plastic Raw Materials, Liquids, Pellets, Powders, Resins—See Vol 3

Plastics, Encapsulating—See Compounds, Encapsulating—Vol 3

Plastics, Heat Shrinkable—See Caps, Forms & Tapes, Heat Shrinkable—Vol 3

Plated Wire Memory Systems—See Memory Systems

Plates, Instructional—See Nameplates—Vol 3

Plates, Name—See Nameplates—Vol 3

Plates, Silk Screen—See Nameplates—Vol 3

Plates, Switch Mounting—See Vol 3

Plating Solutions—See Vol 3

Players, Magnetic Tape—See Recorders, Magnetic Tape (Lab Type)

Pliers—See Vol 3

Plotters, X-Y, & Accessories—See Recorders, X-Y

Plotting Boards—See Boards, Plotting

Plug Adapters—See Vol 3

Plug & Jack Sets—See Vol 3

Plug Caps & Shells—See Vol 3

Plug-In Module Enclosures—See Vol 3

Plugboard Programming Systems—See Boards, Programming

Plugs, Electrical (All Types)—See Vol 3

Plugs, Fused—See Vol 3

Pointers, Dial—See Vol 2

Polarimeters
Arco Systems Inc., Palo Alto, Cal
Bendix, Rochester, N.Y.
Epic, Inc., New York, N.Y.
Ercona Corp., Bellmore, N.Y.
Process & Instrs. Corp., Brooklyn, N.Y.
Teledyne Micronetics, San Diego, Calif.
Varian Assocs., Palo Alto, Cal.
VWR Scientific, San Francisco, Cal.
Zeiss, Carl, Inc., New York, N.Y.

Polyester Insulating Film—See Insulation Materials, Film—Vol 3

Porcelain—See Insulation Materials, Ceramic—Vol 3

Porosimeters
American Instr. Co., Silver Spring, Md.

Posts, Binding—See Vol 3

Posts, Harness Board—See Vol 3

Potentiometers, Carbon Ceramic—See Vol 3

Potentiometers, Carbon Film—See Vol 3

Potentiometers, Ceramic-Metal (Cermet)—See Vol 3

Potentiometers, Composition, Carbon—See Vol 3

Potentiometers, Conductive Plastic—See Vol 3

Potentiometers, Hot Molded—See Vol 3

Potentiometers, Lab Type
Amphenol Controls Div., Janesville, Wisc.
Biddle, James G., Plymouth Meeting, Pa. p 419
Bowmar Instr. Corp., Ft. Wayne, Ind.
Electro Sci. Inds., Portland, Ore. p 454
IRC St. Peterburg Div. of TRW Inc., St. Petersburg, Fla.
Julie Research Lab., New York, N.Y. p 503
LTV Electrosystems, Huntington, Ind.
Penn Airborne Prods., Southampton, Pa. p 534
RFL Inds., Instr. Div., Boonton, N.J.
Spectrol Elctrns., City of Industry, Cal. p 2924,2925
A. J. Abrams Co., Westport, Conn.
A.O.I.P., 75/Paris 12eme, France
Beckman Instrs., Helipot Div., Fullerton, Cal.
Bourns, Inc., Riverside, Cal.
Brinkmann Instrs., Inc., Westbury, N.Y.
Bristol Div, Waterbury, Conn
Consolidated Resistance Sls., Yonkers, N.Y.
Doric Sci. Corp., San Diego, Calif.
Ealing Corp., Cambridge, Mass.
Electrical Instr. Svc., Inc., Mt. Vernon, N.Y.
General Radio Co., Concord, Mass.
Guildline Instrs., Inc., Larchmont, N.Y.
Hallmark Standards, Inc., Mt. Vernon, N.Y.
Honeywell, Ft. Washington, Pa.
Lewis Engrg. Co., Naugatuck, Conn.
McKee-Pedersen Instrs., Danville, Calif.
Omega Engrg., Inc., Stamford, Conn.
Rex Rheostat & Co., Roosevelt, N.Y.
Samarius, Inc., Derby, Conn.
Taylor Instr. Process Control Div., Rochester, N.Y.
West Instr. Div., Schiller Pk., Ill.
Yewtec Corporation, Larchmont, N.Y.

Potentiometers, Metal Film—See Vol 3

Potentiometers, Metal, Glazed—See Potentiometers, Ceramic-Metal—Vol 3

Potentiometers, Motorized—See Potentiometers, Servo Mount—Vol 3

Potentiometers, Non-Linear—See Potentiometers (As Modified)—Vol 3

Potentiometers, Rectilinear—See Vol 3

Potentiometers, Rheostat—See Rheostats—Vol 3

Potentiometers, Servo Mount—See Vol 2

Potentiometers, Trimmer, Carbon Ceramic—See Vol 3

Potentiometers, Trimmer, Carbon Composition—See Vol 3

Potentiometers, Trimmer, Carbon Film—See Vol 3

Potentiometers, Trimmer, Ceramic-Metal (Cermet)—See Vol 3

Potentiometers, Trimmer, Conductive Plastic—See Vol 3

Potentiometers, Trimmer, Metal Film—See Vol 3

Potentiometers, Trimmer, Wirewound—See Vol 3

Potentiometers, Wirewound—See Vol 3

Powders, Precious Metal—See Vol 3

Power Outlet Boxes—See Boxes, Power Outlet—Vol 3

Power Supplies, AC Output-60 CPS
Aaron-Davis Co., Los Angeles,, Cal. p 616
Abbott Transistor Labs., L.A., Cal. p 618
American Time Products, Woodside, N.Y. p 660
Amp Inc., Elizabethtown, Pa.
Amp Inc., Harrisburg, Pa.
Astrosystems, Lake Success, N.Y.
Austron, Inc., Austin, Tex.
Avtel Corp., Covina, Cal. p 654,656-658
Behlman Div., San Diego, Cal. p 670,671
Bulova Watch Elctrns. Div. Amer. Time Prods., Woodside, N.Y. p 660
Bulova Watch Co., Servo Prods. Elctrns. Div., Woodside, N.Y.
CML-Macarr, Inc., Edison, N.J. p 661-663,665
Del Elctrns. Corp., Mt. Vernon, N.Y. p 680
Electronic Resch. Assocs., Cedar Grove, N.J. p 709
Elgar Corp., San Diego, Cal. p 703-705
Elin Div., San Diego, Cal. p 671
Fork Standards, W. Chicago, Ill. p 718
Freed Transformer Co., Bklyn., N.Y.

Frequency Control, Inc., Austin, Tex.
Gates Elctrn. Co., Bronx, N.Y. ..... p 721
General Elec. Co., Schenectady, N.Y.
Ind'l. Test Equip., Port Washington, N.Y. p 497,733
Interelectronics Corp., Congers, N.Y.
K.G.S. Elctrns., Pasadena, Cal.
Kilovolt Corp., Hackensack, N.J.
Krohn-Hite, Cambridge, Mass.
La Marche Mfg. Co., Des Plaines, Ill. p 774
Lambda Elctrns., Melville, N.Y..... p 802
Light Elec. Corp., Rancocas, N.J. p 809
Mid-Eastern Inds., Scotch Plains, N.J.
Neshaminy Transformer, Furlong, Pa.
North Elec. Co., Galion, Ohio
North Hills Elctrns., Inc., Glen Cove, N.Y.
Nova Electric Mfg. Co., Nutley, N.J. p 828
NWL Transformers, Trenton, N.J.
Powertec, Chatsworth, Cal.
Raytheon Co., Manchester, N.H. .. p 878
Spellman High Voltage Elctrns. Corp., Bronx, N.Y.
Staco, Inc., Dayton, Ohio
Technipower, Ridgefield, Conn.
Thunder Int'l. Corp., Middletown, Conn.
Todd Prods., Farmingdale, N.Y.
Topaz Elctrns., San Diego, Cal. p 898-903
Triac Elctrn. Sys., N.Y., N.Y.
Trio Labs, Inc., Plainview, N.Y.
Unitron, Garland, Tex..... p 936
Varadyne Power Sys., Northridge, Cal. p 934
Vector Engrg., Springfield, N.J. .... p 942
Vector Engrg., Springfield, N.J. .... p 943
Wanlass Div., Fort Washington, Pa. p 946
Zaring Inds., Inc., Carmel, Ind.
Acme Elec. Corp., Cuba, N.Y.
Advanced Energy Conversion, Menlo Pk., Cal.
Aerotronic Assocs., Inc., Contoocook, N.H.
AGAC-Derritron, Inc., Alexandria, Va.
Allis-Chalmers, Milwaukee, Wisc.
Allis, Louis Co., Milwaukee, Wisc.
Allis Louis Co., Greendale, Wisc.
AMBAC Inds., Garden City, N.Y.
Ameco, Inc., Phoenix, Ariz.
American Rectifier Corp., College Point, N.Y.
AMF Electrosystems Div., Vandalia, Ohio
Amplifier Corp. America, Westbury, N.Y.
Associated Specialties Co., Orefield, Pa.
Astro-Metrix, Burbank, Cal.
Barwood Elctrns., Inc., Glendale, Cal.
Basler Elec. Co., Highland, Ill.
Behlman Engrg. Corp., Santa Barbara, Cal.
BF Elctrns., Solana Beach, Calif.
B.H. Inds., Los Angeles, Cal.
Blonder-Tongue Labs., Inc., Old Bridge, N.J.
Bludworth Marine Div., Linden, N.J.
Bogue Elec. Mfg. Co., Paterson, N.J.
Borg-Warner Controls, Santa Ana, Cal.
Cal-Power Corp., El Segundo, Calif.
California Instrs. Co., San Diego, Cal.
Canadian Research Institute, Don Mills, Ont., Canada
Century Coil Corp., Chicago, Ill.
Chicago Condenser Corp., Chicago, Ill.
Coil Co. of Amer., Northvale, N.J.
Collins Electronics, Inc., Stevensville, Md.
Collins Radio Co., Cedar Rapids, Iowa
Collins Radio Co., Dallas, Tex.
Components Corp., Denville, N.J.
Components Specialties, Inc., Freeport, N.Y.
Consolidated Transformers Unltd., San Gabriel, Cal.
Constant Voltage Co., Chicago, Ill.
Cornell-Dubilier Elctrns., Newark, N.J.
Darrah Elec. Co., Inc., Cleveland, Ohio
Davidson Elctrn. Dev. Co., Erie, Pa.
Decor Elctrns. Corp., Austin, Tex.
Delta Elctrn. Control, Costa Mesa, Cal.
Dyna Technology Inc., Sioux City, Iowa
E-Tronics, Van Nuys, Cal.
EDC (Electro Dev.), Lynnwood, Wash.
Eico Electronic Instrument Co., Inc., Brooklyn, N.Y.
Electro Magnetic Prods., Wabash, Ind.
Elctrn. Components Corp., Addison, Ill.
Elctrn. Specialty, Thomaston, Conn.
Elgin Elctrns., Waterford, Pa.
EMP Elctrns., Inc., Phoenix, Ariz.
Engrg. Svcs., Madison, N.J.
Essex Int'l., Inc., Decatur, Ill.
Exide Power Sys. Div., Philadelphia, Pa.
Fairlane Electronics, Inc., Long Valley, N.J.
Gap Instr. Corp., Hauppauge, N.Y.
Glentek, Inc., Santa Monica, Calif.
Grafix, Inc., Albuquerque, N.M.
Green Elec. Corp., Fair Lawn, N.J.
Gulton Inds., Hawthorne, Calif.
Halmar Elctrns., Inc., Columbus, Ohio
HGA Elctrns., Mt. Vernon, N.Y.
Hobby & Brown Elctrn., Rockville Centre, N.Y.
Holt Instr. Labs., Oconto, Wisc.
Honeywell, Ft. Washington, Pa.
Horlick, William I. Co., Inc., Boston, Mass.
Hughes Aircraft Co, Culver City, Cal.
Hyperion Inds. Corp., Watertown, Mass.
Ideal Elec. & Mfg. Co., Mansfield, Ohio
Jerrold/Watkins Div., Toronto, 395, Ont., Can.
Lear Siegler, Anaheim, Cal.
Lincoln Elec. Co., Cleveland, Ohio
Linear Sys., Inc., Watsonville, Calif.
Ling Elctrns., Anaheim, Calif.
Loyola Industries, Inc., El Segundo, Calif.
Magnetics, Inc., Butler, Pa.
Magnetics, Sandy Lake, Pa.
MEM Controls, Inc., Wickliffe, Ohio
Micro Instr., Hawthorne, Cal.
Micro-Tel Corp., Baltimore, Md.
Neutronic Corp., Bridgeton, Mo.
NH Research, Inc., Santa Ana, Calif.
Nuclear Corp. Amer., Denville, N.J.
Nuclear Resch. Corp., Southampton, Pa.
Oeco Corp., Portland, Ore.
Optimation, Inc., Sun Valley, Calif.
Peerless Elec. Prods., Anaheim, Cal.
Permavolt Transformers, Inc., S. Bend, Ind.
Peschel Instrs., Cape Coral, Fla.
Philips Elctrns. Inds., Ltd., Toronto 17, Can.
Pioneer Magnetics, Santa Monica, Cal.
Power Control Corp., Pittsburgh, Pa.
Power Conversion Prods. Inc., Crystal Lake, Ill.
Precision Elctrns. Corp., Marshfield, Mass.
Ratelco, Inc., Seattle, Wash.
RBM Controls, Logansport, Ind.
Rho Engrg. Co., Los Angeles, Calif
RIL Elctrns., Inc., Southampton, Pa.
Riverbank Labs., Geneva, Ill.
Robicon Corp., Pittsburgh, Pa
SBD Systems, Inc., Amityville, N.Y.
Sel-Rex Corp., Nutley, N.J.
Shane Inds., Sunny Vale, Cal.
SKG Assocs., Inc., Boston, Mass.
Sola Elec. Div., Elk Grove Village, Ill.
Solidstate Controls, Inc., Columbus, Ohio
Spatron Inc, Alhambra, Calif.
Sprengnether, W.F. Instr. Co., Inc., St. Louis, Mo.
Stark Elctrn. Instrs., Ltd., Ajax, Ont., Canada
Sunshine Sci. Instrs., Inc., Philadelphia, Pa.
Superior Elec., Bristol, Conn.
Task Corp., Anaheim, Calif.
Tel-Instr. Elctrns. Corp., Carlstadt, N.J.
Teledyne Inet, Gardena, Cal.
Terado Corp., St. Paul, Minn.
Transducer Systems, Inc., Willow Grove, Pa.
Transformer Design, Milwaukee, Wisc.
Transrex Div., Torrance, Cal.
Tresco an Aydin Co., Phila., Pa.
Universal Transistor Prods., Copiague, N.Y.
Varo, Inc., Texas Div., Garland, Tex.
Vectrol, Inc., Rockville, Md.
VIKOA, Hoboken, N.J.
Voltex Co., Inc., Farmingdale, N.Y.
Ward Leonard, Mt. Vernon, N.Y.
Westinghouse Elec. Corp., Pittsburgh, Pa.

Power Supplies, AC Output-400 CPS

Aaron-Davis Co., Los Angeles,, Cal. p 616
Abbott Transistor Labs., L.A., Cal. p 618
American Time Products, Woodside, N.Y. ..... p 660
Amp Inc., Elizabethtown, Pa.
Amp Inc., Harrisburg, Pa.
Arnold Magnetics, Culver City, Cal.
Astrosystems, Lake Success, N.Y.
Austron, Inc., Austin, Tex.
Autronics Corp., Pasadena, Calif.
Avtel Corp., Covina, Cal. .. p 654,656-658
Behlman Div., San Diego, Cal..p 670,671
Bulova Watch Elctrns. Div. Amer. Time Prods., Woodside, N.Y. ..... p 660
Bulova Watch Co., Servo Prods. Elctrns. Div., Woodside, N.Y.
CML-Macarr, Inc., Edison, N.J. p 661-663,665
Del Elctrns. Corp., Mt. Vernon, N.Y. p 680
Electronic Resch. Assocs., Cedar Grove, N.J. ..... p 709
Elgar Corp., San Diego, Cal. ....p 703-705
Elin Div., San Diego, Cal. ..... p 671
Fork Standards, W. Chicago, Ill. .. p 718
Frequency Control, Inc., Austin, Tex.
General Elec. Co., Schenectady, N.Y.
Georator Corp., Manassas, Va. .... p 723
Ind'l. Test Equip., Port Washington, N.Y. p 497,733
Interelectronics Corp., Congers, N.Y.
K.G.S. Elctrns., Pasadena, Cal.
Kilovolt Corp., Hackensack, N.J.
Krohn-Hite, Cambridge, Mass.
Light Elec. Corp., Rancocas, N.J. p 809
Mid-Eastern Inds., Scotch Plains, N.J.
NJE Corp., Kenilworth, N.J..... p 818
North Elec. Co., Galion, Ohio
North Hills Elctrns., Inc., Glen Cove, N.Y. ..... p 817
Nova Electric Mfg. Co., Nutley, N.J. p 828
NWL Transformers, Trenton, N.J.
Powertec, Chatsworth, Cal.
Raytheon Co., Manchester, N.H. .. p 878
Spellman High Voltage Elctrns. Corp., Bronx, N.Y.
Technipower, Ridgefield, Conn.
Thunder Int'l. Corp., Middletown, Conn.
Todd Prods., Farmingdale, N.Y.
Topaz Elctrns., San Diego, Cal. p 899-903
Trio Labs, Inc., Plainview, N.Y.
Unitron, Garland, Tex..... p 936
Varadyne Power Sys., Northridge, Cal. p 934
Vector Engrg., Springfield, N.J. .... p 942
Vector Engrg., Springfield, N.J. .... p 943
Wanlass Div., Fort Washington, Pa. p 946
Zaring Inds., Inc., Carmel, Ind.
Advanced Energy Conversion, Menlo Pk., Cal.
AGAC-Derritron, Inc., Alexandria, Va.
Allis-Chalmers, Milwaukee, Wisc.
Allis, Louis Co., Milwaukee, Wisc.
Allis Louis Co., Greendale, Wisc.
AMBAC Inds., Garden City, N.Y.
American Rectifier Corp., College Point, N.Y.
Amplifier Corp. America, Westbury, N.Y.
Armec Corp., Huntington Sta., N.Y.
Astro-Metrix, Burbank, Cal.
Barnes & Reinecke, Inc., Chicago, Ill.
Barwood Elctrns., Inc., Glendale, Cal.
Basler Elec. Co., Highland, Ill.
Behlman Engrg. Corp., Santa Barbara, Cal.
Bergen Labs., Inc., Paterson, N.J.
BF Elctrns., Solana Beach, Calif.
B.H. Inds., Los Angeles, Cal.
Bogue Elec. Mfg. Co., Paterson, N.J.
Cal-Power Corp., El Segundo, Calif.
California Instrs. Co., San Diego, Cal.
Century Coil Corp., Chicago, Ill.
Chicago Condenser Corp., Chicago, Ill.
Coil Co. of Amer., Northvale, N.J.
Collins Electronics, Inc., Stevensville, Md.
Collins Radio Co., Cedar Rapids, Iowa
Collins Radio Co., Dallas, Tex.
Components Corp., Denville, N.J.
Consolidated Transformers Unltd., San Gabriel, Cal.
Delta Elctrn. Control, Costa Mesa, Cal.
E-Tronics, Van Nuys, Cal.
EDC (Electro Dev.), Lynnwood, Wash.
Electric Machinery Mfg. Co., Minneapolis, Minn.
Electro Magnetic Prods., Wabash, Ind.
Elctrn. Specialty, Thomaston, Conn.
EMP Elctrns., Inc., Phoenix, Ariz.
Engineering Assocs., Dayton, Ohio
Engrg. Svcs., Madison, N.J.
Fairlane Electronics, Inc., Long Valley, N.J.
Gap Instr. Corp., Hauppauge, N.Y.
Glentek, Inc., Santa Monica, Calif.
Gulton Inds., Hawthorne, Calif.
Holt Instr. Labs., Oconto, Wisc.
Hope Elctrns., Clifton, N.J.
Horlick, William I. Co., Inc., Boston, Mass.
Hughes Aircraft Co, Culver City, Cal.
Hyperion Inds. Corp., Watertown, Mass.
Ideal Elec. & Mfg. Co., Mansfield, Ohio
Lear Siegler, Anaheim, Cal.
Linear Sys., Inc., Watsonville, Calif.
Ling Elctrns., Anaheim, Calif.
Magnetico, Inc., E. Northport, N.Y.
Magnetics, Inc., Butler, Pa.
Magnetics, Sandy Lake, Pa.
MEM Controls, Inc., Wickliffe, Ohio
Motor Generator Div., Troy, Ohio
NH Research, Inc., Santa Ana, Calif.
Nuclear Corp. Amer., Denville, N.J.
Oeco Corp., Portland, Ore.
Optimation, Inc., Sun Valley, Calif.
Peerless Elec. Prods., Anaheim, Cal.
Peschel Instrs., Cape Coral, Fla.
Pioneer Magnetics, Santa Monica, Cal.
Power Control Corp., Pittsburgh, Pa.
Precision Elctrns. Corp., Marshfield, Mass.
Rho Engrg. Co., Los Angeles, Calif
Riverbank Labs., Geneva, Ill.
Robicon Corp., Pittsburgh, Pa
SBD Systems, Inc., Amityville, N.Y.
Shane Inds., Sunny Vale, Cal.
Singer-General Precision, Inc., Little Falls, N.J.
SKG Assocs., Inc., Boston, Mass.
Sola Elec. Div., Elk Grove Village, Ill.
Solidstate Controls, Inc., Columbus, Ohio
Spatron Inc, Alhambra, Calif.
Superior Elec., Bristol, Conn.
Task Corp., Anaheim, Calif.
Tel-Instr. Elctrns. Corp., Carlstadt, N.J.
Teledyne Inet, Gardena, Cal.
Transrex Div., Torrance, Cal.
Tresco an Aydin Co., Phila., Pa.
Universal Transistor Prods., Copiague, N.Y.
Varo, Inc., Texas Div., Garland, Tex.
Voltex Co., Inc., Farmingdale, N.Y.
Ward Leonard, Mt. Vernon, N.Y.
Westinghouse Elec. Corp., Pittsburgh, Pa.

Power Supplies, AC Output, Other Than 60 or 400 CPS

Aaron-Davis Co., Los Angeles,, Cal. p 616
Abbott Transistor Labs., L.A., Cal. p 618
American Time Products, Woodside, N.Y.
Amp Inc., Elizabethtown, Pa.
Amp Inc., Harrisburg, Pa.
Arnold Magnetics, Culver City, Cal.
Austron, Inc., Austin, Tex.
Autronics Corp., Pasadena, Calif.
Avtel Corp., Covina, Cal. .. p 654,656-658
Behlman Div., San Diego, Cal..p 670,671
Bulova Watch Elctrns. Div. Amer. Time Prods., Woodside, N.Y.
CML-Macarr, Inc., Edison, N.J. p 661-663,665
Electronic Resch. Assocs., Cedar Grove, N.J.
Elgar Corp., San Diego, Cal. ....p 703,704
Elin Div., San Diego, Cal. ..... p 671
Fork Standards, W. Chicago, Ill. .. p 718
Frequency Control, Inc., Austin, Tex.
General Elec. Co., Schenectady, N.Y.
Ind'l. Test Equip., Port Washington, N.Y. p 733
Interelectronics Corp., Congers, N.Y.
Kilovolt Corp., Hackensack, N.J.
Krohn-Hite, Cambridge, Mass.
Light Elec. Corp., Rancocas, N.J.
Mid-Eastern Inds., Scotch Plains, N.J.
North Elec. Co., Galion, Ohio
North Hills Elctrns., Inc., Glen Cove, N.Y. ..... p 817
Nova Electric Mfg. Co., Nutley, N.J. p 828
NWL Transformers, Trenton, N.J.
Powertec, Chatsworth, Cal.
Raytheon Co., Manchester, N.H.
RFL Inds., Instr. Div., Boonton, N.J.
Ross Engrg. Corp., Campbell, Cal.
Spellman High Voltage Elctrns. Corp., Bronx, N.Y.
SRC Div., Newport Bch., Cal.
Staco, Inc., Dayton, Ohio
Thunder Int'l. Corp., Middletown, Conn.
Todd Prods., Farmingdale, N.Y.

Topaz Elctrns., San Diego, Cal.
Trio Labs, Inc., Plainview, N.Y.
Unitron, Garland, Tex.
Vector Engrg., Springfield, N.J. .... p 942
Vector Engrg., Springfield, N.J. .... p 943
Wanlass Div., Fort Washington, Pa.
Advanced Energy Conversion, Menlo Pk., Cal.
AGAC-Derritron, Inc., Alexandria, Va.
Allis, Louis Co., Milwaukee, Wisc.
Allis Louis Co., Greendale, Wisc.
AMBAC Inds., Garden City, N.Y.
American Rectifier Corp., College Point, N.Y.
AMF Electrosystems Div., Vandalia, Ohio
Armec Corp., Huntington Sta., N.Y.
Astro-Metrix, Burbank, Cal.
Barnes & Reinecke, Inc., Chicago, Ill.
Barwood Elctrns., Inc., Glendale, Cal.
Behlman Engrg. Corp., Santa Barbara, Cal.
Bergen Labs., Inc., Paterson, N.J.
B.H. Inds., Los Angeles, Cal.
Bludworth Marine Div., Linden, N.J.
Bogue Elec. Mfg. Co., Paterson, N.J.
Bose Corp., Natick, Mass.
Cal-Power Corp., El Segundo, Calif.
California Instrs. Co., San Diego, Cal.
Canadian Research Institute, Don Mills, Ont., Canada
Chicago Condenser Corp., Chicago, Ill.
Coil Co. of Amer., Northvale, N.J.
Collins Electronics, Inc., Stevensville, Md.
Collins Radio Co., Cedar Rapids, Iowa
Collins Radio Co., Dallas, Tex.
Consolidated Transformers Unltd., San Gabriel, Cal.
Delta Elctrn. Control, Costa Mesa, Cal.
EDC (Electro Dev.), Lynnwood, Wash.
Electro Magnetic Prods., Wabash, Ind.
Elctrn. Specialty, Thomaston, Conn.
Elgin Elctrns., Waterford, Pa.
EMP Elctrns., Inc., Phoenix, Ariz.
Engrg. Svcs., Madison, N.J.
Exide Power Sys. Div., Philadelphia, Pa.
Gap Instr. Corp., Hauppauge, N.Y.
Glentek, Inc., Santa Monica, Calif.
Glentronics, Glendora, Cal.
Grafix, Inc., Albuquerque, N.M.
Gulton Inds., Hawthorne, Calif.
Holt Instr. Labs., Oconto, Wisc.
Hughes Aircraft Co, Culver City, Cal.
Hyperion Inds. Corp., Watertown, Mass.
Ideal Elec. & Mfg. Co., Mansfield, Ohio
Invertronics, Pine Brook, N.J.
Lear Siegler, Anaheim, Cal.
Magnetics, Inc., Butler, Pa.
Magnetics, Sandy Lake, Pa.
MEM Controls, Inc., Wickliffe, Ohio
NH Research, Inc., Santa Ana, Calif.
Nuclear Corp. Amer., Denville, N.J.
NuTek Industries, Mountain View, Cal.
Optimation, Inc., Sun Valley, Calif.
Peerless Elec. Prods., Anaheim, Cal.
Permavolt Transformers, Inc., S. Bend, Ind.
Peschel Instrs., Cape Coral, Fla.
Precision Elctrns. Corp., Marshfield, Mass.
Rho Engrg. Co., Los Angeles, Calif
Riverbank Labs., Geneva, Ill.
Robicon Corp., Pittsburgh, Pa
SBD Systems, Inc., Amityville, N.Y.
Shane Inds., Sunny Vale, Cal.
Singer-General Precision, Inc., Little Falls, N.J.
SKG Assocs., Inc., Boston, Mass.
Sola Elec. Div., Elk Grove Village, Ill.
Solidstate Controls, Inc., Columbus, Ohio
Spatron Inc, Alhambra, Calif.
Superior Elec., Bristol, Conn.
Task Corp., Anaheim, Calif.
Tel-Instr. Elctrns. Corp., Carlstadt, N.J.
Teledyne Inet, Gardena, Cal.
Transducer Systems, Inc., Willow Grove, Pa.
Transformer Design, Milwaukee, Wisc.
Transrex Div., Torrance, Cal.
Unitek Corp., Monrovia, Calif.
Universal Transistor Prods., Copiague, N.Y.
Varo, Inc., Texas Div., Garland, Tex.
Voltex Co., Inc., Farmingdale, N.Y.
Ward Leonard, Mt. Vernon, N.Y.

Power Supplies, D-C Output, Other Than 60 or 400 CPS Input

Aaron-Davis Co., Los Angeles,, Cal. p 616
Abbott Transistor Labs., L.A., Cal. p 618
ACDC Elctrns., Oceanside, Cal.
Acopian Corp., Easton, Pa.
American Time Products, Woodside, N.Y.
Amp Inc., Elizabethtown, Pa. ..... p 643
Arnold Magnetics, Culver City, Cal. p 645
Astro-Space Labs., Huntsville, Ala
Austron, Inc., Austin, Tex.
Autronics Corp., Pasadena, Calif.
Bulova Watch Elctrns. Div. Amer. Time Prods., Woodside, N.Y.
Bulova Watch Co., Servo Prods. Elctrns. Div., Woodside, N.Y.
California Elctrn. Mfg. Co., Alamo, Calif.
Circuit Power, Inc., Portland, Conn. p 677
CML-Macarr, Inc., Edison, N.J.
Computer Prods., Ft. Lauderdale, Fla.
Del Elctrns. Corp., Mt. Vernon, N.Y.
Dressen-Barnes Elctrns., Pasadena, Cal.
Elctrn. Meas. Inc., Neptune, N.J.
Electronic Resch. Assocs., Cedar Grove, N.J.
General Elec. Co., Schenectady, N.Y.
Hewlett-Packard, Palo Alto, Cal.
Interelectronics Corp., Congers, N.Y.
International Rectifier, El Segundo, Cal.
Lambda Elctrns., Melville, N.Y. p 790-792,795,797-799
Light Elec. Corp., Rancocas, N.J.
Mid-Eastern Inds., Scotch Plains, N.J.
North Elec. Co., Galion, Ohio
North Hills Elctrns., Inc., Glen Cove, N.Y.
Nova Electric Mfg. Co., Nutley, N.J.
NWL Transformers, Trenton, N.J.
Opad Elec. Co., Inc., New York, N.Y.
Power/Mate, Hackensack, N.J. p 836,856,857
Powertec, Chatsworth, Cal. p 861,862,864
Raytheon Co., Manchester, N.H.
RO Assocs., Menlo Pk., Cal. ....p 867,869
Ross Engrg. Corp., Campbell, Cal.
Sierra Sys., Mountain View, Cal.
Systron-Donner Alpha Div., Oakland, Cal.
Systron Donner Trygon Elctrns. Sub., Roosevelt, N.Y.
Teledyne Philbrick, Dedham, Mass.
Thunder Int'l. Corp., Middletown, Conn.
Todd Prods., Farmingdale, N.Y.
Topaz Elctrns., San Diego, Cal.
Venus Scientific, Farmingdale, N.Y.
Wanlass Div., Fort Washington, Pa.
Acme Elec. Corp., Cuba, N.Y.
Advanced Energy Conversion, Menlo Pk., Cal.
Allis, Louis Co., Milwaukee, Wisc.
Allis Louis Co., Greendale, Wisc.
AMBAC Inds., Garden City, N.Y.
Anocut Engrg. Co., Elk Grove Village, Ill.
Astro-Metrix, Burbank, Cal.
AUL Instrs., Inc., Flushng, N.Y.
Barwood Elctrns., Inc., Glendale, Cal.
Behlman Engrg. Corp., Santa Barbara, Cal.
Bertan Assocs., Inc., Plainview, N.Y.
B.H. Inds., Los Angeles, Cal.
Bogue Elec. Mfg. Co., Paterson, N.J.
Bose Corp., Natick, Mass.
Bullock Magnetics Corp., Pomona, Calif.
Cardion Elctrns., Woodbury, N.Y.
Chicago Condenser Corp., Chicago, Ill.
Consolidated Transformers Unltd., San Gabriel, Cal.
Constant Voltage Co., Chicago, Ill.
Delta Elctrn. Control, Costa Mesa, Cal.
Delta-Tronics Corp., Tempe, Ariz.
EDC (Electro Dev.), Lynnwood, Wash.
Elasco-Eastern, Inc., Bloomfield, Conn.
Electro-Pacific, Inc., Goleta, Calif.
Elctrn. Specialty, Thomaston, Conn.
EMP Elctrns., Inc., Phoenix, Ariz.
Engrg. Svcs., Madison, N.J.
Exide Power Sys. Div., Philadelphia, Pa.
Gap Instr. Corp., Hauppauge, N.Y.
Green Elec. Corp., Fair Lawn, N.J.
Gulton Inds., Hawthorne, Calif.
Hope Elctrns., Clifton, N.J.
Horlick, William I. Co., Inc., Boston, Mass.
Hughes Aircraft Co, Culver City, Cal.
Instrulab, Inc., Dayton, Ohio
Intercontinental Elctrns., E. Rochester, N.Y.
K West, Westminster, Calif.
Keltron Corp., Waltham, Mass.
Kikusui Elctrns. Corp., Kawasaki City, Kanagawa-Pref., Japan
Magnetic Sys. & Instrs., Worcester, Mass.
Magnetics, Inc., Butler, Pa.
Magnetics, Sandy Lake, Pa.
Magnetics Sys. & Instrs., Worcester, Mass.
Maxwell Labs., Inc., San Diego, Calif.
Mil Elctrns. Inc., Hudson, N.H.
Modular Devices, Inc., Gardena, Calif.
Modular Power, Inc., Poway, Cal.
Motor Generator Div., Troy, Ohio
Narco Avionics, Ft. Washington, Pa.
Pace-Tronics, Newark, N.J.
Palomar Engrs., Escondido, Cal.
Peerless Elec. Prods., Anaheim, Cal.
Pioneer Magnetics, Santa Monica, Cal.
Precision Elctrns. Corp., Marshfield, Mass.
Rapid Elec. Co., Bronx, N.Y.
Ratelco, Inc., Seattle, Wash.
Rho Engrg. Co., Los Angeles, Calif
Rosemount Engrg. Co., Minneapolis, Minn.
Semiconductor Circuits Inc., Woburn, Mass.
Semi/Dyne Elctrns. Corp., Freeport, N.Y.
Shane Inds., Sunny Vale, Cal.
Singer-General Precision, Inc., Little Falls, N.J.
SKG Assocs., Inc., Boston, Mass.
Teledyne Inet, Gardena, Cal.
Ther Elec. & Mach. Works, Chicago, Ill.
Transistor Devices, Cedar Knolls, N.J.
Transrex Div., Torrance, Cal.
Varo, Inc., Texas Div., Garland, Tex.
Velonex, Santa Clara, Calif.
Viking Modules, Waltham, Mass.

Power Supplies, 60 or 60/400 CPS Input, Up To 30 VDC Output, Voltage Regulated

Aaron-Davis Co., Los Angeles,, Cal. p 616
Abbott Transistor Labs., L.A., Cal. p 618
ACDC Elctrns., Oceanside, Cal. p 634-638
Acopian Corp., Easton, Pa. ..... p 641
American Time Products, Woodside, N.Y.
Amp Inc., Elizabethtown, Pa.
Amp Inc., Harrisburg, Pa.
Arnold Magnetics, Culver City, Cal. p 645,646
Astro-Space Labs., Huntsville, Ala p 633
Austron, Inc., Austin, Tex.
Avtel Corp., Covina, Cal. ..... p 659
Beckman Instrs., Cedar Grove, N.J.
Bramco Controls, Piqua, Ohio
Bulova Watch Elctrns. Div. Amer. Time Prods., Woodside, N.Y.
Bulova Watch Co., Servo Prods. Elctrns. Div., Woodside, N.Y.
California Elctrn. Mfg. Co., Alamo, Calif. p 1315
CEA, Monrovia, Cal. ..... p 673
Christie Elec., Los Angeles, Cal. .. p 674
Circuit Power, Inc., Portland, Conn. p 676
CML-Macarr, Inc., Edison, N.J. ..... p 667
Computer Prods., Ft. Lauderdale, Fla. p 341
DDC, Hicksville, N.Y.
Del Elctrns. Corp., Mt. Vernon, N.Y.
Deltron, Inc., N. Wales, Pa. .....p 682-684
Digital Equip. Corp., Maynard, Mass.
Digitron Corp., Norristown, Pa.
Dressen-Barnes Elctrns., Pasadena, Cal. .....p 686-690
Dynage, Bloomfield, Conn. p 692-694,696-699
Elcor Prods. Welex Elctrns., Silver Spring, Md. ..... p 701
Elctrn. Meas. Inc., Neptune, N.J. .. p 702
Electronic Resch. Assocs., Cedar Grove, N.J. .....p 707,708
Elexon Inc., Santa Ana, Cal. ..... p 706
Faratron Corp., Hackensack, N.J. p 711-713
Ferrotran Elctrn., New York, N.Y. p 715-717
Fluke, John Mfg. Co., Inc., Seattle, Wash.
Frequency Control, Inc., Austin, Tex.
Gates Elctrn. Co., Bronx, N.Y. p 720,721
General Elec. Co., Schenectady, N.Y.
General Resistance, Mt. Vernon, N.Y.
Hewlett-Packard, Palo Alto, Cal. p 729-731
Hewlett-Packard, Berkeley Hgts., N.J. p 729-731
Hybrid Sys. Corp., Burlington, Mass.
Interelectronics Corp., Congers, N.Y.
International Rectifier, El Segundo, Cal.
Intronics, Inc., Newton, Mass. ..... p 734
Ithaco, Inc., Ithaca, N.Y.
Julie Research Lab., New York, N.Y. p 502
Kepco, Inc., Flushing, N.Y. p 738-752,754-760
Kratos Precision Prods., Los Angeles, Cal.
La Marche Mfg. Co., Des Plaines, Ill. p 774
Lambda Elctrns., Melville, N.Y. p 777-801
Mauratron, Inc., Dallas, Tex.
Mid-Eastern Inds., Scotch Plains, N.J. p 812-814
Neff Instr. Corp., Duarte, Calif.
Neshaminy Transformer, Furlong, Pa.
NJE Corp., Kenilworth, N.J.....p 819-825
North Elec. Co., Galion, Ohio ..p 826,827
North Hills Elctrns., Inc., Glen Cove, N.Y. ..... p 817
Nova Electric Mfg. Co., Nutley, N.J.
NWL Transformers, Trenton, N.J.
Opad Elec. Co., Inc., New York, N.Y. p 829
Opamp Labs., Los Angeles, Cal.
Pacific Technology, Renton, Wash. p 830
Power Designs, Westbury, N.Y. p 832-835
Power Inc., Burnsville, Minn.
Power/Mate, Hackensack, N.J. p
Powertec, Chatsworth, Cal. ....p 860-864
PPM, Inc., Bedford, Ohio
Raytheon Co., Manchester, N.H. p 878,879
RCA Elctrns. Comps., Harrison, N.J. p 550
RO Assocs., Menlo Pk., Cal. p 865,866,868,869
Rosemount Plug-In, Nashville, Tenn. p 870
Schauer Mfg. Corp., Cincinnati, Ohio
Spellman High Voltage Elctrns. Corp., Bronx, N.Y. ..... p 874
SRC Div., Newport Bch., Cal. ..... p 871
Staco, Inc., Dayton, Ohio
Systron-Donner Alpha Div., Oakland, Cal.
Systron Donner Trygon Elctrns. Sub., Roosevelt, N.Y. ..... p 933
Technipower, Ridgefield, Conn. p 905-921,924-928
Tecnetics, Inc., Boulder, Colo. p 884,885
Teledyne Philbrick, Dedham, Mass. p 1294
Tempo/UTI Div., Chatsworth, Cal.
Thunder Int'l. Corp., Middletown, Conn. p 887-891,893,894
Todd Prods., Farmingdale, N.Y. p 929-931
Topaz Elctrns., San Diego, Cal.
Trio Labs, Inc., Plainview, N.Y..... p 932
Unitron, Garland, Tex.
Universal Elctrns. Co., Irvine, Cal. p 938,939
Varadyne Systems, Canton, Mass. p 385
Vector Engrg., Springfield, N.J.
Wagner Elec. Corp., Livingston, N.J.
Wanlass Div., Fort Washington, Pa. p 946
Abtronics, Inc., Livermore, Calif.
A C Electronics Co., Santa Monica, Cal.
Acme Elec. Corp., Cuba, N.Y.
Active Control Instrumentation, E. Northport, NY
Advanced Energy Conversion, Menlo Pk., Cal.
Aerospace Avionics, Inc., Bohemia, N.Y.
Allis Louis Co., Greendale, Wisc.
AMBAC Inds., Garden City, N.Y.
American Rectifier Corp., College Point, N.Y.
Amplifier Corp. America, Westbury, N.Y.

Analog Devices, Inc., Norwood, Mass.
Analogic, Wakefield, Mass.
Anocut Engrg. Co., Elk Grove Village, Ill.
Applied Electro Mechanics, Alexandria, Va.
Arbor Sys., Inc., Ann Arbor, Mich.
Astro-Metrix, Burbank, Cal.
AUL Instrs., Inc., Flushng, N.Y.
Automatic Control Elctrns. Co., San Antonio, Tex.
Barden Co., Div. Interdyne Co., Los Angeles, Cal.
Barnes & Reinecke, Inc., Chicago, Ill.
Barwood Elctrns., Inc., Glendale, Cal.
Beckman Instrs., Helipot Div., Fullerton, Cal.
BECO Solid State Systems, Salem, Va.
Behlman Engrg. Corp., Santa Barbara, Cal.
Bergen Labs., Inc., Paterson, N.J.
Berkeley Nucleonics Corp., Berkeley, Calif.
B.H. Inds., Los Angeles, Cal.
Bogue Elec. Mfg. Co., Paterson, N.J.
Bose Corp., Natick, Mass.
Broadview Inds. Corp., Hempstead, N.Y.
Buck Engrg. Co., Farmingdale, N.J.
Bullock Magnetics Corp., Pomona, Calif.
Burr-Brown Resch. Corp., Tucson, Ariz.
Cal-Power Corp., El Segundo, Calif.
CGS Units, Inc., Rochester, N.Y.
Chalco Engrg. Corp., Gardena, Cal.
Chicago Condenser Corp., Chicago, Ill.
Clark, David Co., Worcester, Mass.
Coil Co. of Amer., Northvale, N.J.
Coleman Instrs., Maywood, Ill.
Collins Electronics, Inc., Stevensville, Md.
Collins Radio Co., Cedar Rapids, Iowa
Collins Radio Co., Dallas, Tex.
Components Specialties, Inc., Freeport, N.Y.
Computer Diode, Fair Lawn, N.J.
Computer Meas., Gardena, Cal.
Consolidated Ohmic Devices, Carle Pl., N.Y.
Consolidated Transformers Unltd., San Gabriel, Cal.
Constant Voltage Co., Chicago, Ill.
Control Sys. Resch., Inc., Pittsburgh, Pa.
Controlled Power Corp., Farmington, Mich
Darrah Elec. Co., Inc., Cleveland, Ohio
Delta-Tronics Corp., Tempe, Ariz.
Digiac Corp., Plainview, N.Y.
Dorsett Elctrns., Tulsa, Okla.
E-Tronics, Van Nuys, Cal.
EDC (Electro Dev.), Lynnwood, Wash.
Elasco-Eastern, Inc., Bloomfield, Conn.
Electro Magnetic Prods., Wabash, Ind.
Electro-Pacific, Inc., Goleta, Calif.
Electro-Standards Labs., Inc., Miami, Fla.
Elctrn. Components Corp., Addison, Ill.
Elctrn. Specialty, Thomaston, Conn.
Elgin Elctrns., Waterford, Pa.
EMP Elctrns., Inc., Phoenix, Ariz.
Endevco, Pasadena, Calif.
Engineering Assocs., Dayton, Ohio
Engrg. Svcs., Madison, N.J.
Exide Power Sys. Div., Philadelphia, Pa.
Fairlane Electronics, Inc., Long Valley, N.J.
Firing Circuits Div., Norwalk, Conn
FRL, Marin Controls Co., Belmont, Cal.
Glentronics, Glendora, Cal.
GPS Instr. Co., Framingham, Mass.
Grafix, Inc., Albuquerque, N.M.
Green Elec. Corp., Fair Lawn, N.J.
Guide Inds., Inc., Sun Valley, Calif.
Gulton Inds., Hawthorne, Calif.
Heath Co., Benton Harbor, Mich.
Hope Elctrns., Clifton, N.J.
Horlick, William I. Co., Inc., Boston, Mass.
Houston Scientific Inds., Inc., Houston, Tex
Hughes Aircraft Co, Culver City, Cal.
Hyperion Inds. Corp., Watertown, Mass.
Ideal Elec. & Mfg. Co., Mansfield, Ohio
Incor Instr., Plainview, N.Y.
Instrulab, Inc., Dayton, Ohio
Intech, Santa Clara, Cal.
Intercontinental Elctrns., E. Rochester, N.Y.
ITI Electronics, Inc., Clifton, N.J.
K West, Westminster, Calif.
Keltron Corp., Waltham, Mass.
Kikusui Elctrns. Corp., Kawasaki City, Kanagawa-Pref., Japan
Lehigh Valley Elctrn., Inc., Fogelsville, Pa.
Mag-Con Engrg. Co., St. Paul, Minn.
Magnetic Sys. & Instrs., Worcester, Mass.
Magnetics, Inc., Butler, Pa.
Magnetics, Sandy Lake, Pa.
Magnetics Sys. & Instrs., Worcester, Mass.
McKee-Pedersen Instrs., Danville, Calif.
Mennen-Greatbatch Elctrns., Inc., Clarence, N.Y.
Micro Elctrns., Ltd., Kwun Tong, Hong Kong
Midland Standard Inc., Elgin, Ill.
Milletron, Inc., Pittsburgh, Pa.
Model Rectifier Corp., Edison, N.J.
Modular Devices, Inc., Gardena, Calif.
Modular Power, Inc., Poway, Cal.
Monitor Sys., Inc., Ft. Washington, Pa.
Motor Generator Div., Troy, Ohio
Neutronic Corp., Bridgeton, Mo.
Nuclear Corp. Amer., Denville, N.J.
Oeco Corp., Portland, Ore.
Optical Elctrns., Tucson, Ariz.
Optimation, Inc., Sun Valley, Calif.
Pace Div., Harbor City, Calif.
Palomar Engrs., Escondido, Cal.
Permavolt Transformers, Inc., S. Bend, Ind.
Philips Elctrns. Inds., Ltd., Toronto 17, Can.
Philmore Mfg. Co., Richmond Hill, N.Y.
PIC Design Corp., Ridgefield,, Conn.
Pioneer Magnetics, Santa Monica, Cal.
Power Control Corp., Pittsburgh, Pa.
Princeton Applied Resch. Corp., Princeton, N.J.
Ramsay Engrg. Co., Anaheim, Calif.
Rapid Elec. Co., Bronx, N.Y.
Ratelco, Inc., Seattle, Wash.
RHA-Audio Communications, W. New York, N.J.
Rho Engrg. Co., Los Angeles, Calif
Robicon Corp., Pittsburgh, Pa
Robotron Corp., Detroit, Mich.
Rosemount Engrg. Co., Minneapolis, Minn.
SBD Systems, Inc., Amityville, N.Y.
Scintillonics, Inc., Ft. Collins, Colo.
Semiconductor Circuits Inc., Woburn, Mass.
Sensor Corp., Greenwich, Conn.
Shane Inds., Sunny Vale, Cal.
Singer Co., Somerville, N.J.
Singer-General Precision, Inc., Little Falls, N.J.
Singer - Tele-Signal, Woodbury, N.Y.
SKG Assocs., Inc., Boston, Mass.
Sola Elec. Div., Elk Grove Village, Ill.
Solidstate Controls, Inc., Columbus, Ohio
Spatron Inc, Alhambra, Calif.
Spectra Sonics, Ogden, Utah
Spectran Elctrns., Pompano Beach, Fla.
Stark Elctrn. Instrs., Ltd., Ajax, Ont., Canada
Stow Labs., Inc., Hudson, Mass.
Sunshine Sci. Instrs., Inc., Philadelphia, Pa.
Taylor Instr. Process Control Div., Rochester, N.Y.
TDC Div., Littleton, Mass.
Teledyne Inet, Gardena, Cal.
Terado Corp., St. Paul, Minn.
Ther Elec. & Mach. Works, Chicago, Ill.
Transducer Systems, Inc., Willow Grove, Pa.
Transistor Devices, Cedar Knolls, N.J.
Transrex Div., Torrance, Cal.
Tresco an Aydin Co., Phila., Pa.
Unitron Inds. Corp., Taipei, Taiwan, Republic of China
Universal Transistor Prods., Copiague, N.Y.
Varo, Inc., Texas Div., Garland, Tex.
Viking Modules, Waltham, Mass.
Voltex Co., Inc., Farmingdale, N.Y.
Walden Elctrns. Corp., Waltham, Mass.
Ward Leonard, Mt. Vernon, N.Y.
Westinghouse Elec. Corp., Pittsburgh, Pa.
Zeltex, Inc., Concord, Calif.

Power Supplies, 60 or 60/400 CPS Input, Up To 100 VDC Output, Voltage Regulated

Aaron-Davis Co., Los Angeles,, Cal. p 616
Abbott Transistor Labs., L.A., Cal. p 618
ACDC Elctrns., Oceanside, Cal. p 634,635,638
Acopian Corp., Easton, Pa. ..... p 641
Allen-Bradley Co., Milwaukee, Wisc.
American Time Products, Woodside, N.Y.
Amp Inc., Elizabethtown, Pa.
Amp Inc., Harrisburg, Pa.
Arnold Magnetics, Culver City, Cal. p 645,646
Astro-Space Labs., Huntsville, Ala
Autronics Corp., Pasadena, Calif.
Avtel Corp., Covina, Cal.
Beckman Instrs., Cedar Grove, N.J.
Bulova Watch Elctrns. Div. Amer. Time Prods., Woodside, N.Y.
Bulova Watch Co., Servo Prods. Elctrns. Div., Woodside, N.Y.
CEA, Monrovia, Cal. ..... p 673
Christie Elec., Los Angeles, Cal. .. p 674
Circuit Power, Inc., Portland, Conn. p 676
CML-Macarr, Inc., Edison, N.J.
Del Elctrns. Corp., Mt. Vernon, N.Y. p 678
Deltron, Inc., N. Wales, Pa. ..... p 682
Dressen-Barnes Elctrns., Pasadena, Cal. .....p 686,690
Dynage, Bloomfield, Conn. p 692,697,699
Elcor Prods. Welex Elctrns., Silver Spring, Md. ..... p 701
Elctrn. Meas. Inc., Neptune, N.J. .. p 702
Electronic Resch. Assocs., Cedar Grove, N.J. .....p 707-709
Faratron Corp., Hackensack, N.J. p 712,713
Ferrotran Elctrn., New York, N.Y. p 715-717
Fluke, John Mfg. Co., Inc., Seattle, Wash. ..... p 477
Freed Transformer Co., Bklyn., N.Y. p 481
Gates Elctrn. Co., Bronx, N.Y. p 720,721
General Elec. Co., Schenectady, N.Y.
Hewlett-Packard, Palo Alto, Cal. p 729,731,732
Hewlett-Packard, Berkeley Hgts., N.J. p 729,731,732
Interelectronics Corp., Congers, N.Y.
International Rectifier, El Segundo, Cal.
Ithaco, Inc., Ithaca, N.Y.
Julie Research Lab., New York, N.Y. p 502
Kepco, Inc., Flushing, N.Y. p 738,739,741-761
La Marche Mfg. Co., Des Plaines, Ill. p 774
Lambda Elctrns., Melville, N.Y. p 778-801
Mid-Eastern Inds., Scotch Plains, N.J. p 812-814
Neshaminy Transformer, Furlong, Pa.
NJE Corp., Kenilworth, N.J.....p 819-825
North Elec. Co., Galion, Ohio ..p 826,827
North Hills Elctrns., Inc., Glen Cove, N.Y.
Nova Electric Mfg. Co., Nutley, N.J.
NWL Transformers, Trenton, N.J.
Opad Elec. Co., Inc., New York, N.Y. p 829
Opamp Labs., Los Angeles, Cal.
Power Designs, Westbury, N.Y. p 832-835
Power Inc., Burnsville, Minn.
Power/Mate, Hackensack, N.J. p 838,839,841,846,847,851,853,856-859
Powertec, Chatsworth, Cal. ....p 860-862
Precision Standards Corp., Santa Ana, Cal.
Raytheon Co., Manchester, N.H. p 878,879
RO Assocs., Menlo Pk., Cal. ..... p 868
Schauer Mfg. Corp., Cincinnati, Ohio
Sierra Sys., Mountain View, Cal.
Spellman High Voltage Elctrns. Corp., Bronx, N.Y. ..... p 874
SRC Div., Newport Bch., Cal. ..... p 871
Staco, Inc., Dayton, Ohio
Systron-Donner Alpha Div., Oakland, Cal.
Systron Donner Trygon Elctrns. Sub., Roosevelt, N.Y. ..... p 933
Technipower, Ridgefield, Conn.
p
Teledyne Philbrick, Dedham, Mass. p 1294
Thunder Int'l. Corp., Middletown, Conn. p 887-889,893,894
Todd Prods., Farmingdale, N.Y. p 930,931
Topaz Elctrns., San Diego, Cal.
Trio Labs, Inc., Plainview, N.Y.
Unitron, Garland, Tex.
Universal Elctrns. Co., Irvine, Cal.
Vector Engrg., Springfield, N.J.
Wanlass Div., Fort Washington, Pa. p 946
Abtronics, Inc., Livermore, Calif.
A C Electronics Co., Santa Monica, Cal.
Acme Elec. Corp., Cuba, N.Y.
Advance Instr. Corp., Belmar, N. J.
Advanced Energy Conversion, Menlo Pk., Cal.
Allis, Louis Co., Milwaukee, Wisc.
Allis Louis Co., Greendale, Wisc.
AMBAC Inds., Garden City, N.Y.
American Rectifier Corp., College Point, N.Y.
Amplifier Corp. America, Westbury, N.Y.
Analog Devices, Inc., Norwood, Mass.
Analogic, Wakefield, Mass.
Anocut Engrg. Co., Elk Grove Village, Ill.
Applied Control Co., Fairfield, N.J.
Armour Elctrns. Corp., Worcester, Mass.
Associated Specialties Co., Orefield, Pa.
Astro-Metrix, Burbank, Cal.
AUL Instrs., Inc., Flushng, N.Y.
Barden Co., Div. Interdyne Co., Los Angeles, Cal.
Barnes & Reinecke, Inc., Chicago, Ill.
Barwood Elctrns., Inc., Glendale, Cal.
BECO Solid State Systems, Salem, Va.
Behlman Engrg. Corp., Santa Barbara, Cal.
Bergen Labs., Inc., Paterson, N.J.
B.H. Inds., Los Angeles, Cal.
Bogue Elec. Mfg. Co., Paterson, N.J.
Bose Corp., Natick, Mass.
Buck Engrg. Co., Farmingdale, N.J.
Bullock Magnetics Corp., Pomona, Calif.
Burr-Brown Resch. Corp., Tucson, Ariz.
Cal-Power Corp., El Segundo, Calif.
Central Scientific Co., Chicago, Ill.
CGS Units, Inc., Rochester, N.Y.
Chalco Engrg. Corp., Gardena, Cal.
Chicago Condenser Corp., Chicago, Ill.
Coil Co. of Amer., Northvale, N.J.
Collins Radio Co., Cedar Rapids, Iowa
Collins Radio Co., Dallas, Tex.
Consolidated Transformers Unltd., San Gabriel, Cal.
Constant Voltage Co., Chicago, Ill.
Control Sys. Resch., Inc., Pittsburgh, Pa.
Controlled Power Corp., Farmington, Mich
Darrah Elec. Co., Inc., Cleveland, Ohio
Delta-Tronics Corp., Tempe, Ariz.
Dorsett Elctrns., Tulsa, Okla.
E-Tronics, Van Nuys, Cal.
EDC (Electro Dev.), Lynnwood, Wash.
Elasco-Eastern, Inc., Bloomfield, Conn.
Electro Magnetic Prods., Wabash, Ind.
Electro-Pacific, Inc., Goleta, Calif.
Electro-Standards Labs., Inc., Miami, Fla.
Elctrn. Components Corp., Addison, Ill.
Elctrn. Specialty, Thomaston, Conn.
Elgin Elctrns., Waterford, Pa.
EMP Elctrns., Inc., Phoenix, Ariz.
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Intercontinental Elctrns., E. Rochester, N.Y.
International Tech. Svc., Glen Ellyn, Ill.
IPT Corp., Mountain View, Cal.
ITI Electronics, Inc., Clifton, N.J.
K West, Westminster, Calif.
Keltron Corp., Waltham, Mass.
Kikusui Elctrns. Corp., Kawasaki City, Kanagawa-Pref., Japan
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Magnetics, Inc., Butler, Pa.
Magnetics, Sandy Lake, Pa.
Magnetics Sys. & Instrs., Worcester, Mass.

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Modular Devices, Inc., Gardena, Calif.
Modular Power, Inc., Poway, Cal.
Neutronic Corp., Bridgeton, Mo.
Nuclear Corp. Amer., Denville, N.J.
Nuclear Resch. Corp., Southampton, Pa.
Oeco Corp., Portland, Ore.
Optimation, Inc., Sun Valley, Calif.
Pacific Electro Dynamics, Bellevue, Wash
Packer, B. L., Co., Inc., Hicksville, N.Y.
Permavolt Transformers, Inc., S. Bend, Ind.
Philips Elctrns. Inds., Ltd., Toronto 17, Can.
Pioneer Magnetics, Santa Monica, Cal.
Power Control Corp., Pittsburgh, Pa.
Power Instrs., Skokie, Ill.
Ramm Rectifier Co., Inc., Bronx, N.Y.
Rapid Elec. Co., Bronx, N.Y.
Ratelco, Inc., Seattle, Wash.
Rho Engrg. Co., Los Angeles, Calif
RIL Elctrns., Inc., Southampton, Pa.
Robicon Corp., Pittsburgh, Pa
Sanders Assocs., Nashua, N.H.
SBD Systems, Inc., Amityville, N.Y.
Scintillonics, Inc., Ft. Collins, Colo.
Sel-Rex Corp., Nutley, N.J.
Semiconductor Circuits Inc., Woburn, Mass.
Shane Inds., Sunny Vale, Cal.
Singer - Tele-Signal, Woodbury, N.Y.
SKG Assocs., Inc., Boston, Mass.
Sola Elec. Div., Elk Grove Village, Ill.
Solidstate Controls, Inc., Columbus, Ohio
Spatron Inc, Alhambra, Calif.
Spectran Elctrns., Pompano Beach, Fla.
Sunshine Sci. Instrs., Inc., Philadelphia, Pa.
Tabet Mfg. Co., Norfolk, Va.
TDC Div., Littleton, Mass.
Teledyne Inet, Gardena, Cal.
Teledyne Kinetics, Solana Beach, Cal.
Ther Elec. & Mach. Works, Chicago, Ill.
Transformer Tech., Inc., Chicago, Ill.
Transistor Devices, Cedar Knolls, N.J.
Transrex Div., Torrance, Cal.
Tresco an Aydin Co., Phila., Pa.
Universal Transistor Prods., Copiague, N.Y.
Varo, Inc., Texas Div., Garland, Tex.
Viking Modules, Waltham, Mass.
Virginia Elctrns. Co., Inc., Falls Church, Va.
Voltex Co., Inc., Farmingdale, N.Y.
Walden Elctrns. Corp., Waltham, Mass.
Ward Leonard, Mt. Vernon, N.Y.
Warner Elec. Brake & Clutch Co., Beloit, Wisc.
Warren Communications, Littleton, Mass.
Zeltex, Inc., Concord, Calif.

Power Supplies, 60 or 60/400 CPS Input, Up To 1,000 VDC Output, Voltage Regulated

Aaron-Davis Co., Los Angeles,, Cal. p 616
Abbott Transistor Labs., L.A., Cal. p 618
ACDC Elctrns., Oceanside, Cal. p 634,635,638
Acopian Corp., Easton, Pa. ..... p 641
Advanced High Voltage Co., Inc., Northridge, Cal. ..... p 617
Allen-Bradley Co., Milwaukee, Wisc.
Amp Inc., Elizabethtown, Pa.
Amp Inc., Harrisburg, Pa.
Arnold Magnetics, Culver City, Cal. p 645,646
Astro-Space Labs., Huntsville, Ala
Avtel Corp., Covina, Cal.
Beckman Instrs., Cedar Grove, N.J.
CEA, Monrovia, Cal. ..... p 673
Christie Elec., Los Angeles, Cal. .. p 674
Circuit Power, Inc., Portland, Conn. p 676
CML-Macarr, Inc., Edison, N.J.
Computer Prods., Ft. Lauderdale, Fla.
CPS, Sunnyvale, Calif. ..... p 669
Del Elctrns. Corp., Mt. Vernon, N.Y. p 678,679
Deltron, Inc., N. Wales, Pa.
Dressen-Barnes Elctrns., Pasadena, Cal. ..... p 690
Dynage, Bloomfield, Conn. .....p 697,699
Elcor Prods. Welex Elctrns., Silver Spring, Md. ..... p 701
Electronic Dev. Corp., Boston, Mass.
Elctrn. Meas. Inc., Neptune, N.J. .. p 702
Electronic Resch. Assocs., Cedar Grove, N.J. .....p 707,709
Faratron Corp., Hackensack, N.J. p 713
Ferrotran Elctrn., New York, N.Y. p 716
Fluke, John Mfg. Co., Inc., Seattle, Wash. ..... p 477
Freed Transformer Co., Bklyn., N.Y. p 481
Gates Elctrn. Co., Bronx, N.Y. ..... p 720
General Elec. Co., Schenectady, N.Y.
Hewlett-Packard, Palo Alto, Cal. p 729,732
Hewlett-Packard, Berkeley Hgts., N.J. p 729,732
Hi-G, Windsor Locks, Conn.
Hipotronics, Inc., Brewster, N.Y. p 727,728
Interelectronics Corp., Congers, N.Y.
International Rectifier, El Segundo, Cal.
Julie Research Lab., New York, N.Y. p 502
Kepco, Inc., Flushing, N.Y. p 746,749-753,756-758
La Marche Mfg. Co., Des Plaines, Ill. p 774
Lambda Elctrns., Melville, N.Y. p 785,796-799
Meloy Laboratories, Springfield, Va.
Mid-Eastern Inds., Scotch Plains, N.J. p 812-814
Multitech Power Sys., Costa Mesa, Cal.
Neshaminy Transformer, Furlong, Pa.
NJE Corp., Kenilworth, N.J.
North Elec. Co., Galion, Ohio .. p 826,827
Nova Electric Mfg. Co., Nutley, N.J.
NWL Transformers, Trenton, N.J.
Opad Elec. Co., Inc., New York, N.Y. p 829
Power Designs, Westbury, N.Y. p 833,835
Power/Mate, Hackensack, N.J. p 853,858
Powertec, Chatsworth, Cal. ..... p 862
Raytheon Co., Manchester, N.H. .. p 878
RO Assocs., Menlo Pk., Cal. ..... p 868
Sierra Sys., Mountain View, Cal.
Spellman High Voltage Elctrns. Corp., Bronx, N.Y. ..... p 873,874,876
Sprague Elec. Co., No. Adams, Mass.
SRC Div., Newport Bch., Cal. ..... p 871
Systron-Donner Alpha Div., Oakland, Cal.
Systron Donner Trygon Elctrns. Sub., Roosevelt, N.Y.
Technipower, Ridgefield, Conn. p 905,912,916,920,921,924,926
Thunder Int'l. Corp., Middletown, Conn. p 893,894
Todd Prods., Farmingdale, N.Y. .... p 931
Topaz Elctrns., San Diego, Cal.
Trio Labs, Inc., Plainview, N.Y.
United-Page, Patterson, N.J..... p 1856
Vector Engrg., Springfield, N.J.
Wanlass Div., Fort Washington, Pa.
Acme Elec. Corp., Cuba, N.Y.
Advanced Energy Conversion, Menlo Pk., Cal.
Allis, Louis Co., Milwaukee, Wisc.
Allis Louis Co., Greendale, Wisc.
AMBAC Inds., Garden City, N.Y.
American Rectifier Corp., College Point, N.Y.
Analog Devices, Inc., Norwood, Mass.
Analogic, Wakefield, Mass.
Anocut Engrg. Co., Elk Grove Village, Ill.
Argent Inds., Inc., Dayton, Ohio
Artronix, Inc., St. Louis, Mo.
Associated Specialties Co., Orefield, Pa.
Astro-Metrix, Burbank, Cal.
Barnes & Reinecke, Inc., Chicago, Ill.
Barwood Elctrns., Inc., Glendale, Cal.
Behlman Engrg. Corp., Santa Barbara, Cal.
Bertan Assocs., Inc., Plainview, N.Y.
B.H. Inds., Los Angeles, Cal.
Bogue Elec. Mfg. Co., Paterson, N.J.
Buck Engrg. Co., Farmingdale, N.J.
Cal-Power Corp., El Segundo, Calif.
Central Scientific Co., Chicago, Ill.
Chalco Engrg. Corp., Gardena, Cal.
Chicago Condenser Corp., Chicago, Ill.
Coil Co. of Amer., Northvale, N.J.
Collins Radio Co., Cedar Rapids, Iowa
Collins Radio Co., Dallas, Tex.
Compu-Systems Co., Wakefield, Mass.
Consolidated Transformers Unltd., San Gabriel, Cal.
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Controlled Power Corp., Farmington, Mich
Cyberex Inc., Willoughby, Ohio
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Display Power Sys. Corp., Carmel, N.Y.
Dynascan Corp., Chicago, Ill.
E-Tronics, Van Nuys, Cal.
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Electro-Standards Labs., Inc., Miami, Fla.
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Electrophysics Corp., Nutley, N.J.
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Gulton Inds., Hawthorne, Calif.
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Magnetics, Sandy Lake, Pa.
Magnetics Sys. & Instrs., Worcester, Mass.
McKee-Pedersen Instrs., Danville, Calif.
Merrimack Magnetics, Lowell, Mass.
Milletron, Inc., Pittsburgh, Pa.
Modular Devices, Inc., Gardena, Calif.
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Moran Instr. Corp., Pasadena, Calif.
Neutronic Corp., Bridgeton, Mo.
Northeast Scientific Corp., Acton, Mass.
Nuclear-Chicago, Des Plaines, Ill.
Nuclear Corp. Amer., Denville, N.J.
Nuclear Resch. Corp., Southampton, Pa.
NuTek Industries, Mountain View, Cal.
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Ratelco, Inc., Seattle, Wash.
Raytheon Co., Waltham, Mass.
Rho Engrg. Co., Los Angeles, Calif
RIL Elctrns., Inc., Southampton, Pa.
Robicon Corp., Pittsburgh, Pa
SBD Systems, Inc., Amityville, N.Y.
Schoeffel Instr. Corp., Westwood, N.J.
Scintillonics, Inc., Ft. Collins, Colo.
Sel-Rex Corp., Nutley, N.J.
Semiconductor Circuits Inc., Woburn, Mass.
Semi/Dyne Elctrns. Corp., Freeport, N.Y.
Shane Inds., Sunny Vale, Cal.
SKG Assocs., Inc., Boston, Mass.
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Spatron Inc, Alhambra, Calif.
Sunshine Sci. Instrs., Inc., Philadelphia, Pa.
Teledyne Inet, Gardena, Cal.
Teledyne Kinetics, Solana Beach, Cal.
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Transrex Div., Torrance, Cal.
Universal Transistor Prods., Copiague, N.Y.
Varo, Inc., Texas Div., Garland, Tex.
Velonex, Santa Clara, Calif.
Viking Modules, Waltham, Mass.
Voltex Co., Inc., Farmingdale, N.Y.
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Walden Elctrns. Corp., Waltham, Mass.

Power Supplies, 60 or 60/400 CPS Input, Up To 10,000 VDC output, Voltage Regulated

Aaron-Davis Co., Los Angeles,, Cal. p 616
Abbott Transistor Labs., L.A., Cal. p 618
Advanced High Voltage Co., Inc., Northridge, Cal. ..... p 617
Amp Inc., Elizabethtown, Pa. ..... p 642
Amp Inc., Harrisburg, Pa.
Arnold Magnetics, Culver City, Cal.
Associated Resch., Chicago, Ill.
Astro-Space Labs., Huntsville, Ala
Avtel Corp., Covina, Cal.
Beckman Instrs., Cedar Grove, N.J. p 414
Cober Elctrns., Inc., Stamford, Conn.
CPS, Sunnyvale, Calif. ..... p 669
Del Elctrns. Corp., Mt. Vernon, N.Y. p 678,679
Electronic Resch. Assocs., Cedar Grove, N.J. ..... p 709
Fluke, John Mfg. Co., Inc., Seattle, Wash. ..... p 477
General Elec. Co., Schenectady, N.Y.
Hewlett-Packard, Palo Alto, Cal. p 729,732
Hewlett-Packard, Berkeley Hgts., N.J. p 729,732
Hipotronics, Inc., Brewster, N.Y. p 727,728
Interelectronics Corp., Congers, N.Y.
International Rectifier, El Segundo, Cal.
Kepco, Inc., Flushing, N.Y. p 749-751,753
Kilovolt Corp., Hackensack, N.J. .. p 772
Light Elec. Corp., Rancocas, N.J. p 808
Multitech Power Sys., Costa Mesa, Cal.
Neshaminy Transformer, Furlong, Pa.
NJE Corp., Kenilworth, N.J.
North Elec. Co., Galion, Ohio
NWL Transformers, Trenton, N.J.
Opad Elec. Co., Inc., New York, N.Y. p 829
Power Designs, Westbury, N.Y. p 833,835
Power/Mate, Hackensack, N.J.
Powertec, Chatsworth, Cal.
Raytheon Co., Manchester, N.H. .. p 878
Ross Engrg. Corp., Campbell, Cal.
Sierra Sys., Mountain View, Cal.
Spellman High Voltage Elctrns. Corp., Bronx, N.Y. ..... p 873,874,876
SRC Div., Newport Bch., Cal. ..... p 871
Thunder Int'l. Corp., Middletown, Conn.
Todd Prods., Farmingdale, N.Y. .... p 930
Universal Voltronics Corp., Mt. Kisco, N.Y. .....p 940,941
Vector Engrg., Springfield, N.J.
Venus Scientific, Farmingdale, N.Y.
Wagner Elec. Corp., Livingston, N.J.
Acme Elec. Corp., Cuba, N.Y.
Advanced Energy Conversion, Menlo Pk., Cal.
AMBAC Inds., Garden City, N.Y.
American Rectifier Corp., College Point, N.Y.
Astro-Metrix, Burbank, Cal.
Bertan Assocs., Inc., Plainview, N.Y.
B.H. Inds., Los Angeles, Cal.
Bogue Elec. Mfg. Co., Paterson, N.J.
Canadian Research Institute, Don Mills, Ont., Canada
Chicago Condenser Corp., Chicago, Ill.
Clinton Instr. Co., Clinton, Conn.
Coil Co. of Amer., Northvale, N.J.
Collins Radio Co., Cedar Rapids, Iowa
Collins Radio Co., Dallas, Tex.
Consolidated Transformers Unltd., San Gabriel, Cal.
Constant Voltage Co., Chicago, Ill.
Delta-Tronics Corp., Tempe, Ariz.
Denton Vacuum, Inc., Cherry Hill, N.J.
Display Power Sys. Corp., Carmel, N.Y.
EDC (Electro Dev.), Lynnwood, Wash.
Electro Magnetic Prods., Wabash, Ind.
Electro Powerpacs Corp., Cambridge, Mass.
Electrophysics Corp., Nutley, N.J.
Elgin Elctrns., Waterford, Pa.
EMP Elctrns., Inc., Phoenix, Ariz.

Energy Systems, Palo Alto. Cal.
Gap Instr. Corp., Hauppauge, N.Y.
Gencom Div., Plainview, N.Y.
Glentronics, Glendora, Cal.
Grafix, Inc., Albuquerque, N.M.
Guide Inds., Inc., Sun Valley, Calif.
Gulton Inds., Hawthorne, Calif.
Hope Elctrns., Clifton, N.J.
Hughes Aircraft Co, Culver City, Cal.
Hyperion Inds. Corp., Watertown, Mass.
Ind'l. Gauging & Control, Norwalk, Conn.
Intercontinental Elctrns., E. Rochester, N.Y.
ITI Electronics, Inc., Clifton, N.J.
Johnston Labs., Inc., Cockeysville, Md.
Keithley Instrs., Inc., Cleveland, Ohio
Kentrox Inds., Inc., Portland, Ore.
Ling Elctrns., Anaheim, Calif.
Magnetic Sys. & Instrs., Worcester, Mass.
Magnetics, Inc., Butler, Pa.
Magnetics, Sandy Lake, Pa.
Magnetics Sys. & Instrs., Worcester, Mass.
Maxwell Labs., Inc., San Diego, Calif.
Micro-Power, Inc., Long Island City, N.Y.
Mictron Div. KMS, Inc., Sarasota, Fla.
Milletron, Inc., Pittsburgh, Pa.
Moran Instr. Corp., Pasadena, Calif.
Northeast Scientific Corp., Acton, Mass.
Nuclear Corp. Amer., Denville, N.J.
Nuclear Data, Inc., Palatine, Ill.
Nuclear Resch. Corp., Southampton, Pa.
Optimation, Inc., Sun Valley, Calif.
Pacific Photometric Instrs., Berkeley, Cal.
Peerless Elec. Prods., Anaheim, Cal.
Peschel Instrs., Cape Coral, Fla.
Pioneer Magnetics, Santa Monica, Cal.
Power Control Corp., Pittsburgh, Pa.
Princeton Applied Resch. Corp., Princeton, N.J.
Ramm Rectifier Co., Inc., Bronx, N.Y.
Rho Engrg. Co., Los Angeles, Calif
RIL Elctrns., Inc., Southampton, Pa.
Rodale Elctrns., Inc., Garden City, N.Y.
Semi/Dyne Elctrns. Corp., Freeport, N.Y.
SKG Assocs., Inc., Boston, Mass.
Sloan Technology Corp., Santa Barbara, Calif.
Sola Elec. Div., Elk Grove Village, Ill.
Spatron Inc, Alhambra, Calif.
Teledyne Inet, Gardena, Cal.
Teledyne Kinetics, Solana Beach, Cal.
Ther Elec. & Mach. Works, Chicago, Ill.
Transrex Div., Torrance, Cal.
Varo, Inc., Texas Div., Garland, Tex.
Velonex, Santa Clara, Calif.
Voltex Co., Inc., Farmingdale, N.Y.
Wabash Magnetics, Inc., Huntington, Ind.
Walden Elctrns. Corp., Waltham, Mass.

Power Supplies, 60 or 60/400 CPS Input, Up To 50,000 VDC output, Voltage Regulated

Advanced High Voltage Co., Inc., Northridge, Cal. ..... **p 617**
Amp Inc., Elizabethtown, Pa. ..... **p 642**
Amp Inc., Harrisburg, Pa.
Associated Resch., Chicago, Ill.
Avtel Corp., Covina, Cal.
Beckman Instrs., Cedar Grove, N.J. p 414
Cober Elctrns., Inc., Stamford, Conn.
CPS, Sunnyvale, Calif. ..... **p 669**
Del Elctrns. Corp., Mt. Vernon, N.Y. p 678,679
Electronic Resch. Assocs., Cedar Grove, N.J.
Fluke, John Mfg. Co., Inc., Seattle, Wash. ..... **p 477**
Hipotronics, Inc., Brewster, N.Y. p 727,728
Interelectronics Corp., Congers, N.Y.
International Rectifier, El Segundo, Cal.
Kilovolt Corp., Hackensack, N.J. p 772,773
Light Elec. Corp., Rancocas, N.J. p 808
Matrix Corp., Beech Grove, Ind.
Neshaminy Transformer, Furlong, Pa.
NJE Corp., Kenilworth, N.J.
North Elec. Co., Galion, Ohio
NWL Transformers, Trenton, N.J.
Power Designs, Westbury, N.Y...... **p 833**
Power/Mate, Hackensack, N.J.
Raytheon Co., Manchester, N.H. .. **p 878**
Ross Engrg. Corp., Campbell, Cal.
Sierra Sys., Mountain View, Cal. .. **p 872**
Spellman High Voltage Elctrns. Corp., Bronx, N.Y. ..... **p 873,874,876,877**
SRC Div., Newport Bch., Cal. ..... **p 871**
Universal Voltronics Corp., Mt. Kisco, N.Y. ..... **p 940,941**
Vector Engrg., Springfield, N.J.
Venus Scientific, Farmingdale, N.Y.
Advanced Energy Conversion, Menlo Pk., Cal.
American Elctrn. Controls Co., Barrington, N.J.
American Rectifier Corp., College Point, N.Y.
Astro-Metrix, Burbank, Cal.
Bertan Assocs., Inc., Plainview, N.Y.
Bogue Elec. Mfg. Co., Paterson, N.J.
Cal-Power Corp., El Segundo, Calif.
Canadian Research Institute, Don Mills, Ont., Canada
Chicago Condenser Corp., Chicago, Ill.
Coil Co. of Amer., Northvale, N.J.
Collins Radio Co., Cedar Rapids, Iowa
Collins Radio Co., Dallas, Tex.
Condenser Prods. Corp., Brooksville, Fla.
Constant Voltage Co., Chicago, Ill.
Denton Vacuum, Inc., Cherry Hill, N.J.
Ealing Corp., Cambridge, Mass.
EDC (Electro Dev.), Lynnwood, Wash.
Electro Magnetic Prods., Wabash, Ind.
Electro Powerpacs Corp., Cambridge, Mass.
Elgin Elctrns., Waterford, Pa.
Energy Systems, Palo Alto, Cal.
Gencom Div., Plainview, N.Y.
Glentronics, Glendora, Cal.
Grafix, Inc., Albuquerque, N.M.
Guide Inds., Inc., Sun Valley, Calif.
Gulton Inds., Hawthorne, Calif.
Hughes Aircraft Co, Culver City, Cal.
Hyperion Inds. Corp., Watertown, Mass.
Ind'l. Gauging & Control, Norwalk, Conn.
Instr. Resch. Co., Lincoln, Mass.
Intercontinental Elctrns., E. Rochester, N.Y.
ITI Electronics, Inc., Clifton, N.J.
ITT Aerospace, San Fernando, Cal.
Kentrox Inds., Inc., Portland, Ore.
Ling Elctrns., Anaheim, Calif.
Litton Inds., San Carlos, Calif.
Magnetic Sys. & Instrs., Worcester, Mass.
Magnetics, Inc., Butler, Pa.
Magnetics, Sandy Lake, Pa.
Magnetics Sys. & Instrs., Worcester, Mass.
Maxwell Labs., Inc., San Diego, Calif.
Moran Instr. Corp., Pasadena, Calif.
Northeast Scientific Corp., Acton, Mass.
Nuclear-Chicago, Des Plaines, Ill.
Nuclear Resch. Corp., Southampton, Pa.
Optimation, Inc., Sun Valley, Calif.
Peerless Elec. Prods., Anaheim, Cal.
Peschel Instrs., Cape Coral, Fla.
Power Control Corp., Pittsburgh, Pa.
RIL Elctrns., Inc., Southampton, Pa.
Scientific Elec., Inc., Garfield, N.J.
Scientronics, Barrington, N.J.
SKG Assocs., Inc., Boston, Mass.
Sloan Technology Corp., Santa Barbara, Calif.
Sola Elec. Div., Elk Grove Village, Ill.
Spatron Inc, Alhambra, Calif.
Transrex Div., Torrance, Cal.
TRW Instrs., El Segundo, Cal.
Universal Transistor Prods., Copiague, N.Y.
Varo, Inc., Texas Div., Garland, Tex.
Velonex, Santa Clara, Calif.
Wabash Magnetics, Inc., Huntington, Ind.
Walden Elctrns. Corp., Waltham, Mass.

Power Supplies, 60 or 60/400 CPS Input, Up To 500,000 VDC Output, Voltage Regulated

Associated Resch., Chicago, Ill.
Cober Elctrns., Inc., Stamford, Conn.
Del Elctrns. Corp., Mt. Vernon, N.Y. p 679
Hipotronics, Inc., Brewster, N.Y.
Interelectronics Corp., Congers, N.Y.
International Rectifier, El Segundo, Cal.
Kilovolt Corp., Hackensack, N.J. p 772,773
Light Elec. Corp., Rancocas, N.J. p 808
Raytheon Co., Manchester, N.H.
Spellman High Voltage Elctrns. Corp., Bronx, N.Y. ..... **p 873,874,877**
Universal Voltronics Corp., Mt. Kisco, N.Y. ..... **p 940,941**
Condenser Prods. Corp., Brooksville, Fla.
Constant Voltage Co., Chicago, Ill.
Display Power Sys. Corp., Carmel, N.Y.
High Voltage Engrg. Corp., Burlington, Mass.
Hughes Aircraft Co, Culver City, Cal.
Ind'l. Gauging & Control, Norwalk, Conn.
Ionic Electrostatic Corp., Garfield, N.J.
Ling Elctrns., Anaheim, Calif.
Magnetic Sys. & Instrs., Worcester, Mass.
Maxwell Labs., Inc., San Diego, Calif.
Peschel Instrs., Cape Coral, Fla.
Transrex Div., Torrance, Cal.

Power Supplies, 60 or 60/400 CPS Input, Over 500,000 VDC Output, Voltage Regulated

Associated Resch., Chicago, Ill.
Cober Elctrns., Inc., Stamford, Conn.
Hipotronics, Inc., Brewster, N.Y.
International Rectifier, El Segundo, Cal.
Kilovolt Corp., Hackensack, N.J. p 772,773
Light Elec. Corp., Rancocas, N.J.
Raytheon Co., Manchester, N.H.
Ross Engrg. Corp., Campbell, Cal.
Spellman High Voltage Elctrns. Corp., Bronx, N.Y. ..... **p 873,877**
Universal Voltronics Corp., Mt. Kisco, N.Y. ..... **p 940,941**
High Voltage Engrg. Corp., Burlington, Mass.
Hughes Aircraft Co, Culver City, Cal.
Ling Elctrns., Anaheim, Calif.
Maxwell Labs., Inc., San Diego, Calif.
Scientific Elec., Inc., Garfield, N.J.
Transrex Div., Torrance, Cal.

Power Supplies, 60-400 CPS Input, Unregulated D-C Ouput

Aaron-Davis Co., Los Angeles,, Cal.
ACDC Elctrns., Oceanside, Cal.
Acopian Corp., Easton, Pa. ..... **p 641**
Advanced High Voltage Co., Inc., Northridge, Cal.
Almond Instrs. Co., Covina, Cal
American Time Products, Woodside, N.Y.
Amp Inc., Elizabethtown, Pa.
Amp Inc., Harrisburg, Pa.
Arnold Magnetics, Culver City, Cal.
Astro-Space Labs., Huntsville, Ala
Austron, Inc., Austin, Tex.
Beckman Instrs., Cedar Grove, N.J.
Bulova Watch Elctrns. Div. Amer. Time Prods., Woodside, N.Y.
Bulova Watch Co., Servo Prods. Elctrns. Div., Woodside, N.Y.
California Elctrn. Mfg. Co., Alamo, Calif.
CEA, Monrovia, Cal.
Christie Elec., Los Angeles, Cal. .. **p 674**
Circuit Power, Inc., Portland, Conn.
CML-Macarr, Inc., Edison, N.J.
Cober Elctrns., Inc., Stamford, Conn.
Computer Prods., Ft. Lauderdale, Fla. p 341
Del Elctrns. Corp., Mt. Vernon, N.Y. p 678
Digitron Corp., Norristown, Pa.
Dressen-Barnes Elctrns., Pasadena, Cal.
Dynage, Bloomfield, Conn.
Elcor Prods. Welex Elctrns., Silver Spring, Md.
Electro Sci. Inds., Portland, Ore.
Electronic Resch. Assocs., Cedar Grove, N.J.
Faratron Corp., Hackensack, N.J.
Ferrotran Elctrn., New York, N.Y. p 716
Gates Elctrn. Co., Bronx, N.Y. ..... **p 721**
Hipotronics, Inc., Brewster, N.Y. .. **p 726**
Interelectronics Corp., Congers, N.Y.
International Rectifier, El Segundo, Cal.
Kepco, Inc., Flushing, N.Y.
Kilovolt Corp., Hackensack, N.J.
Lambda Elctrns., Melville, N.Y...... **p 783**
Light Elec. Corp., Rancocas, N.J.
Melcor Elctrns. Corp., Farmingdale, N.Y.
Mid-Eastern Inds., Scotch Plains, N.J.
Millen, James Mfg., Malden, Mass. p 523
Neshaminy Transformer, Furlong, Pa.
NJE Corp., Kenilworth, N.J.
North Elec. Co., Galion, Ohio
Nova Electric Mfg. Co., Nutley, N.J.
NWL Transformers, Trenton, N.J.
Opad Elec. Co., Inc., New York, N.Y.
Opamp Labs., Los Angeles, Cal.
Power/Mate, Hackensack, N.J.
Powertec, Chatsworth, Cal.
Raytheon Co., Manchester, N.H. .. **p 878**
Schauer Mfg. Corp., Cincinnati, Ohio
Spellman High Voltage Elctrns. Corp., Bronx, N.Y. ..... **p 877**
Staco, Inc., Dayton, Ohio
Systron-Donner Alpha Div., Oakland, Cal.
Systron Donner Trygon Elctrns. Sub., Roosevelt, N.Y.
Technipower, Ridgefield, Conn.
Tecnetics, Inc., Boulder, Colo.
Thunder Int'l. Corp., Middletown, Conn.
Tobe Deutschmann Labs., Inc., Canton, Mass.
Todd Prods., Farmingdale, N.Y.
Topaz Elctrns., San Diego, Cal.
Unitron, Garland, Tex.
Universal Elctrns. Co., Irvine, Cal. **p 939**
Vector Engrg., Springfield, N.J.
Wanlass Div., Fort Washington, Pa.
Zaring Inds., Inc., Carmel, Ind.
Abtronics, Inc., Livermore, Calif.
Acme Elec. Corp., Cuba, N.Y.
Action Systems Co., Meriden, Conn.
Active Control Instrumentation, E. Northport, NY
Advanced Energy Conversion, Menlo Pk., Cal.
Allis, Louis Co., Milwaukee, Wisc.
Allis Louis Co., Greendale, Wisc.
AMBAC Inds., Garden City, N.Y.
American Rectifier Corp., College Point, N.Y.
Anocut Engrg. Co., Elk Grove Village, Ill.
Astro-Metrix, Burbank, Cal.
AUL Instrs., Inc., Flushng, N.Y.
Beckman Instrs., Helipot Div., Fullerton, Cal.
Behlman Engrg. Corp., Santa Barbara, Cal.
Bergen Labs., Inc., Paterson, N.J.
Bertan Assocs., Inc., Plainview, N.Y.
B.H. Inds., Los Angeles, Cal.
Blonder-Tongue Labs., Inc., Old Bridge, N.J.
Bogue Elec. Mfg. Co., Paterson, N.J.
Buck Engrg. Co., Farmingdale, N.J.
Bullock Magnetics Corp., Pomona, Calif.
Burr-Brown Resch. Corp., Tucson, Ariz.
Cal-Power Corp., El Segundo, Calif.
Central Scientific Co., Chicago, Ill.
Century Coil Corp., Chicago, Ill.
CGS Units, Inc., Rochester, N.Y.
Chicago Condenser Corp., Chicago, Ill.
Coil Co. of Amer., Northvale, N.J.
Collins Radio Co., Cedar Rapids, Iowa
Collins Radio Co., Dallas, Tex.
Condenser Prods. Corp., Brooksville, Fla.
Constant Voltage Co., Chicago, Ill.
Controlled Power Corp., Farmington, Mich
Darrah Elec. Co., Inc., Cleveland, Ohio
Delta-Tronics Corp., Tempe, Ariz.
Denton Vacuum, Inc., Cherry Hill, N.J.
Diamond Repeater Co., Madison, N.J.
Dorsett Elctrns., Tulsa, Okla.
E-Tronics, Van Nuys, Cal.
EDC (Electro Dev.), Lynnwood, Wash.
Elasco-Eastern, Inc., Bloomfield, Conn.
Electro Magnetic Prods., Wabash, Ind.
Electro-Pacific, Inc., Goleta, Calif.
Electro Powerpacs Corp., Cambridge, Mass.
Electro Prods. Labs., Power Supply, Chicago, Ill.
Electro Prods. Labs., Transducer Div., Chgo., Ill.
Electro-Standards Labs., Inc., Miami, Fla.
Elctrn. Components Corp., Addison, Ill.
Elctrn. Specialty, Thomaston, Conn.
Elgin Elctrns., Waterford, Pa.
EMP Elctrns., Inc., Phoenix, Ariz.
Energy Systems, Palo Alto, Cal.
Engineering Assocs., Dayton, Ohio
Engrg. Svcs., Madison, N.J.
Fairlane Electronics, Inc., Long Valley, N.J.
Glentek, Inc., Santa Monica, Calif.
Glentronics, Glendora, Cal.
Grafix, Inc., Albuquerque, N.M.
Green Elec. Corp., Fair Lawn, N.J.
Green Rectifier Corp., Fair Lawn, N.J.
Guide Inds., Inc., Sun Valley, Calif.

Gulton Inds., Hawthorne, Calif.
Heath Co., Benton Harbor, Mich.
Hope Elctrns., Clifton, N.J.
Horlick, William I. Co., Inc., Boston, Mass.
Hughes Aircraft Co, Culver City, Cal.
Hyperion Inds. Corp., Watertown, Mass.
Ideal Elec. & Mfg. Co., Mansfield, Ohio
Instrument Displays, Haverhill, Mass.
Intercontinental Elctrns., E. Rochester, N.Y.
ITI Electronics, Inc., Clifton, N.J.
K West, Westminster, Calif.
Keltron Corp., Waltham, Mass.
Lehigh Valley Elctrn., Inc., Fogelsville, Pa.
Linear Sys., Inc., Watsonville, Calif.
Mag-Con Engrg. Co., St. Paul, Minn.
Magnetic Sys. & Instrs., Worcester, Mass.
Magnetics, Inc., Butler, Pa.
Magnetics, Sandy Lake, Pa.
Magnetics Sys. & Instrs., Worcester, Mass.
Maxwell Labs., Inc., San Diego, Calif.
Milletron, Inc., Pittsburgh, Pa.
Model Rectifier Corp., Edison, N.J.
Modular Devices, Inc., Gardena, Calif.
Modular Power, Inc., Poway, Cal.
Northeast Scientific Corp., Acton, Mass.
Nuclear Corp. Amer., Denville, N.J.
Oeco Corp., Portland, Ore.
Pace Div., Harbor City, Calif.
Peerless Elec. Prods., Anaheim, Cal.
Peschel Instrs., Cape Coral, Fla.
Philips Elctrns. Inds., Ltd., Toronto 17, Can.
Philmore Mfg. Co., Richmond Hill, N.Y.
Power Control Corp., Pittsburgh, Pa.
Precision Elctrns. Corp., Marshfield, Mass.
Preferred Electronics, Inc., Westfield, Mass.
Private Tele-Comms., Inc., Chicago, Ill.
Ramm Rectifier Co., Inc., Bronx, N.Y.
Rapid Elec. Co., Bronx, N.Y.
Rectifier Engrg. & Supply, St. Louis, Mo.
Rho Engrg. Co., Los Angeles, Calif
Robicon Corp., Pittsburgh, Pa
SBD Systems, Inc., Amityville, N.Y.
Scientific Elec., Inc., Garfield, N.J.
Scintillonics, Inc., Ft. Collins, Colo.
Sel-Rex Corp., Nutley, N.J.
Semiconductor Circuits Inc., Woburn, Mass.
Shane Inds., Sunny Vale, Cal.
Singer Co., Somerville, N.J.
Singer - Tele-Signal, Woodbury, N.Y.
SKG Assocs., Inc., Boston, Mass.
Solidstate Controls, Inc., Columbus, Ohio
Spatron Inc, Alhambra, Calif.
Strong Elec. Corp., Toledo, Ohio
Sunshine Sci. Instrs., Inc., Philadelphia, Pa.
TDC Div., Littleton, Mass.
TEC, Inc., Eden Prairie, Minn.
Teledyne Inet, Gardena, Cal.
Ther Elec. & Mach. Works, Chicago, Ill.
Transformer Design, Milwaukee, Wisc.
Transistor Devices, Cedar Knolls, N.J.
Transrex Div., Torrance, Cal.
Tresco an Aydin Co., Phila., Pa.
Triple-A Specialty Co., Chicago, Ill.
Universal Transistor Prods., Copiague, N.Y.
Varian Assocs., Palo Alto, Cal.
Varo, Inc., Texas Div., Garland, Tex.
Vectrol, Inc., Rockville, Md.
Viking Modules, Waltham, Mass.
Voltex Co., Inc., Farmingdale, N.Y.
Wabash Magnetics, Inc., Huntington, Ind.
Ward Leonard, Mt. Vernon, N.Y.

Power Supplies, 400 CPS Input Only, D-C Output, Voltage Regulated

Aaron-Davis Co., Los Angeles,, Cal.
Abbott Transistor Labs., L.A., Cal. p 618
ACDC Elctrns., Oceanside, Cal.
American Time Products, Woodside, N.Y.
Amp Inc., Elizabethtown, Pa. ..... p 643
Amp Inc., Harrisburg, Pa.
Arnold Magnetics, Culver City, Cal. p 645
Astro-Space Labs., Huntsville, Ala
Autronics Corp., Pasadena, Calif.
Avtel Corp., Covina, Cal.
Bulova Watch Elctrns. Div. Amer. Time Prods., Woodside, N.Y.
Bulova Watch Co., Servo Prods. Elctrns. Div., Woodside, N.Y.
CEA, Monrovia, Cal.
Christie Elec., Los Angeles, Cal.
Circuit Power, Inc., Portland, Conn.
Cober Elctrns., Inc., Stamford, Conn.
Del Elctrns. Corp., Mt. Vernon, N.Y.
Dressen-Barnes Elctrns., Pasadena, Cal.
Dynage, Bloomfield, Conn.
Elcor Prods. Welex Elctrns., Silver Spring, Md.
Elctrn. Meas. Inc., Neptune, N.J.
Electronic Resch. Assocs., Cedar Grove, N.J.
Faratron Corp., Hackensack, N.J.
Ferrotran Elctrn., New York, N.Y.
Hi-G, Windsor Locks, Conn. ....p 724,725
Interelectronics Corp., Congers, N.Y.
International Rectifier, El Segundo, Cal.
Kepco, Inc., Flushing, N.Y..... p 753
Kilovolt Corp., Hackensack, N.J.
La Marche Mfg. Co., Des Plaines, Ill.
Lambda Elctrns., Melville, N.Y.
Light Elec. Corp., Rancocas, N.J.
Melcor Elctrns. Corp., Farmingdale, N.Y.
Mid-Eastern Inds., Scotch Plains, N.J.
Multitech Power Sys., Costa Mesa, Cal. p 816
Neff Instr. Corp., Duarte, Calif.
Neshaminy Transformer, Furlong, Pa.
NJE Corp., Kenilworth, N.J.
North Elec. Co., Galion, Ohio
North Hills Elctrns., Inc., Glen Cove, N.Y.
Nova Electric Mfg. Co., Nutley, N.J.
Opad Elec. Co., Inc., New York, N.Y.
Power Designs, Westbury, N.Y.
Power Inc., Burnsville, Minn.
Power/Mate, Hackensack, N.J.
Powertec, Chatsworth, Cal. ..... p 863
Raytheon Co., Manchester, N.H.
RO Assocs., Menlo Pk., Cal.
Spellman High Voltage Elctrns. Corp., Bronx, N.Y.
SRC Div., Newport Bch., Cal.
Systron Donner Trygon Elctrns. Sub., Roosevelt, N.Y.
Technipower, Ridgefield, Conn. p 905,924,925
Thunder Int'l. Corp., Middletown, Conn. p 892
Todd Prods., Farmingdale, N.Y.
Trio Labs, Inc., Plainview, N.Y.
Unitron, Garland, Tex.
Universal Elctrns. Co., Irvine, Cal.
Vector Engrg., Springfield, N.J.
Wagner Elec. Corp., Livingston, N.J.
Wanlass Div., Fort Washington, Pa.
Acme Elec. Corp., Cuba, N.Y.
Advanced Energy Conversion, Menlo Pk., Cal.
Aerospace Avionics, Inc., Bohemia, N.Y.
Allis, Louis Co., Milwaukee, Wisc.
Allis Louis Co., Greendale, Wisc.
AMBAC Inds., Garden City, N.Y.
American Rectifier Corp., College Point, N.Y.
AMF Electrosystems Div., Vandalia, Ohio
Astro-Metrix, Burbank, Cal.
Barnes & Reinecke, Inc., Chicago, Ill.
Beckman Instrs., Helipot Div., Fullerton, Cal.
Behlman Engrg. Corp., Santa Barbara, Cal.
Bergen Labs., Inc., Paterson, N.J.
B.H. Inds., Los Angeles, Cal.
Bogue Elec. Mfg. Co., Paterson, N.J.
Bose Corp., Natick, Mass.
Cal-Power Corp., El Segundo, Calif.
Chicago Condenser Corp., Chicago, Ill.
Coil Co. of Amer., Northvale, N.J.
Collins Radio Co., Cedar Rapids, Iowa
Collins Radio Co., Dallas, Tex.
Consolidated Resistance Sls., Yonkers, N.Y.
Consolidated Transformers Unltd., San Gabriel, Cal.
Constant Voltage Co., Chicago, Ill.
Delta Elctrn. Control, Costa Mesa, Cal.
Delta-Tronics Corp., Tempe, Ariz.
E-Tronics, Van Nuys, Cal.
EDC (Electro Dev.), Lynnwood, Wash.
Elasco-Eastern, Inc., Bloomfield, Conn.
Electro Magnetic Prods., Wabash, Ind.
Electro-Pacific, Inc., Goleta, Calif.
Elctrn. Specialty, Thomaston, Conn.
Elgin Elctrns., Waterford, Pa.
EMP Elctrns., Inc., Phoenix, Ariz.
Energy Systems, Palo Alto, Cal.
Engrg. Svcs., Madison, N.J.
Fairlane Electronics, Inc., Long Valley, N.J.
Glentek, Inc., Santa Monica, Calif.
Glentronics, Glendora, Cal.
Grafix, Inc., Albuquerque, N.M.
Guide Inds., Inc., Sun Valley, Calif.
Gulton Inds., Hawthorne, Calif.
Horlick, William I. Co., Inc., Boston, Mass.
Hughes Aircraft Co, Culver City, Cal.
Hyperion Inds. Corp., Watertown, Mass.
Incor Instr., Plainview, N.Y.
Intercontinental Elctrns., E. Rochester, N.Y.
ITI Electronics, Inc., Clifton, N.J.
K West, Westminster, Calif.
Mag-Con Engrg. Co., St. Paul, Minn.
Magnetico, Inc., E. Northport, N.Y.
Magnetics, Inc., Butler, Pa.
Magnetics, Sandy Lake, Pa.
Modular Devices, Inc., Gardena, Calif.
Modular Power, Inc., Poway, Cal.
Novatronics, Inc., Pompano Beach, Fla.
Nuclear Corp. Amer., Denville, N.J.
Oeco Corp., Portland, Ore.
Peerless Elec. Prods., Anaheim, Cal.
Peschel Instrs., Cape Coral, Fla.
Pioneer Magnetics, Santa Monica, Cal.
Power Control Corp., Pittsburgh, Pa.
Preferred Electronics, Inc., Westfield, Mass.
Rho Engrg. Co., Los Angeles, Calif
Robicon Corp., Pittsburgh, Pa
Rodale Elctrns., Inc., Garden City, N.Y.
SBD Systems, Inc., Amityville, N.Y.
Sel-Rex Corp., Nutley, N.J.
Semiconductor Circuits Inc., Woburn, Mass.
Shane Inds., Sunny Vale, Cal.
Singer-General Precision, Inc., Little Falls, N.J.
SKG Assocs., Inc., Boston, Mass.
Spatron Inc, Alhambra, Calif.
Spectran Elctrns., Pompano Beach, Fla.
Teledyne Inet, Gardena, Cal.
Teledyne Kinetics, Solana Beach, Cal.
Ther Elec. & Mach. Works, Chicago, Ill.
Transistor Devices, Cedar Knolls, N.J.
Transrex Div., Torrance, Cal.
Tresco an Aydin Co., Phila., Pa.
Universal Transistor Prods., Copiague, N.Y.
Varo, Inc., Texas Div., Garland, Tex.
Viking Modules, Waltham, Mass.
Voltex Co., Inc., Farmingdale, N.Y.
Wabash Magnetics, Inc., Huntington, Ind.
Ward Leonard, Mt. Vernon, N.Y.
Westinghouse Elec. Corp., Pittsburgh, Pa.

Power Supplies, 400 CPS Input Only, D-C Output, Voltage Unregulated

Aaron-Davis Co., Los Angeles,, Cal.
ACDC Elctrns., Oceanside, Cal.
American Time Products, Woodside, N.Y.
Amp Inc., Elizabethtown, Pa.
Amp Inc., Harrisburg, Pa.
Arnold Magnetics, Culver City, Cal.
Astro-Space Labs., Huntsville, Ala
Autronics Corp., Pasadena, Calif.
Bulova Watch Elctrns. Div. Amer. Time Prods., Woodside, N.Y.
Bulova Watch Co., Servo Prods. Elctrns. Div., Woodside, N.Y.
Christie Elec., Los Angeles, Cal.
Circuit Power, Inc., Portland, Conn.
Cober Elctrns., Inc., Stamford, Conn.
Del Elctrns. Corp., Mt. Vernon, N.Y.
Dressen-Barnes Elctrns., Pasadena, Cal.
Dynage, Bloomfield, Conn.
Elcor Prods. Welex Elctrns., Silver Spring, Md.
Electronic Resch. Assocs., Cedar Grove, N.J.
Faratron Corp., Hackensack, N.J.
Ferrotran Elctrn., New York, N.Y.
Interelectronics Corp., Congers, N.Y.
International Rectifier, El Segundo, Cal.
Kilovolt Corp., Hackensack, N.J.
Light Elec. Corp., Rancocas, N.J.
Melcor Elctrns. Corp., Farmingdale, N.Y.
Mid-Eastern Inds., Scotch Plains, N.J.
Neshaminy Transformer, Furlong, Pa.
NJE Corp., Kenilworth, N.J.
North Elec. Co., Galion, Ohio
Opad Elec. Co., Inc., New York, N.Y.
Power Inc., Burnsville, Minn.
Power/Mate, Hackensack, N.J.
Powertec, Chatsworth, Cal.
Raytheon Co., Manchester, N.H.
Spellman High Voltage Elctrns. Corp., Bronx, N.Y.
Systron Donner Trygon Elctrns. Sub., Roosevelt, N.Y.
Technipower, Ridgefield, Conn.
Thunder Int'l. Corp., Middletown, Conn.
Todd Prods., Farmingdale, N.Y.
Unitron, Garland, Tex.
Vector Engrg., Springfield, N.J.
Wanlass Div., Fort Washington, Pa.
Zaring Inds., Inc., Carmel, Ind.
Acme Elec. Corp., Cuba, N.Y.
Advanced Energy Conversion, Menlo Pk., Cal.
Allis, Louis Co., Milwaukee, Wisc.
Allis Louis Co., Greendale, Wisc.
AMBAC Inds., Garden City, N.Y.
American Rectifier Corp., College Point, N.Y.
AMF Electrosystems Div., Vandalia, Ohio
Astro-Metrix, Burbank, Cal.
Barnes & Reinecke, Inc., Chicago, Ill.
Behlman Engrg. Corp., Santa Barbara, Cal.
Bergen Labs., Inc., Paterson, N.J.
B.H. Inds., Los Angeles, Cal.
Bogue Elec. Mfg. Co., Paterson, N.J.
Cal-Power Corp., El Segundo, Calif.
Century Coil Corp., Chicago, Ill.
CGS Units, Inc., Rochester, N.Y.
Chicago Condenser Corp., Chicago, Ill.
Coil Co. of Amer., Northvale, N.J.
Collins Radio Co., Cedar Rapids, Iowa
Collins Radio Co., Dallas, Tex.
Condenser Prods. Corp., Brooksville, Fla.
Consolidated Resistance Sls., Yonkers, N.Y.
Constant Voltage Co., Chicago, Ill.
Delta-Tronics Corp., Tempe, Ariz.
E-Tronics, Van Nuys, Cal.
EDC (Electro Dev.), Lynnwood, Wash.
Elasco-Eastern, Inc., Bloomfield, Conn.
Electro Magnetic Prods., Wabash, Ind.
Electro-Pacific, Inc., Goleta, Calif.
Elctrn. Specialty, Thomaston, Conn.
Elgin Elctrns., Waterford, Pa.
EMP Elctrns., Inc., Phoenix, Ariz.
Energy Systems, Palo Alto, Cal.
Engrg. Svcs., Madison, N.J.
Glentek, Inc., Santa Monica, Calif.
Glentronics, Glendora, Cal.
Grafix, Inc., Albuquerque, N.M.
Guide Inds., Inc., Sun Valley, Calif.
Gulton Inds., Hawthorne, Calif.
Hughes Aircraft Co, Culver City, Cal.
Hyperion Inds. Corp., Watertown, Mass.
Intercontinental Elctrns., E. Rochester, N.Y.
ITI Electronics, Inc., Clifton, N.J.
K West, Westminster, Calif.
Mag-Con Engrg. Co., St. Paul, Minn.
Magnetics, Inc., Butler, Pa.
Magnetics, Sandy Lake, Pa.
Model Rectifier Corp., Edison, N.J.
Modular Devices, Inc., Gardena, Calif.
Modular Power, Inc., Poway, Cal.
Nuclear Corp. Amer., Denville, N.J.
Oeco Corp., Portland, Ore.
Peerless Elec. Prods., Anaheim, Cal.
Peschel Instrs., Cape Coral, Fla.
Power Control Corp., Pittsburgh, Pa.
Precision Elctrns. Corp., Marshfield, Mass.
Rho Engrg. Co., Los Angeles, Calif
Robicon Corp., Pittsburgh, Pa
SBD Systems, Inc., Amityville, N.Y.
Sel-Rex Corp., Nutley, N.J.
Semiconductor Circuits Inc., Woburn, Mass.
Shane Inds., Sunny Vale, Cal.
SKG Assocs., Inc., Boston, Mass.
Spatron Inc, Alhambra, Calif.
Teledyne Inet, Gardena, Cal.
Ther Elec. & Mach. Works, Chicago, Ill.
Transformer Design, Milwaukee, Wisc.
Transistor Devices, Cedar Knolls, N.J.
Transrex Div., Torrance, Cal.
Tresco an Aydin Co., Phila., Pa.
Universal Transistor Prods., Copiague, N.Y.
Varo, Inc., Texas Div., Garland, Tex.
Viking Modules, Waltham, Mass.
Voltex Co., Inc., Farmingdale, N.Y.

Ward Leonard, Mt. Vernon, N.Y.

Power Supplies, 60 or 400 CPS Input, D-C Output, Current Regulated

Aaron-Davis Co., Los Angeles,, Cal.
ACDC Elctrns., Oceanside, Cal.
Almond Instrs. Co., Covina, Cal
Amp Inc., Elizabethtown, Pa.
Amp Inc., Harrisburg, Pa.
Arnold Magnetics, Culver City, Cal.
Astro-Space Labs., Huntsville, Ala
Autronics Corp., Pasadena, Calif.
Avtel Corp., Covina, Cal.
Beckman Instrs., Cedar Grove, N.J.
Bulova Watch Co., Servo Prods. Elctrns. Div., Woodside, N.Y.
California Elctrn. Mfg. Co., Alamo, Calif. p 1315
CEA, Monrovia, Cal.
Christie Elec., Los Angeles, Cal.. p 674
Circuit Power, Inc., Portland, Conn.
CML-Macarr, Inc., Edison, N.J.
Cober Elctrns., Inc., Stamford, Conn.
Del Elctrns. Corp., Mt. Vernon, N.Y.
Deltron, Inc., N. Wales, Pa.
Digital Equip. Corp., Maynard, Mass.
Dressen-Barnes Elctrns., Pasadena, Cal.
Dynage, Bloomfield, Conn.
Elcor Prods. Welex Elctrns., Silver Spring, Md.
Elctrn. Meas. Inc., Neptune, N.J.. p 702
Electronic Resch. Assocs., Cedar Grove, N.J.
Faratron Corp., Hackensack, N.J. p 713
Ferrotran Elctrn., New York, N.Y.
Fluke, John Mfg. Co., Inc., Seattle, Wash.
Freed Transformer Co., Bklyn., N.Y.
Gates Elctrn. Co., Bronx, N.Y.
Hewlett-Packard, Palo Alto, Cal.
Interelectronics Corp., Congers, N.Y.
Kepco, Inc., Flushing, N.Y. p 739,751,755-757
Kilovolt Corp., Hackensack, N.J. p 772,773
La Marche Mfg. Co., Des Plaines, Ill.
Lambda Elctrns., Melville, N.Y. p 796,798-801
Light Elec. Corp., Rancocas, N.J.
Mauratron, Inc., Dallas, Tex.
Melcor Elctrns. Corp., Farmingdale, N.Y.
Mid-Eastern Inds., Scotch Plains, N.J. p 812,814
Neshaminy Transformer, Furlong, Pa.
NJE Corp., Kenilworth, N.J.....p 822-825
North Elec. Co., Galion, Ohio ..... p 826
North Hills Elctrns., Inc., Glen Cove, N.Y. ..... p 817
Opad Elec. Co., Inc., New York, N.Y.
Power Designs, Westbury, N.Y.
Power Inc., Burnsville, Minn.
Power/Mate, Hackensack, N.J. p 850,851
Powertec, Chatsworth, Cal.
Raytheon Co., Manchester, N.H. .. p 879
Rosemount Plug-In, Nashville, Tenn.
Schauer Mfg. Corp., Cincinnati, Ohio
Spellman High Voltage Elctrns. Corp., Bronx, N.Y. ..... p 874
SRC Div., Newport Bch., Cal. p 871,1994
Staco, Inc., Dayton, Ohio
Systron Donner Trygon Elctrns. Sub., Roosevelt, N.Y.
Technipower, Ridgefield, Conn.
Tempo/UTI Div., Chatsworth, Cal.
Thunder Int'l. Corp., Middletown, Conn.
Todd Prods., Farmingdale, N.Y.
Trio Labs, Inc., Plainview, N.Y.
Unitron, Garland, Tex.
Universal Elctrns. Co., Irvine, Cal. p 939
Universal Voltronics Corp., Mt. Kisco, N.Y.
Vector Engrg., Springfield, N.J.
Wanlass Div., Fort Washington, Pa.
Zaring Inds., Inc., Carmel, Ind.
Acme Elec. Corp., Cuba, N.Y.
Advanced Energy Conversion, Menlo Pk., Cal.
Aerospace Avionics, Inc., Bohemia, N.Y.
Allis, Louis Co., Milwaukee, Wisc.
Allis Louis Co., Greendale, Wisc.
Altec, Anaheim, Calif.
AMBAC Inds., Garden City, N.Y.
American Rectifier Corp., College Point, N.Y.
Analogic, Wakefield, Mass.
Anocut Engrg. Co., Elk Grove Village, Ill.
Armour Elctrns. Corp., Worcester, Mass.
Astro-Metrix, Burbank, Cal.
AUL Instrs., Inc., Flushng, N.Y.
Barnes & Reinecke, Inc., Chicago, Ill.
Basler Elec. Co., Highland, Ill.
Behlman Engrg. Corp., Santa Barbara, Cal.
Bergen Labs., Inc., Paterson, N.J.
B.H. Inds., Los Angeles, Cal.
Bogue Elec. Mfg. Co., Paterson, N.J.
Bose Corp., Natick, Mass.
Buck Engrg. Co., Farmingdale, N.J.
Cal-Power Corp., El Segundo, Calif.
Central Engrg. Co., Minneapolis, Minn.
CGS Units, Inc., Rochester, N.Y.
Coil Co. of Amer., Northvale, N.J.
Coleman Instrs., Maywood, Ill.
Collins, G.L. Corp., Long Beach, Calif.
Collins Radio Co., Cedar Rapids, Iowa
Collins Radio Co., Dallas, Tex.
Constant Voltage Co., Chicago, Ill.
Control Sys. Resch., Inc., Pittsburgh, Pa.
Controlled Power Corp., Farmington, Mich
Delta Elctrn. Control, Costa Mesa, Cal.
Delta-Tronics Corp., Tempe, Ariz.
E-Tronics, Van Nuys, Cal.
EDC (Electro Dev.), Lynnwood, Wash.
Elasco-Eastern, Inc., Bloomfield, Conn.
Electro Magnetic Prods., Wabash, Ind.
Electro-Pacific, Inc., Goleta, Calif.
Electro-Standards Labs., Inc., Miami, Fla.
Elctrn. Components Corp., Addison, Ill.
Elctrn. Specialty, Thomaston, Conn.
Elgin Elctrns., Waterford, Pa.
EMP Elctrns., Inc., Phoenix, Ariz.
Energy Systems, Palo Alto, Cal.
Engrg. Svcs., Madison, N.J.
Exide Power Sys. Div., Philadelphia, Pa.
Firing Circuits Div., Norwalk, Conn
Gap Instr. Corp., Hauppauge, N.Y.
Glentek, Inc., Santa Monica, Calif.
Glentronics, Glendora, Cal.
Grafix, Inc., Albuquerque, N.M.
Guide Inds., Inc., Sun Valley, Calif.
Gulton Inds., Hawthorne, Calif.
Halmar Elctrns., Inc., Columbus, Ohio
Heath Co., Benton Harbor, Mich.
High Voltage Engrg. Corp., Burlington, Mass.
Holt Instr. Labs., Oconto, Wisc.
Horlick, William I. Co., Inc., Boston, Mass.
Hughes Aircraft Co, Culver City, Cal.
Hyperion Inds. Corp., Watertown, Mass.
Ideal Elec. & Mfg. Co., Mansfield, Ohio
Incor Instr., Plainview, N.Y.
Instrulab, Inc., Dayton, Ohio
IPT Corp., Mountain View, Cal.
K West, Westminster, Calif.
Keithley Instrs., Inc., Cleveland, Ohio
Keltron Corp., Waltham, Mass.
Magnetic Sys. & Instrs., Worcester, Mass.
Magnetics, Inc., Butler, Pa.
Magnetics, Sandy Lake, Pa.
Magnetics Sys. & Instrs., Worcester, Mass.
Maxwell Labs., Inc., San Diego, Calif.
Modular Devices, Inc., Gardena, Calif.
Modular Power, Inc., Poway, Cal.
Neutronic Corp., Bridgeton, Mo.
Northeast Scientific Corp., Acton, Mass.
Nuclear Corp. Amer., Denville, N.J.
Oeco Corp., Portland, Ore.
Oxford Instr. Corp., Annapolis, Md.
Philips Elctrns. Inds., Ltd., Toronto 17, Can.
Pioneer Magnetics, Santa Monica, Cal.
Power Control Corp., Pittsburgh, Pa.
Princeton Applied Resch. Corp., Princeton, N.J.
Ramm Rectifier Co., Inc., Bronx, N.Y.
Rapid Elec. Co., Bronx, N.Y.
Ratelco, Inc., Seattle, Wash.
Rho Engrg. Co., Los Angeles, Calif
Robicon Corp., Pittsburgh, Pa
Rosemount Engrg. Co., Minneapolis, Minn.
SBD Systems, Inc., Amityville, N.Y.
Schoeffel Instr. Corp., Westwood, N.J.
Scintillonics, Inc., Ft. Collins, Colo.
Sel-Rex Corp., Nutley, N.J.
Semiconductor Circuits Inc., Woburn, Mass.
Shane Inds., Sunny Vale, Cal.
Singer-General Precision, Inc., Little Falls, N.J.
Singer - Tele-Signal, Woodbury, N.Y.
SKG Assocs., Inc., Boston, Mass.
Sola Elec. Div., Elk Grove Village, Ill.
Solidstate Controls, Inc., Columbus, Ohio
Spatron Inc, Alhambra, Calif.
Spectran Elctrns., Pompano Beach, Fla.
Sunshine Sci. Instrs., Inc., Philadelphia, Pa.
Teledyne Inet, Gardena, Cal.
Ther Elec. & Mach. Works, Chicago, Ill.
Transistor Devices, Cedar Knolls, N.J.
Transrex Div., Torrance, Cal.
Tresco an Aydin Co., Phila., Pa.
Unitron Inds. Corp., Taipei, Taiwan, Republic of China
Universal Transistor Prods., Copiague, N.Y.
Varian Assocs., Palo Alto, Cal.
Varo, Inc., Texas Div., Garland, Tex.
Voltex Co., Inc., Farmingdale, N.Y.
Wabash Magnetics, Inc., Huntington, Ind.
Walden Elctrns. Corp., Waltham, Mass.
Ward Leonard, Mt. Vernon, N.Y.
Westinghouse Elec. Corp., Pittsburgh, Pa.
Westinghouse Elec., Pittsburgh, Pa.

Power Supplies, 28 VDC Input, Up To 100 VDC Output, Voltage Regulated

Aaron-Davis Co., Los Angeles,, Cal.
Abbott Transistor Labs., L.A., Cal. p 618
American Time Products, Woodside, N.Y.
Amp Inc., Elizabethtown, Pa. ..... p 643
Amp Inc., Harrisburg, Pa.
Arnold Magnetics, Culver City, Cal. p 646-648
Astro-Space Labs., Huntsville, Ala
Austron, Inc., Austin, Tex.
Autronics Corp., Pasadena, Calif.
Avtel Corp., Covina, Cal.
Bowmar Instr. Corp., Ft. Wayne, Ind.
Bulova Watch Elctrns. Div. Amer. Time Prods., Woodside, N.Y.
Bulova Watch Co., Servo Prods. Elctrns. Div., Woodside, N.Y.
CEA, Monrovia, Cal.
Circuit Power, Inc., Portland, Conn. p 677
CML-Macarr, Inc., Edison, N.J.
Del Elctrns. Corp., Mt. Vernon, N.Y.
Dynage, Bloomfield, Conn.
Elctrn. Meas. Inc., Neptune, N.J.
Electronic Resch. Assocs., Cedar Grove, N.J.
Freed Transformer Co., Bklyn., N.Y.
Interelectronics Corp., Congers, N.Y.
K.G.S. Elctrns., Pasadena, Cal.
Melcor Elctrns. Corp., Farmingdale, N.Y.
Mid-Eastern Inds., Scotch Plains, N.J.
North Elec. Co., Galion, Ohio
North Hills Elctrns., Inc., Glen Cove, N.Y.
Power Inc., Burnsville, Minn.
Power/Mate, Hackensack, N.J.
Powertec, Chatsworth, Cal.
Raytheon Co., Manchester, N.H.
RO Assocs., Menlo Pk., Cal.
Sierra Sys., Mountain View, Cal.
Spellman High Voltage Elctrns. Corp., Bronx, N.Y. ..... p 875
Systron Donner Trygon Elctrns. Sub., Roosevelt, N.Y.
Technipower, Ridgefield, Conn. p 922,923
Tecnetics, Inc., Boulder, Colo. p 880,881
Tempo/UTI Div., Chatsworth, Cal.
Thunder Int'l. Corp., Middletown, Conn.
Todd Prods., Farmingdale, N.Y.
Topaz Elctrns., San Diego, Cal. .... p 899
Trio Labs, Inc., Plainview, N.Y.
Unitron, Garland, Tex.
Varadyne Systems, Canton, Mass. p 385
Vector Engrg., Springfield, N.J.
Wagner Elec. Corp., Livingston, N.J.
Wanlass Div., Fort Washington, Pa.
Zaring Inds., Inc., Carmel, Ind.
Advanced Energy Conversion, Menlo Pk., Cal.
Altec, Anaheim, Calif.
AMBAC Inds., Garden City, N.Y.
American Rectifier Corp., College Point, N.Y.
AMF Electrosystems Div., Vandalia, Ohio
Analog Devices, Inc., Norwood, Mass.
Armour Elctrns. Corp., Worcester, Mass.
Astro-Metrix, Burbank, Cal.
Barnes & Reinecke, Inc., Chicago, Ill.
Behlman Engrg. Corp., Santa Barbara, Cal.
Bergen Labs., Inc., Paterson, N.J.
B.H. Inds., Los Angeles, Cal.
Bogue Elec. Mfg. Co., Paterson, N.J.
Bose Corp., Natick, Mass.
Burr-Brown Resch. Corp., Tucson, Ariz.
Cal-Power Corp., El Segundo, Calif.
CGS Units, Inc., Rochester, N.Y.
Coil Co. of Amer., Northvale, N.J.
Collins Radio Co., Cedar Rapids, Iowa
Collins Radio Co., Dallas, Tex.
Computer Diode, Fair Lawn, N.J.
Consolidated Ohmic Devices, Carle Pl., N.Y.
Consolidated Transformers Unltd., San Gabriel, Cal.
Constant Voltage Co., Chicago, Ill.
Cornell-Dubilier Elctrns., Newark, N.J.
Crestronics, Crestline, Cal.
Delta Elctrn. Control, Costa Mesa, Cal.
Delta-Tronics Corp., Tempe, Ariz.
Dial Prods. Co., Bayonne, N.J.
Dorsett Elctrns., Tulsa, Okla.
E-Tronics, Van Nuys, Cal.
EDC (Electro Dev.), Lynnwood, Wash.
Elasco-Eastern, Inc., Bloomfield, Conn.
Electro Magnetic Prods., Wabash, Ind.
Elctrn. Specialty, Thomaston, Conn.
EMP Elctrns., Inc., Phoenix, Ariz.
EMR Div., Princeton, N.J.
Engrg. Svcs., Madison, N.J.
Eon Instr., Inc., Van Nuys, Cal.
Exide Power Sys. Div., Philadelphia, Pa.
Fairchild Controls, Mountain View, Calif.
Fairlane Electronics, Inc., Long Valley, N.J.
GAR Enterprises, Pasadena, Cal.
Glentronics, Glendora, Cal.
Grafix, Inc., Albuquerque, N.M.
Guide Inds., Inc., Sun Valley, Calif.
Gulton Inds., Hawthorne, Calif.
Hope Elctrns., Clifton, N.J.
Horlick, William I. Co., Inc., Boston, Mass.
Hughes Aircraft Co, Culver City, Cal.
Hyperion Inds. Corp., Watertown, Mass.
Instrulab, Inc., Dayton, Ohio
Intercontinental Elctrns., E. Rochester, N.Y.
K West, Westminster, Calif.
Keltron Corp., Waltham, Mass.
Mil Elctrns. Inc., Hudson, N.H.
Modular Power, Inc., Poway, Cal.
Novatronics, Inc., Pompano Beach, Fla.
Nuclear Corp. Amer., Denville, N.J.
Oeco Corp., Portland, Ore.
Palomar Engrs., Escondido, Cal.
Power Control Corp., Pittsburgh, Pa.
Powercube Corp, Waltham, Mass.
Ratelco, Inc., Seattle, Wash.
Rho Engrg. Co., Los Angeles, Calif
Rosemount Engrg. Co., Minneapolis, Minn.
Sanders Assocs., Nashua, N.H.
SBD Systems, Inc., Amityville, N.Y.
Shane Inds., Sunny Vale, Cal.
Singer-General Precision, Inc., Little Falls, N.J.
SKG Assocs., Inc., Boston, Mass.
Solidstate Controls, Inc., Columbus, Ohio
Spatron Inc, Alhambra, Calif.
Spectran Elctrns., Pompano Beach, Fla.
Teledyne Inet, Gardena, Cal.
Teledyne Kinetics, Solana Beach, Cal.
Ther Elec. & Mach. Works, Chicago, Ill.
Transrex Div., Torrance, Cal.
Trepac Corp. America, Englewood, N.J.
Tresco an Aydin Co., Phila., Pa.
Universal Transistor Prods., Copiague, N.Y.
Varo, Inc., Texas Div., Garland, Tex.
Velonex, Santa Clara, Calif.
Virginia Elctrns. Co., Inc., Falls Church, Va.
Voltex Co., Inc., Farmingdale, N.Y.
Westinghouse Elec. Corp., Pittsburgh, Pa.

Power Supplies, 28 VDC Input, Up To 1,000 VDC Output, Voltage Regulated

Aaron-Davis Co., Los Angeles,, Cal.
Abbott Transistor Labs., L.A., Cal. p 618
Advanced High Voltage Co., Inc., Northridge, Cal. ..... p 617
Amp Inc., Elizabethtown, Pa. ..... p 643
Amp Inc., Harrisburg, Pa.
Arnold Magnetics, Culver City, Cal. p 647,648
Astro-Space Labs., Huntsville, Ala

Austron, Inc., Austin, Tex.
Avtel Corp., Covina, Cal.
Bowmar Instr. Corp., Ft. Wayne, Ind.
CEA, Monrovia, Cal.
Circuit Power, Inc., Portland, Conn.
CML-Macarr, Inc., Edison, N.J.
Del Elctrns. Corp., Mt. Vernon, N.Y.
Elctrn. Meas. Inc., Neptune, N.J.
Electronic Resch. Assocs., Cedar Grove, N.J.
Interelectronics Corp., Congers, N.Y.
K.G.S. Elctrns., Pasadena, Cal.
Mid-Eastern Inds., Scotch Plains, N.J.
Multitech Power Sys., Costa Mesa, Cal.
North Elec. Co., Galion, Ohio
Power/Mate, Hackensack, N.J.
Powertec, Chatsworth, Cal.
Raytheon Co., Manchester, N.H.
Sierra Sys., Mountain View, Cal. .. p 872
Spellman High Voltage Elctrns. Corp., Bronx, N.Y. ..... p 875
Systron Donner Trygon Elctrns. Sub., Roosevelt, N.Y.
Technipower, Ridgefield, Conn. p 905,923
Tecnetics, Inc., Boulder, Colo. p 880,881
Thunder Int'l. Corp., Middletown, Conn.
Todd Prods., Farmingdale, N.Y.
Topaz Elctrns., San Diego, Cal. .... p 899
Trio Labs, Inc., Plainview, N.Y.
Vector Engrg., Springfield, N.J.
Venus Scientific, Farmingdale, N.Y. p 944,945
Wagner Elec. Corp., Livingston, N.J.
Wanlass Div., Fort Washington, Pa.
Advanced Energy Conversion, Menlo Pk., Cal.
AMBAC Inds., Garden City, N.Y.
American Rectifier Corp., College Point, N.Y.
Analog Devices, Inc., Norwood, Mass.
Argent Inds., Inc., Dayton, Ohio
Astro-Metrix, Burbank, Cal.
Barnes & Reinecke, Inc., Chicago, Ill.
Behlman Engrg. Corp., Santa Barbara, Cal.
Bertan Assocs., Inc., Plainview, N.Y.
B.H. Inds., Los Angeles, Cal.
Bogue Elec. Mfg. Co., Paterson, N.J.
Chicago Condenser Corp., Chicago, Ill.
Coil Co. of Amer., Northvale, N.J.
Collins Radio Co., Cedar Rapids, Iowa
Collins Radio Co., Dallas, Tex.
Constant Voltage Co., Chicago, Ill.
Crestronics, Crestline, Cal.
Darrah Elec. Co., Inc., Cleveland, Ohio
Delta Elctrn. Control, Costa Mesa, Cal.
Delta-Tronics Corp., Tempe, Ariz.
Display Power Sys. Corp., Carmel, N.Y.
Dorsett Elctrns., Tulsa, Okla.
EDC (Electro Dev.), Lynnwood, Wash.
Elasco-Eastern, Inc., Bloomfield, Conn.
Electro Magnetic Prods., Wabash, Ind.
Elctrn. Specialty, Thomaston, Conn.
Electrophysics Corp., Nutley, N.J.
EMP Elctrns., Inc., Phoenix, Ariz.
EMR Div., Princeton, N.J.
Engrg. Svcs., Madison, N.J.
Fairlane Electronics, Inc., Long Valley, N.J.
GAR Enterprises, Pasadena, Cal.
Glentek, Inc., Santa Monica, Calif.
Glentronics, Glendora, Cal.
Grafix, Inc., Albuquerque, N.M.
Guide Inds., Inc., Sun Valley, Calif.
Gulton Inds., Hawthorne, Calif.
Hope Elctrns., Clifton, N.J.
Horlick, William I. Co., Inc., Boston, Mass.
Hughes Aircraft Co, Culver City, Cal.
Hyperion Inds. Corp., Watertown, Mass.
K West, Westminster, Calif.
Linear Sys., Inc., Watsonville, Calif.
Magnetics, Sandy Lake, Pa.
Mil Elctrns. Inc., Hudson, N.H.
Modular Power, Inc., Poway, Cal.
Novatronics, Inc., Pompano Beach, Fla.
Nuclear Corp. Amer., Denville, N.J.
Oeco Corp., Portland, Ore.
Power Control Corp., Pittsburgh, Pa.
Powercube Corp, Waltham, Mass.
Ram Meter, Inc., Ferndale, Mich.
Ratelco, Inc., Seattle, Wash.
Rho Engrg. Co., Los Angeles, Calif
SBD Systems, Inc., Amityville, N.Y.
Semi/Dyne Elctrns. Corp., Freeport, N.Y.
Shane Inds., Sunny Vale, Cal.
SKG Assocs., Inc., Boston, Mass.
Spatron Inc, Alhambra, Calif.
Teledyne Inet, Gardena, Cal.
Teledyne Kinetics, Solana Beach, Cal.
Ther Elec. & Mach. Works, Chicago, Ill.
Transrex Div., Torrance, Cal.
Universal Transistor Prods., Copiague, N.Y.
Varo, Inc., Texas Div., Garland, Tex.
Velonex, Santa Clara, Calif.
Voltex Co., Inc., Farmingdale, N.Y.
Wabash Magnetics, Inc., Huntington, Ind.
Walden Elctrns. Corp., Waltham, Mass.

Power Supplies, 28 VDC Input, Up To 10,000 VDC Output, Voltage Regulated

Aaron-Davis Co., Los Angeles,, Cal.
Abbott Transistor Labs., L.A., Cal. p 618
Advanced High Voltage Co., Inc., Northridge, Cal. ..... p 617
Amp Inc., Elizabethtown, Pa.
Amp Inc., Harrisburg, Pa.
Arnold Magnetics, Culver City, Cal. p 647,648
Austron, Inc., Austin, Tex.
Avtel Corp., Covina, Cal.
CML-Macarr, Inc., Edison, N.J.
Cober Elctrns., Inc., Stamford, Conn.
CPS, Sunnyvale, Calif.
Del Elctrns. Corp., Mt. Vernon, N.Y.
Electronic Resch. Assocs., Cedar Grove, N.J.
Gates Elctrn. Co., Bronx, N.Y.
Hipotronics, Inc., Brewster, N.Y. .. p 728
Interelectronics Corp., Congers, N.Y.
Kilovolt Corp., Hackensack, N.J.
Light Elec. Corp., Rancocas, N.J.
Multitech Power Sys., Costa Mesa, Cal.
North Elec. Co., Galion, Ohio
Power/Mate, Hackensack, N.J.
Powertec, Chatsworth, Cal.
Raytheon Co., Manchester, N.H.
Sierra Sys., Mountain View, Cal. .. p 872
Spellman High Voltage Elctrns. Corp., Bronx, N.Y. ..... p 875
Sprague Elec. Co., No. Adams, Mass.
SRC Div., Newport Bch., Cal.
Tecnetics, Inc., Boulder, Colo. p 880,881
Thunder Int'l. Corp., Middletown, Conn. p 895
Topaz Elctrns., San Diego, Cal.
Vector Engrg., Springfield, N.J.
Venus Scientific, Farmingdale, N.Y. p 944,945
Wagner Elec. Corp., Livingston, N.J.
Advanced Energy Conversion, Menlo Pk., Cal.
American Rectifier Corp., College Point, N.Y.
Astro-Metrix, Burbank, Cal.
B & W Elctrn. Resch. Labs., Dallas, Tex.
Bertan Assocs., Inc., Plainview, N.Y.
B.H. Inds., Los Angeles, Cal.
Bogue Elec. Mfg. Co., Paterson, N.J.
Coil Co. of Amer., Northvale, N.J.
Collins Radio Co., Cedar Rapids, Iowa
Collins Radio Co., Dallas, Tex.
Constant Voltage Co., Chicago, Ill.
Delta-Tronics Corp., Tempe, Ariz.
Display Power Sys. Corp., Carmel, N.Y.
EDC (Electro Dev.), Lynnwood, Wash.
Electro Magnetic Prods., Wabash, Ind.
Electrophysics Corp., Nutley, N.J.
EMP Elctrns., Inc., Phoenix, Ariz.
EMR Div., Princeton, N.J.
Gap Instr. Corp., Hauppauge, N.Y.
General Devices, Inc., Princeton, N.J.
Glentronics, Glendora, Cal.
Grafix, Inc., Albuquerque, N.M.
Guide Inds., Inc., Sun Valley, Calif.
Gulton Inds., Hawthorne, Calif.
Hope Elctrns., Clifton, N.J.
Hughes Aircraft Co, Culver City, Cal.
Hyperion Inds. Corp., Watertown, Mass.
Ling Elctrns., Anaheim, Calif.
Magnetics, Sandy Lake, Pa.
Maxwell Labs., Inc., San Diego, Calif.
Mil Elctrns. Inc., Hudson, N.H.
Nuclear Corp. Amer., Denville, N.J.
Oeco Corp., Portland, Ore.
Peerless Elec. Prods., Anaheim, Cal.
Power Control Corp., Pittsburgh, Pa.
Ram Meter, Inc., Ferndale, Mich.
Rho Engrg. Co., Los Angeles, Calif
Rodale Elctrns., Inc., Garden City, N.Y.
Semi/Dyne Elctrns. Corp., Freeport, N.Y.
SKG Assocs., Inc., Boston, Mass.
Spatron Inc, Alhambra, Calif.
Transrex Div., Torrance, Cal.
Varo, Inc., Texas Div., Garland, Tex.
Velonex, Santa Clara, Calif.
Voltex Co., Inc., Farmingdale, N.Y.
Wabash Magnetics, Inc., Huntington, Ind.
Walden Elctrns. Corp., Waltham, Mass.

Power Supplies, 28 VDC Input, Over 10,000 VDC Output, Voltage Regulated

Advanced High Voltage Co., Inc., Northridge, Cal. ..... p 617
Amp Inc., Elizabethtown, Pa. ..... p 642
Amp Inc., Harrisburg, Pa.
Arnold Magnetics, Culver City, Cal.
Avtel Corp., Covina, Cal.
Cober Elctrns., Inc., Stamford, Conn. p 600
Del Elctrns. Corp., Mt. Vernon, N.Y.
Electronic Resch. Assocs., Cedar Grove, N.J.
Hipotronics, Inc., Brewster, N.Y. .. p 728
Interelectronics Corp., Congers, N.Y.
ITT Jennings, Div. Int'l. Telephone & Telegraph Corp., San Jose, Cal.
Kilovolt Corp., Hackensack, N.J.
Light Elec. Corp., Rancocas, N.J.
North Elec. Co., Galion, Ohio
Raytheon Co., Manchester, N.H.
Sierra Sys., Mountain View, Cal. .. p 872
Spellman High Voltage Elctrns. Corp., Bronx, N.Y. ..... p 875
SRC Div., Newport Bch., Cal.
Vector Engrg., Springfield, N.J.
Venus Scientific, Farmingdale, N.Y. p 944
Wagner Elec. Corp., Livingston, N.J.
Advanced Energy Conversion, Menlo Pk., Cal.
American Rectifier Corp., College Point, N.Y.
Astro-Metrix, Burbank, Cal.
B & W Elctrn. Resch. Labs., Dallas, Tex.
Bertan Assocs., Inc., Plainview, N.Y.
B.H. Inds., Los Angeles, Cal.
Bogue Elec. Mfg. Co., Paterson, N.J.
Coil Co. of Amer., Northvale, N.J.
Collins Radio Co., Cedar Rapids, Iowa
Collins Radio Co., Dallas, Tex.
Constant Voltage Co., Chicago, Ill.
Display Power Sys. Corp., Carmel, N.Y.
EDC (Electro Dev.), Lynnwood, Wash.
Electro Magnetic Prods., Wabash, Ind.
Glentronics, Glendora, Cal.
Grafix, Inc., Albuquerque, N.M.
Guide Inds., Inc., Sun Valley, Calif.
Hughes Aircraft Co, Culver City, Cal.
Hyperion Inds. Corp., Watertown, Mass.
Ling Elctrns., Anaheim, Calif.
Magnetics, Sandy Lake, Pa.
Maxwell Labs., Inc., San Diego, Calif.
Oeco Corp., Portland, Ore.
Peerless Elec. Prods., Anaheim, Cal.
Power Control Corp., Pittsburgh, Pa.
TDC Div., Littleton, Mass.
Transrex Div., Torrance, Cal.
Varo, Inc., Texas Div., Garland, Tex.
Velonex, Santa Clara, Calif.
Wabash Magnetics, Inc., Huntington, Ind.
Walden Elctrns. Corp., Waltham, Mass.

Power Supplies, 28 VDC Input, D-C Output, Unregulated

Aaron-Davis Co., Los Angeles,, Cal.
Advanced High Voltage Co., Inc., Northridge, Cal.
American Time Products, Woodside, N.Y.
Amp Inc., Elizabethtown, Pa.
Amp Inc., Harrisburg, Pa.
Arnold Magnetics, Culver City, Cal.
Astro-Space Labs., Huntsville, Ala
Austron, Inc., Austin, Tex.
Autronics Corp., Pasadena, Calif.
Avtel Corp., Covina, Cal.
Bulova Watch Elctrns. Div. Amer. Time Prods., Woodside, N.Y.
Bulova Watch Co., Servo Prods. Elctrns. Div., Woodside, N.Y.
CEA, Monrovia, Cal.
Circuit Power, Inc., Portland, Conn.
CML-Macarr, Inc., Edison, N.J.
Cober Elctrns., Inc., Stamford, Conn.
Del Elctrns. Corp., Mt. Vernon, N.Y.
Dynage, Bloomfield, Conn.
Electronic Resch. Assocs., Cedar Grove, N.J.
Freed Transformer Co., Bklyn., N.Y.
Interelectronics Corp., Congers, N.Y.
K.G.S. Elctrns., Pasadena, Cal.
Kilovolt Corp., Hackensack, N.J.
Light Elec. Corp., Rancocas, N.J.
Melcor Elctrns. Corp., Farmingdale, N.Y.
Microtran Co., Valley Stream, N.Y.
Mid-Eastern Inds., Scotch Plains, N.J.
North Elec. Co., Galion, Ohio
Opad Elec. Co., Inc., New York, N.Y.
Power Inc., Burnsville, Minn.
Powertec, Chatsworth, Cal.
Raytheon Co., Manchester, N.H.
Spellman High Voltage Elctrns. Corp., Bronx, N.Y.
Sprague Elec. Co., No. Adams, Mass.
Systron Donner Trygon Elctrns. Sub., Roosevelt, N.Y.
Tecnetics, Inc., Boulder, Colo.
Thunder Int'l. Corp., Middletown, Conn.
Todd Prods., Farmingdale, N.Y.
Topaz Elctrns., San Diego, Cal.
Unitron, Garland, Tex.
Vector Engrg., Springfield, N.J.
Venus Scientific, Farmingdale, N.Y.
Wagner Elec. Corp., Livingston, N.J.
Wanlass Div., Fort Washington, Pa.
Zaring Inds., Inc., Carmel, Ind.
Advanced Energy Conversion, Menlo Pk., Cal.
AMBAC Inds., Garden City, N.Y.
American Rectifier Corp., College Point, N.Y.
Armour Elctrns. Corp., Worcester, Mass.
Astro-Metrix, Burbank, Cal.
B & W Elctrn. Resch. Labs., Dallas, Tex.
Barnes & Reinecke, Inc., Chicago, Ill.
Behlman Engrg. Corp., Santa Barbara, Cal.
Bergen Labs., Inc., Paterson, N.J.
Bertan Assocs., Inc., Plainview, N.Y.
B.H. Inds., Los Angeles, Cal.
Bogue Elec. Mfg. Co., Paterson, N.J.
Bullock Magnetics Corp., Pomona, Calif.
Cal-Power Corp., El Segundo, Calif.
Century Coil Corp., Chicago, Ill.
CGS Units, Inc., Rochester, N.Y.
Coil Co. of Amer., Northvale, N.J.
Collins Radio Co., Cedar Rapids, Iowa
Collins Radio Co., Dallas, Tex.
Constant Voltage Co., Chicago, Ill.
Control Sys. Resch., Inc., Pittsburgh, Pa.
Crestronics, Crestline, Cal.
Delta-Tronics Corp., Tempe, Ariz.
Dorsett Elctrns., Tulsa, Okla.
Dyna Technology Inc., Sioux City, Iowa
E-Tronics, Van Nuys, Cal.
EDC (Electro Dev.), Lynnwood, Wash.
Elasco-Eastern, Inc., Bloomfield, Conn.
Electro Magnetic Prods., Wabash, Ind.
Elctrn. Specialty, Thomaston, Conn.
Electrophysics Corp., Nutley, N.J.
EMP Elctrns., Inc., Phoenix, Ariz.
Engineering Assocs., Dayton, Ohio
Engrg. Svcs., Madison, N.J.
Exide Power Sys. Div., Philadelphia, Pa.
GAR Enterprises, Pasadena, Cal.
Glentek, Inc., Santa Monica, Calif.
Glentronics, Glendora, Cal.
Grafix, Inc., Albuquerque, N.M.
Guide Inds., Inc., Sun Valley, Calif.
Gulton Inds., Hawthorne, Calif.
Hope Elctrns., Clifton, N.J.
Horlick, William I. Co., Inc., Boston, Mass.
Hughes Aircraft Co, Culver City, Cal.
Hyperion Inds. Corp., Watertown, Mass.
Intercontinental Elctrns., E. Rochester, N.Y.
Invertronics, Pine Brook, N.J.
Jerome Elec. Corp., Orange, N.J.
K West, Westminster, Calif.
Linear Sys., Inc., Watsonville, Calif.
Magnetics, Sandy Lake, Pa.
Maxwell Labs., Inc., San Diego, Calif.
Mil Elctrns. Inc., Hudson, N.H.
Modular Power, Inc., Poway, Cal.
Nuclear Corp. Amer., Denville, N.J.
Pacific Electro Dynamics, Bellevue, Wash
Peerless Elec. Prods., Anaheim, Cal.
Power Control Corp., Pittsburgh, Pa.
Powercube Corp, Waltham, Mass.
Rho Engrg. Co., Los Angeles, Calif
Rosemount Engrg. Co., Minneapolis, Minn.
SBD Systems, Inc., Amityville, N.Y.
Shane Inds., Sunny Vale, Cal.

Singer-General Precision, Inc., Little Falls, N.J.
SKG Assocs., Inc., Boston, Mass.
Solidstate Controls, Inc., Columbus, Ohio
Spatron Inc, Alhambra, Calif.
Teledyne Inet, Gardena, Cal.
Transrex Div., Torrance, Cal.
Trepac Corp. America, Englewood, N.J.
Universal Transistor Prods., Copiague, N.Y.
Varo, Inc., Texas Div., Garland, Tex.
Voltex Co., Inc., Farmingdale, N.Y.
Wabash Magnetics, Inc., Huntington, Ind.
Ward Leonard, Mt. Vernon, N.Y.

Power Supplies, Arc Lamp

Amp Inc., Elizabethtown, Pa.
Christie Elec., Los Angeles, Cal. p 674,675
CML-Macarr, Inc., Edison, N.J.
Del Elctrns. Corp., Mt. Vernon, N.Y.
Elctrn. Meas. Inc., Neptune, N.J. .. p 702
General Elec. Co., Schenectady, N.Y.
Illumination Inds., Inc., Sunnyvale, Cal. p 1644
ITT Jennings, Div. Int'l. Telephone & Telegraph Corp., San Jose, Cal. p 501
ITT Jennings, Dunellen,, N.J. ..... p 501
Kepco, Inc., Flushing, N.Y.
Kilovolt Corp., Hackensack, N.J.. p 773
Light Elec. Corp., Rancocas, N.J.
Mid-Eastern Inds., Scotch Plains, N.J.
NWL Transformers, Trenton, N.J.
Opad Elec. Co., Inc., New York, N.Y.
Power Designs, Westbury, N.Y.
Raytheon Co., Manchester, N.H. .. p 878
Systron Donner Trygon Elctrns. Sub., Roosevelt, N.Y.
Thunder Int'l. Corp., Middletown, Conn.
Topaz Elctrns., San Diego, Cal.
Universal Voltronics Corp., Mt. Kisco, N.Y. .....p 940,941
Vector Engrg., Springfield, N.J.
Wanlass Div., Fort Washington, Pa.
Acme Elec. Corp., Cuba, N.Y.
Advanced Energy Conversion, Menlo Pk., Cal.
Aerospace Controls Corp., Gardena, Cal.
American Rectifier Corp., College Point, N.Y.
Armour Elctrns. Corp., Worcester, Mass.
Bertan Assocs., Inc., Plainview, N.Y.
Bogue Elec. Mfg. Co., Paterson, N.J.
Dyonics, Inc., Woburn, Mass.
Eimac, San Carlos, Calif.
Electro Magnetic Prods., Wabash, Ind.
Electro Powerpacs Corp., Cambridge, Mass.
Gates, Geo. W. & Co., Franklin Sq., N.Y.
Green Elec. Corp., Fair Lawn, N.J.
GTE Sylvania Inc., Danvers, Mass.
Hanovia Lamp Div., Newark, N.J.
Hughes Aircraft Co, Culver City, Cal.
ILC, Inc., Sunnyvale, Calif.
Ionics, Inc., Watertown, Mass
LAD Electro-Sys., Inc., Hicksville, N.Y.
Magnetics, Sandy Lake, Pa.
Maxwell Labs., Inc., San Diego, Calif.
Miller Elec. Mfg. Co., Appleton, Wisc.
Mutron Corp., Brockton, Mass.
Nuclear Corp. Amer., Denville, N.J.
Oriel Optics Corp., Stamford, Conn.
Pek, Inc., Sunnyvale, Calif.
Quartz Radiation Corp., Fairfield, N.J.
Rapid Elec. Co., Bronx, N.Y.
SBD Systems, Inc., Amityville, N.Y.
Schoeffel Instr. Corp., Westwood, N.J.
Siemens Corp., Comps. Div., Iselin, N.J.
Sola Elec. Div., Elk Grove Village, Ill.
Strong Elec. Corp., Toledo, Ohio
Transrex Div., Torrance, Cal.
U.S. Scientific Instrs., Watertown, Mass.
Varo, Inc., Texas Div., Garland, Tex.
Velonex, Santa Clara, Calif.
Wabash Magnetics, Inc., Huntington, Ind.

Power Supplies, Bi-Polar

Aaron-Davis Co., Los Angeles,, Cal. p 616
Abbott Transistor Labs., L.A., Cal. p 618
Acopian Corp., Easton, Pa.
Amp Inc., Elizabethtown, Pa.
Amp Inc., Harrisburg, Pa.
Arnold Magnetics, Culver City, Cal. p 646
Astro-Space Labs., Huntsville, Ala
Avtel Corp., Covina, Cal.
CEA, Monrovia, Cal.
Cober Elctrns., Inc., Stamford, Conn.
Del Elctrns. Corp., Mt. Vernon, N.Y.
Fluke, John Mfg. Co., Inc., Seattle, Wash. ..... p 477
Hewlett-Packard, Palo Alto, Cal.
Hipotronics, Inc., Brewster, N.Y. .. p 727
Interelectronics Corp., Congers, N.Y.
Kepco, Inc., Flushing, N.Y..... p 747
Light Elec. Corp., Rancocas, N.J. p 808
Microtran Co., Valley Stream, N.Y.
Opamp Labs., Los Angeles, Cal.
Power Designs, Westbury, N.Y. p 832,833,835
Power/Mate, Hackensack, N.J. p 838,839,848,849,856-858
Raytheon Co., Manchester, N.H.
Sprague Elec. Co., No. Adams, Mass.
Technipower, Ridgefield, Conn. p 905,906,912,914,916,918,920,922,924
Todd Prods., Farmingdale, N.Y.
Universal Voltronics Corp., Mt. Kisco, N.Y. .....p 940,941
Vector Engrg., Springfield, N.J.
Advanced Energy Conversion, Menlo Pk., Cal.
Analog Devices, Inc., Norwood, Mass.
Analogic, Wakefield, Mass.
Armour Elctrns. Corp., Worcester, Mass.
Bogue Elec. Mfg. Co., Paterson, N.J.
Collins Electronics, Inc., Stevensville, Md.
Components Corp., Denville, N.J.
Computer Meas., Gardena, Cal.
Control Sys. Resch., Inc., Pittsburgh, Pa.
Dial Prods. Co., Bayonne, N.J.
Diamond Repeater Co., Madison, N.J.
E-Tronics, Van Nuys, Cal.
Gap Instr. Corp., Hauppauge, N.Y.
GPS Instr. Co., Framingham, Mass.
Grafix, Inc., Albuquerque, N.M.
Gulton Inds., Hawthorne, Calif.
Hughes Aircraft Co, Culver City, Cal.
Joliet Control Corp., Joliet, Ill.
Kentrox Inds., Inc., Portland, Ore.
Magnetic Sys. & Instrs., Worcester, Mass.
Magnetics, Sandy Lake, Pa.
Magnetics Sys. & Instrs., Worcester, Mass.
Maxwell Labs., Inc., San Diego, Calif.
Mil Elctrns. Inc., Hudson, N.H.
Nuclear Corp. Amer., Denville, N.J.
Peschel Instrs., Cape Coral, Fla.
Rho Engrg. Co., Los Angeles, Calif
Sola Elec. Div., Elk Grove Village, Ill.
Spectra Sonics, Ogden, Utah
Teledyne Inet, Gardena, Cal.
Ther Elec. & Mach. Works, Chicago, Ill.
Varo, Inc., Texas Div., Garland, Tex.

Power Supplies, CRT

Advanced High Voltage Co., Inc., Northridge, Cal. ..... p 617
American Time Products, Woodside, N.Y.
Amp Inc., Elizabethtown, Pa. ..p 642,643
Arnold Magnetics, Culver City, Cal. p 647,648
Astro-Space Labs., Huntsville, Ala
Austron, Inc., Austin, Tex.
Beta Instr., Newton Upper Falls, Mass. p 337
Bulova Watch Elctrns. Div. Amer. Time Prods., Woodside, N.Y.
Bulova Watch Co., Servo Prods. Elctrns. Div., Woodside, N.Y.
CPS, Sunnyvale, Calif. ..... p 669
Del Elctrns. Corp., Mt. Vernon, N.Y. p 679
Electronic Resch. Assocs., Cedar Grove, N.J. ..... p 709
Erie Technological Prods. (EEM), Erie, Pa.
Ind'l Elctrn. Engrs., Van Nuys, Cal.
Interelectronics Corp., Congers, N.Y.
ITT Jennings, Div. Int'l. Telephone & Telegraph Corp., San Jose, Cal. p 501
ITT Jennings, Dunellen,, N.J. ..... p 501
Mid-Eastern Inds., Scotch Plains, N.J.
Multitech Power Sys., Costa Mesa, Cal. p 816
North Elec. Co., Galion, Ohio
Power Designs, Westbury, N.Y..... p 833
Power/Mate, Hackensack, N.J.
Powertec, Chatsworth, Cal.
Raytheon Co., Manchester, N.H. .. p 878
Sierra Sys., Mountain View, Cal. .. p 872
Spellman High Voltage Elctrns. Corp., Bronx, N.Y. ..... p 873,875,876
Universal Voltronics Corp., Mt. Kisco, N.Y. ..... p 941
Venus Scientific, Farmingdale, N.Y. p 944
Advanced Energy Conversion, Menlo Pk., Cal.
Astro-Metrix, Burbank, Cal.
Bertan Assocs., Inc., Plainview, N.Y.
B.H. Inds., Los Angeles, Cal.
Bogue Elec. Mfg. Co., Paterson, N.J.
Broadview Inds. Corp., Hempstead, N.Y.
Bullock Magnetics Corp., Pomona, Calif.
Constant Voltage Co., Chicago, Ill.
Crestronics, Crestline, Cal.
Display Power Sys. Corp., Carmel, N.Y.
Engrg. Svcs., Madison, N.J.
Ferranti Ltd., Hollinwood, Lancs., England
Gap Instr. Corp., Hauppauge, N.Y.
Gencom Div., Plainview, N.Y.
Litton Inds., San Carlos, Calif.
Mil Elctrns. Inc., Hudson, N.H.
Nuclear Corp. Amer., Denville, N.J.
Optimation, Inc., Sun Valley, Calif.
Peerless Elec. Prods., Anaheim, Cal.
Pioneer Magnetics, Santa Monica, Cal.
Varo, Inc., Texas Div., Garland, Tex.
Velonex, Santa Clara, Calif.
Walden Elctrns. Corp., Waltham, Mass.

Power Supplies, D-C Input, A-C Output—See Inverters D-C To A-C, D-C To D-C

Power Supplies, D-C Welding

Christie Elec., Los Angeles, Cal. .. p 674
Cober Elctrns., Inc., Stamford, Conn.
Del Elctrns. Corp., Mt. Vernon, N.Y.
Elctrn. Meas. Inc., Neptune, N.J. .. p 702
Ferrotran Elctrn., New York, N.Y.
Hipotronics, Inc., Brewster, N.Y. .. p 726
International Rectifier, El Segundo, Cal.
Kepco, Inc., Flushing, N.Y.
Mid-Eastern Inds., Scotch Plains, N.J.
Neshaminy Transformer, Furlong, Pa.
Opad Elec. Co., Inc., New York, N.Y.
Power Designs, Westbury, N.Y.
Power/Mate, Hackensack, N.J. .... p 847
Raytheon Co., Manchester, N.H.
Universal Voltronics Corp., Mt. Kisco, N.Y. .....p 940,941
Vector Engrg., Springfield, N.J.
American Rectifier Corp., College Point, N.Y.
Anocut Engrg. Co., Elk Grove Village, Ill.
Basler Elec. Co., Highland, Ill.
Bogue Elec. Mfg. Co., Paterson, N.J.
Coil Co. of Amer., Northvale, N.J.
Constant Voltage Co., Chicago, Ill.
Eutectic Corp., Flushing, N.Y.
Green Rectifier Corp., Fair Lawn, N.J.
Halmar Elctrns., Inc., Columbus, Ohio
Hughes Aircraft Co., Vacuum Tube Prods. Div/Welding Equip., Oceanside, Calif.
Hyperion Inds. Corp., Watertown, Mass.
Lear Siegler, Inc., Santa Monica, Calif.
Lincoln Elec. Co., Cleveland, Ohio
Magnetics, Sandy Lake, Pa.
Maxwell Labs., Inc., San Diego, Calif.
Miller Elec. Mfg. Co., Appleton, Wisc.
Milletron, Inc., Pittsburgh, Pa.
Model Rectifier Corp., Edison, N.J.
Motor Generator Div., Troy, Ohio
Rapid Elec. Co., Bronx, N.Y.
Robicon Corp., Pittsburgh, Pa
Robotron Corp., Detroit, Mich.
Sel-Rex Corp., Nutley, N.J.
Taylor-Winfield Corp., Warren, Ohio
Transrex Div., Torrance, Cal.
Unitek Corp., Monrovia, Calif.
Wabash Magnetics, Inc., Huntington, Ind.
Weltronic Co., Southfield, Mich.
Westinghouse Elec., Sykesville, Md.
Westinghouse Elec. Corp., Pittsburgh, Pa.

Power Supplies, Electroplating Equipment

ATR Elctrns., Inc., St. Paul, Minn.
California Elctrn. Mfg. Co., Alamo, Calif.
Christie Elec., Los Angeles, Cal. .. p 674
CML-Macarr, Inc., Edison, N.J.
Del Elctrns. Corp., Mt. Vernon, N.Y. p 678
Elctrn. Meas. Inc., Neptune, N.J. .. p 702
Gates Elctrn. Co., Bronx, N.Y. ..... p 720
International Rectifier, El Segundo, Cal.
Kepco, Inc., Flushing, N.Y.
Light Elec. Corp., Rancocas, N.J.
Opad Elec. Co., Inc., New York, N.Y.
Power Designs, Westbury, N.Y.
Power/Mate, Hackensack, N.J.
Raytheon Co., Manchester, N.H.
Systron-Donner Alpha Div., Oakland, Cal.
Universal Elctrns. Co., Irvine, Cal.
Universal Voltronics Corp., Mt. Kisco, N.Y. .....p 940,941
Advanced Energy Conversion, Menlo Pk., Cal.
Allied Chemical Corp., Morristown, N.J.
Anocut Engrg. Co., Elk Grove Village, Ill.
Astro-Metrix, Burbank, Cal.
Basler Elec. Co., Highland, Ill.
Bogue Elec. Mfg. Co., Paterson, N.J.
Canadian Research Institute, Don Mills, Ont., Canada
Controlled Power Corp., Farmington, Mich
Cyberex Inc., Willoughby, Ohio
Electro-Standards Labs., Inc., Miami, Fla.
Green Rectifier Corp., Fair Lawn, N.J.
Halmar Elctrns., Inc., Columbus, Ohio
Lehighton Elctrns., Inc., Lehighton, Pa.
M & T Chemicals Inc., Rahway, N.J.
Magnetics, Sandy Lake, Pa.
Maxwell Labs., Inc., San Diego, Calif.
Metaplast Electrochemicals, Bronx, N.Y.
Miller Elec. Mfg. Co., Appleton, Wisc.
NuTek Industries, Mountain View, Cal.
Rapid Elec. Co., Bronx, N.Y.
Robicon Corp., Pittsburgh, Pa
Sel-Rex Corp., Nutley, N.J.
Sunshine Sci. Instrs., Inc., Philadelphia, Pa.
Ther Elec. & Mach. Works, Chicago, Ill.
Transrex Div., Torrance, Cal.
Westinghouse Elec., Buffalo, N. Y.
Wolfson, P.J. Co., New Rochelle, N.Y.

Power Supplies, Energy Storage

Amglo Inds., Inc., Rosemont, Ill. p 1641
Amp Inc., Elizabethtown, Pa. ..... p 642
Amp Inc., Harrisburg, Pa.
Arnold Magnetics, Culver City, Cal.
Avtel Corp., Covina, Cal. ..... p 654
Beckman Instrs., Cedar Grove, N.J. p 414
Christie Elec., Los Angeles, Cal.. p 674
Cober Elctrns., Inc., Stamford, Conn.
Del Elctrns. Corp., Mt. Vernon, N.Y. p 678
Elctrn. Meas. Inc., Neptune, N.J. .. p 702
Electronic Resch. Assocs., Cedar Grove, N.J. ..... p 709
Hipotronics, Inc., Brewster, N.Y. .. p 726
Interelectronics Corp., Congers, N.Y.
Kepco, Inc., Flushing, N.Y.
Kilovolt Corp., Hackensack, N.J.
Light Elec. Corp., Rancocas, N.J. p 808
Mid-Eastern Inds., Scotch Plains, N.J.
Opad Elec. Co., Inc., New York, N.Y.
Power Designs, Westbury, N.Y.
Power Inc., Burnsville, Minn. ..... p 831
Power/Mate, Hackensack, N.J.
Raytheon Co., Manchester, N.H.
Ross Engrg. Corp., Campbell, Cal.
Spellman High Voltage Elctrns. Corp., Bronx, N.Y. ..... p 873,874,876
Systron Donner Trygon Elctrns. Sub., Roosevelt, N.Y.
Tobe Deutschmann Labs., Inc., Canton, Mass.
Topaz Elctrns., San Diego, Cal.
Universal Voltronics Corp., Mt. Kisco, N.Y. .....p 940,941
Vector Engrg., Springfield, N.J.
Abtronics, Inc., Livermore, Calif.
Acme Elec. Corp., Cuba, N.Y.
Advanced Kinetics, Costa Mesa, Calif.
Allis, Louis Co., Milwaukee, Wisc.
Allis Louis Co., Greendale, Wisc.
Bertan Assocs., Inc., Plainview, N.Y.
Bogue Elec. Mfg. Co., Paterson, N.J.
Borg-Warner Controls, Santa Ana, Cal.
Burmac Elctrns., Lindenhurst, N.Y.
Central Scientific Co., Chicago, Ill.
Constant Voltage Co., Chicago, Ill.
Dyonics, Inc., Woburn, Mass.
EG & G, Inc., Salem, Mass.
Electro Magnetic Prods., Wabash, Ind.
Electro Powerpacs Corp., Cambridge, Mass.
Elgin Elctrns., Waterford, Pa.
Energy Systems, Palo Alto, Cal.
Exide Power Sys. Div., Philadelphia, Pa.
Globe-Union Inc., Milwaukee, Wisc.

Grafix, Inc., Albuquerque, N.M.
Green Rectifier Corp., Fair Lawn, N.J.
Gulton Inds., Hawthorne, Calif.
Hadron Inc., Westbury, N.Y.
Honeywell, Aerospace & Def., Minneapolis, Minn.
Hughes Aircraft Co, Culver City, Cal.
Hughes Aircraft Co., Vacuum Tube Prods. Div/Welding Equip., Oceanside, Calif.
ILC, Inc., Sunnyvale, Calif.
Magnetics, Sandy Lake, Pa.
Maxwell Labs., Inc., San Diego, Calif.
Mil Elctrns. Inc., Hudson, N.H.
Pek, Inc., Sunnyvale, Calif.
Peschel Instrs., Cape Coral, Fla.
Power Applications, Inc., Bayside, N.Y.
Rae Co. Inc., Indianapolis, Ind.
Rho Engrg. Co., Los Angeles, Calif
Sel-Rex Corp., Nutley, N.J.
Teledyne Inet, Gardena, Cal.
Transrex Div., Torrance, Cal.
TRW Instrs., El Segundo, Cal.
Unitek Corp., Monrovia, Calif.
Varo, Inc., Texas Div., Garland, Tex.
Velonex, Santa Clara, Calif.
Wabash Magnetics, Inc., Huntington, Ind.
Walden Elctrns. Corp., Waltham, Mass.

Power Supplies, Intergrated Circuit

Aaron-Davis Co., Los Angeles,, Cal. p 616
Abbott Transistor Labs., L.A., Cal. p 618
ACDC Elctrns., Oceanside, Cal. p 634-637
Acopian Corp., Easton, Pa.
Almond Instrs. Co., Covina, Cal.... p 329
American Time Products, Woodside, N.Y.
Amp Inc., Elizabethtown, Pa.
Arnold Magnetics, Culver City, Cal. p 645,646
Astro-Space Labs., Huntsville, Ala p 633
Austron, Inc., Austin, Tex. ..... p 653
Avtel Corp., Covina, Cal.
Bulova Watch Elctrns. Div. Amer. Time Prods., Woodside, N.Y.
Bulova Watch Co., Servo Prods. Elctrns. Div., Woodside, N.Y.
CEA, Monrovia, Cal. ..... p 672
Christie Elec., Los Angeles, Cal.
Circuit Power, Inc., Portland, Conn.
Computer Prods., Ft. Lauderdale, Fla. p 341
Del Elctrns. Corp., Mt. Vernon, N.Y.
Deltron, Inc., N. Wales, Pa. ..... p 682
Digital Equip. Corp., Maynard, Mass.
Douglas Electronics, Inc., San Leandro, Cal.
Dynage, Bloomfield, Conn. ..... p 694
Elcor Prods. Welex Elctrns., Silver Spring, Md. ..... p 701
Elctrn. Meas. Inc., Neptune, N.J. .. p 702
Electronic Resch. Assocs., Cedar Grove, N.J. ..... p 707,708
Faratron Corp., Hackensack, N.J. p 711
Ferrotran Elctrn., New York, N.Y. p 717
Hewlett-Packard, Palo Alto, Cal.
Hi-G, Windsor Locks, Conn. ....p 724,725
Interelectronics Corp., Congers, N.Y.
Intronics, Inc., Newton, Mass. ..... p 734
Kepco, Inc., Flushing, N.Y.....p 755,759
Lambda Elctrns., Melville, N.Y. p 777,805,806
Mid-Eastern Inds., Scotch Plains, N.J. p 812,813
(NES) Nationwide Elctrn. Sys., Itasca, Ill. ..... p 365
North Elec. Co., Galion, Ohio
Power Designs, Westbury, N.Y..... p 835
Power/Mate, Hackensack, N.J. p 838,839,848,849,852-854,856,857
Powertec, Chatsworth, Cal.
Raytheon Co., Manchester, N.H.
RO Assocs., Menlo Pk., Cal. p 865,867,869
SRC Div., Newport Bch., Cal. ..... p 871
Stevens-Arnold, Inc., So. Boston, Mass.
Systron Donner Trygon Elctrns. Sub., Roosevelt, N.Y.
Technipower, Ridgefield, Conn. p 905-908
Tecnetics, Inc., Boulder, Colo...... p 884
Tempo/UTI Div., Chatsworth, Cal.
Thunder Int'l. Corp., Middletown, Conn. p 890,891
Todd Prods., Farmingdale, N.Y. .... p 929
Trio Labs, Inc., Plainview, N.Y..... p 932
Universal Elctrns. Co., Irvine, Cal. p 938
Varadyne Systems, Canton, Mass. p 385
Vector Engrg., Springfield, N.J.
Wanlass Div., Fort Washington, Pa. p 946
Acme Elec. Corp., Cuba, N.Y.
Advanced Energy Conversion, Menlo Pk., Cal.
Analog Devices, Inc., Norwood, Mass.
Anocut Engrg. Co., Elk Grove Village, Ill.
Armour Elctrns. Corp., Worcester, Mass.
Astro-Metrix, Burbank, Cal.
AUL Instrs., Inc., Flushng, N.Y.
BECO Solid State Systems, Salem, Va.
B.H. Inds., Los Angeles, Cal.
Bogue Elec. Mfg. Co., Paterson, N.J.
Burr-Brown Resch. Corp., Tucson, Ariz.
CGS Units, Inc., Rochester, N.Y.
Computer Diode, Fair Lawn, N.J.
Computer Meas., Gardena, Cal.
Constant Voltage Co., Chicago, Ill.
Data Technology Corp., Palo Alto, Cal.
E-Tronics, Van Nuys, Cal.
Elasco-Eastern, Inc., Bloomfield, Conn.
Elgin Elctrns., Waterford, Pa.
Engrg. Svcs., Madison, N.J.
Fairchild Semiconductor, Mountain View, Calif.
Hughes Aircraft Co, Culver City, Cal.
Hughes Aircraft Co., Vacuum Tube Prods. Div/Welding Equip., Oceanside, Calif.
Incor Instr., Plainview, N.Y.
Instrument Displays, Haverhill, Mass.
K West, Westminster, Calif.
Keltron Corp., Waltham, Mass.
Magnetics, Sandy Lake, Pa.
Modular Devices, Inc., Gardena, Calif.
Modular Power, Inc., Poway, Cal.
Monitor Sys., Inc., Ft. Washington, Pa.
Nuclear Corp. Amer., Denville, N.J.
Pioneer Magnetics, Santa Monica, Cal.
Preferred Electronics, Inc., Westfield, Mass.
Rho Engrg. Co., Los Angeles, Calif
Scintillonics, Inc., Ft. Collins, Colo.
Shane Inds., Sunny Vale, Cal.
Transistor Devices, Cedar Knolls, N.J.
Varo, Inc., Texas Div., Garland, Tex.
Velonex, Santa Clara, Calif.
Viking Modules, Waltham, Mass.

Power Supplies, Klystron-Also See Power Supplies By Output Voltage Range

Abbott Transistor Labs., L.A., Cal. p 618
Amp Inc., Elizabethtown, Pa. ..... p 643
Amp Inc., Harrisburg, Pa.
Arnold Magnetics, Culver City, Cal. p 647,648
Christie Elec., Los Angeles, Cal. .. p 674
Circuit Power, Inc., Portland, Conn.
Cober Elctrns., Inc., Stamford, Conn.
Del Elctrns. Corp., Mt. Vernon, N.Y. p 678
Electronic Resch. Assocs., Cedar Grove, N.J. ..... p 709
Ferrotran Elctrn., New York, N.Y.
Fluke, John Mfg. Co., Inc., Seattle, Wash.
Hewlett-Packard, Palo Alto, Cal.
Hipotronics, Inc., Brewster, N.Y. .. p 726
Interelectronics Corp., Congers, N.Y.
Kepco, Inc., Flushing, N.Y.
Kilovolt Corp., Hackensack, N.J.... p 773
Light Elec. Corp., Rancocas, N.J.
Multitech Power Sys., Costa Mesa, Cal. p 816
Power Designs, Westbury, N.Y.
Power/Mate, Hackensack, N.J.
Powertec, Chatsworth, Cal.
SRC Div., Newport Bch., Cal.
Tecnetics, Inc., Boulder, Colo.
Trio Labs, Inc., Plainview, N.Y.
Universal Voltronics Corp., Mt. Kisco, N.Y. ..... p 941
Vector Engrg., Springfield, N.J.
Weinschel Engrg. Co., Gaithersburg, Md.
Bertan Assocs., Inc., Plainview, N.Y.
Bogue Elec. Mfg. Co., Paterson, N.J.
Burmac Elctrns., Lindenhurst, N.Y.
Cal-Power Corp., El Segundo, Calif.
Crestronics, Crestline, Cal.
Electro Magnetic Prods., Wabash, Ind.
Energy Systems, Palo Alto, Cal.
General Microwave Corp., Farmingdale, N.Y.
Grafix, Inc., Albuquerque, N.M.
Hyperion Inds. Corp., Watertown, Mass.
Ling Elctrns., Anaheim, Calif.
Litton Inds., San Carlos, Calif.
Magnetics, Sandy Lake, Pa.
Maxwell Labs., Inc., San Diego, Calif.
Micro-Now Instr., Chicago, Ill.
Micro-Power, Inc., Long Island City, N.Y.
Narda Microwave Corp., Plainview, N.Y.
Northeast Scientific Corp., Acton, Mass.
Pioneer Magnetics, Santa Monica, Cal.
PRD Elctrns., Inc., Westbury, N.Y.
Reeve Elctrns., Inc., Chicago, Ill.
Rho Engrg. Co., Los Angeles, Calif
SBD Systems, Inc., Amityville, N.Y.
Semi/Dyne Elctrns. Corp., Freeport, N.Y.
Sperry Elctrn. Tube, Gainesville, Fla.
Transistor Devices, Cedar Knolls, N.J.
Transrex Div., Torrance, Cal.
Varo, Inc., Texas Div., Garland, Tex.
Walden Elctrns. Corp., Waltham, Mass.

Power Supplies, Lab, Multiple Output

Aaron-Davis Co., Los Angeles,, Cal.
ACDC Elctrns., Oceanside, Cal.
Acopian Corp., Easton, Pa. ..... p 641
Amp Inc., Elizabethtown, Pa.
Astro-Space Labs., Huntsville, Ala
Avtel Corp., Covina, Cal. .....p 656,658
Beckman Instrs., Cedar Grove, N.J.
Behlman Div., San Diego, Cal
CEA, Monrovia, Cal.
Christie Elec., Los Angeles, Cal. .. p 674
Circuit Power, Inc., Portland, Conn.
CML-Macarr, Inc., Edison, N.J.
Cober Elctrns., Inc., Stamford, Conn.
Computer Prods., Ft. Lauderdale, Fla.
Del Elctrns. Corp., Mt. Vernon, N.Y. p 679
Deltron, Inc., N. Wales, Pa. ..... p 685
Dressen-Barnes Elctrns., Pasadena, Cal.
Dynage, Bloomfield, Conn.
Elgar Corp., San Diego, Cal. ..... p 703
Fluke, John Mfg. Co., Inc., Seattle, Wash. ..... p 477
Gates Elctrn. Co., Bronx, N.Y. p 720,721
Hewlett-Packard, Palo Alto, Cal. p 729-732
Hewlett-Packard, Berkeley Hgts., N.J. p 729-732
Interelectronics Corp., Congers, N.Y.
Kepco, Inc., Flushing, N.Y. p 747,750-754,756-758
Lambda Elctrns., Melville, N.Y. p 778,795-801
Mid-Eastern Inds., Scotch Plains, N.J. p 812-814
NJE Corp., Kenilworth, N.J. p 819-821,824,825
North Elec. Co., Galion, Ohio ..... p 827
Opad Elec. Co., Inc., New York, N.Y.
Power Designs, Westbury, N.Y. p 832-835
Power/Mate, Hackensack, N.J. p 850,851,858
Powertec, Chatsworth, Cal. ..... p 862
Precision Standards Corp., Santa Ana, Cal.
Raytheon Co., Manchester, N.H. p 878,879
RCA Elctrns. Comps., Harrison, N.J. p 550
RFL Inds., Instr. Div., Boonton, N.J.
RO Assocs., Menlo Pk., Cal.
Spellman High Voltage Elctrns. Corp., Bronx, N.Y. .....p 874,876
SRC Div., Newport Bch., Cal. ..... p 871
Systron-Donner Corp., Concord, Cal. p 564
Systron-Donner Alpha Div., Oakland, Cal.
Systron-Donner Concord Instr. Div., Concord, Cal. ..... p 564
Systron-Donner Datapulse Div., Culver City, Cal. ..... p 564
Systron Donner Trygon Elctrns. Sub., Roosevelt, N.Y. .....p 564,933
Technipower, Ridgefield, Conn..... p 905
Thunder Int'l. Corp., Middletown, Conn.
Todd Prods., Farmingdale, N.Y.
Trio Labs, Inc., Plainview, N.Y.
Venus Scientific, Farmingdale, N.Y. p 945
Wagner Elec. Corp., Livingston, N.J.
Wanlass Div., Fort Washington, Pa.
Abtronics, Inc., Livermore, Calif.
Advanced Energy Conversion, Menlo Pk., Cal.
AMBAC Inds., Garden City, N.Y.
Armour Elctrns. Corp., Worcester, Mass.
Astro-Metrix, Burbank, Cal.
AUL Instrs., Inc., Flushng, N.Y.
BECO Solid State Systems, Salem, Va.
Behlman Engrg. Corp., Santa Barbara, Cal.
Bertan Assocs., Inc., Plainview, N.Y.
B.H. Inds., Los Angeles, Cal.
Broadview Inds. Corp., Hempstead, N.Y.
Buck Engrg. Co., Farmingdale, N.J.
Burr-Brown Resch. Corp., Tucson, Ariz.
Cal-Power Corp., El Segundo, Calif.
California Instrs. Co., San Diego, Cal.
CGS Units, Inc., Rochester, N.Y.
Components Specialties, Inc., Freeport, N.Y.
Computer Meas., Gardena, Cal.
E-Tronics, Van Nuys, Cal.
Elasco-Eastern, Inc., Bloomfield, Conn.
EMP Elctrns., Inc., Phoenix, Ariz.
Glentronics, Glendora, Cal.
International Tech. Svc., Glen Ellyn, Ill.
Keithley Instrs., Inc., Cleveland, Ohio
Ling Elctrns., Anaheim, Calif.
Magnetics, Sandy Lake, Pa.
Maxwell Labs., Inc., San Diego, Calif.
McKee-Pedersen Instrs., Danville, Calif.
Modular Devices, Inc., Gardena, Calif.
Novatronics, Inc., Pompano Beach, Fla.
Pacific Electro Dynamics, Bellevue, Wash
PIC Design Corp., Ridgefield,, Conn.
Rapid Elec. Co., Bronx, N.Y.
Ratelco, Inc., Seattle, Wash.
Schoeffel Instr. Corp., Westwood, N.J.
Sel-Rex Corp., Nutley, N.J.
Semiconductor Circuits Inc., Woburn, Mass.
Spectran Elctrns., Pompano Beach, Fla.
Transidyne-General Corp., Ann Arbor, Mich.
Transistor Devices, Cedar Knolls, N.J.
Transrex Div., Torrance, Cal.
Velonex, Santa Clara, Calif.
Viking Modules, Waltham, Mass.
Walden Elctrns. Corp., Waltham, Mass.
Wolfson, P.J. Co., New Rochelle, N.Y.

Power Supplies, Laser

American Tech. Ceramics, Huntington Sta., N.Y.
Amp Inc., Elizabethtown, Pa. ..... p 642
Amp Inc., Harrisburg, Pa.
Arnold Magnetics, Culver City, Cal. p 647,648
Astro-Space Labs., Huntsville, Ala
Beckman Instrs., Cedar Grove, N.J.
Cober Elctrns., Inc., Stamford, Conn. p 600
Del Elctrns. Corp., Mt. Vernon, N.Y.
Elctrn. Meas. Inc., Neptune, N.J. .. p 702
Electronic Resch. Assocs., Cedar Grove, N.J. ..... p 709
Hewlett-Packard, Palo Alto, Cal.
Hipotronics, Inc., Brewster, N.Y. .. p 726
ITT Jennings, Div. Int'l. Telephone & Telegraph Corp., San Jose, Cal. p 501
ITT Jennings, Dunellen,, N.J. ..... p 501
Kilovolt Corp., Hackensack, N.J.... p 773
Light Elec. Corp., Rancocas, N.J.
Opad Elec. Co., Inc., New York, N.Y.
Power Designs, Westbury, N.Y.
Power/Mate, Hackensack, N.J.
Powertec, Chatsworth, Cal.
Spellman High Voltage Elctrns. Corp., Bronx, N.Y. ..... p 874
Tobe Deutschmann Labs., Inc., Canton, Mass.
Todd Prods., Farmingdale, N.Y.
Topaz Elctrns., San Diego, Cal.
Universal Voltronics Corp., Mt. Kisco, N.Y. .....p 940,941
Vector Engrg., Springfield, N.J.
Advanced Energy Conversion, Menlo Pk., Cal.
Advanced Kinetics, Costa Mesa, Calif.
Bertan Assocs., Inc., Plainview, N.Y.
Bogue Elec. Mfg. Co., Paterson, N.J.
Condenser Prods. Corp., Brooksville, Fla.
Constant Voltage Co., Chicago, Ill.
Crestronics, Crestline, Cal.
Display Power Sys. Corp., Carmel, N.Y.
E.F.E. Labs., Inc., Horsham, Pa.

Electro Powerpacs Corp., Cambridge, Mass.
Elctrn. Enterprises, Pasadena, Calif.
Elgin Elctrns., Waterford, Pa.
Grafix, Inc., Albuquerque, N.M.
Hadron Inc., Westbury, N.Y.
Hughes Aircraft Co, Culver City, Cal.
Hughes Aircraft Co., Torrance, Cal.
ILC, Inc., Sunnyvale, Calif.
Korad Mat'ls. Sys. Div., Santa Monica, Cal.
LAD Electro-Sys., Inc., Hicksville, N.Y.
Maxwell Labs., Inc., San Diego, Calif.
Mil Elctrns. Inc., Hudson, N.H.
Permavolt Transformers, Inc., S. Bend, Ind.
Rapid Elec. Co., Bronx, N.Y.
Resalab Inc., Advanced Development Lab., Los Angeles, Cal.
Rho Engrg. Co., Los Angeles, Calif
SKG Assocs., Inc., Boston, Mass.
Transrex Div., Torrance, Cal.
Varo, Inc., Texas Div., Garland, Tex.
Velonex, Santa Clara, Calif.
Wabash Magnetics, Inc., Huntington, Ind.

Power Supplies, Operational

Amp Inc., Elizabethtown, Pa.
Arnold Magnetics, Culver City, Cal.
Astro-Space Labs., Huntsville, Ala
California Elctrn. Mfg. Co., Alamo, Calif. p 1315
Cober Elctrns., Inc., Stamford, Conn.
DDC, Hicksville, N.Y. p 1282
Del Elctrns. Corp., Mt. Vernon, N.Y.
Dressen-Barnes Elctrns., Pasadena, Cal. p 688
Dynage, Bloomfield, Conn.
Electronic Resch. Assocs., Cedar Grove, N.J. p 708
Hewlett-Packard, Palo Alto, Cal.
Interelectronics Corp., Congers, N.Y.
Kepco, Inc., Flushing, N.Y. p 747-749
Kilovolt Corp., Hackensack, N.J.
Lambda Elctrns., Melville, N.Y. p 777
Light Elec. Corp., Rancocas, N.J.
Mid-Eastern Inds., Scotch Plains, N.J. p 812
Power Designs, Westbury, N.Y.
Power/Mate, Hackensack, N.J. p 852,853,856,857
Powertec, Chatsworth, Cal.
Raytheon Co., Manchester, N.H.
Schauer Mfg. Corp., Cincinnati, Ohio
Systron Donner Trygon Elctrns. Sub., Roosevelt, N.Y.
Tecnetics, Inc., Boulder, Colo. p 884
Tempo/UTI Div., Chatsworth, Cal.
Thunder Int'l. Corp., Middletown, Conn.
Todd Prods., Farmingdale, N.Y.
Vector Engrg., Springfield, N.J.
Abtronics, Inc., Livermore, Calif.
Acme Elec. Corp., Cuba, N.Y.
Analog Devices, Inc., Norwood, Mass.
Anocut Engrg. Co., Elk Grove Village, Ill.
Beckman Instrs., Helipot Div., Fullerton, Cal.
Burr-Brown Resch. Corp., Tucson, Ariz.
CGS Units, Inc., Rochester, N.Y.
Constant Voltage Co., Chicago, Ill.
Control Sys. Resch., Inc., Pittsburgh, Pa.
Delta Elctrn. Control, Costa Mesa, Cal.
Elasco-Eastern, Inc., Bloomfield, Conn.
Glentek, Inc., Santa Monica, Calif.
GPS Instr. Co., Framingham, Mass.
Gulton Inds., Hawthorne, Calif.
Keithley Instrs., Inc., Cleveland, Ohio
Keltron Corp., Waltham, Mass.
Ling Elctrns., Anaheim, Calif.
Maxwell Labs., Inc., San Diego, Calif.
Mil Elctrns. Inc., Hudson, N.H.
Modular Devices, Inc., Gardena, Calif.
Neutronic Corp., Bridgeton, Mo.
Nuclear Corp. Amer., Denville, N.J.
Rho Engrg. Co., Los Angeles, Calif
Semiconductor Circuits Inc., Woburn, Mass.
Singer - Tele-Signal, Woodbury, N.Y.
Teledyne Inet, Gardena, Cal.
Transrex Div., Torrance, Cal.
Varo, Inc., Texas Div., Garland, Tex.
Viking Modules, Waltham, Mass.
Voltex Co., Inc., Farmingdale, N.Y.

Power Supplies, Photomultiplier

Advanced High Voltage Co., Inc., Northridge, Cal. p 617
Amp Inc., Elizabethtown, Pa.
Amp Inc., Harrisburg, Pa.
Arnold Magnetics, Culver City, Cal. p 647,648
Austron, Inc., Austin, Tex.
Beckman Instrs., Cedar Grove, N.J. p 414
CEA, Monrovia, Cal.
CELCO, Mahwah, N.J.
Christie Elec., Los Angeles, Cal.
Cober Elctrns., Inc., Stamford, Conn.
CPS, Sunnyvale, Calif. p 669
Del Elctrns. Corp., Mt. Vernon, N.Y. p 678
Electronic Dev. Corp., Boston, Mass.
Electronic Resch. Assocs., Cedar Grove, N.J. p 709
Ferrotran Elctrn., New York, N.Y.
Fluke, John Mfg. Co., Inc., Seattle, Wash.
Hewlett-Packard, Palo Alto, Cal.
Interelectronics Corp., Congers, N.Y.
ITT Jennings, Div. Int'l. Telephone & Telegraph Corp., San Jose, Cal. p 501
ITT Jennings, Dunellen,, N.J. p 501
Kepco, Inc., Flushing, N.Y.
Kilovolt Corp., Hackensack, N.J. p 773
Light Elec. Corp., Rancocas, N.J.
Mid-Eastern Inds., Scotch Plains, N.J.
North Hills Elctrns., Inc., Glen Cove, N.Y.
Power Designs, Westbury, N.Y.
Power/Mate, Hackensack, N.J.
Raytheon Co., Manchester, N.H.
Spellman High Voltage Elctrns. Corp., Bronx, N.Y. p 873,875
SRC Div., Newport Bch., Cal.
Technipower, Ridgefield, Conn.
Tecnetics, Inc., Boulder, Colo.
Thunder Int'l. Corp., Middletown, Conn.
Topaz Elctrns., San Diego, Cal. p 896
Trio Labs, Inc., Plainview, N.Y.
Universal Voltronics Corp., Mt. Kisco, N.Y. p 940,941
Vector Engrg., Springfield, N.J.
Venus Scientific, Farmingdale, N.Y. p 945
Acme Elec. Corp., Cuba, N.Y.
Advanced Energy Conversion, Menlo Pk., Cal.
AMBAC Inds., Garden City, N.Y.
American Rectifier Corp., College Point, N.Y.
Bendix, Ann Arbor, Mich.
Bertan Assocs., Inc., Plainview, N.Y.
B.H. Inds., Los Angeles, Cal.
Cal-Power Corp., El Segundo, Calif.
Constant Voltage Co., Chicago, Ill.
Cryotronics, Inc., High Bridge, N.J.
Display Power Sys. Corp., Carmel, N.Y.
E-Tronics, Van Nuys, Cal.
EG & G, Inc., Salem, Mass.
Electrophysics Corp., Nutley, N.J.
Elgin Elctrns., Waterford, Pa.
EMP Elctrns., Inc., Phoenix, Ariz.
Gencom Div., Plainview, N.Y.
Glentek, Inc., Santa Monica, Calif.
Glentronics, Glendora, Cal.
Grafix, Inc., Albuquerque, N.M.
Hyperion Inds. Corp., Watertown, Mass.
Instrulab, Inc., Dayton, Ohio
International Light, Newburyport, Mass.
Johnston Labs., Inc., Cockeysville, Md.
Keithley Instrs., Inc., Cleveland, Ohio
Loyola Industries, Inc., El Segundo, Calif.
Malaker Corp., High Bridge, N.J.
McKee-Pedersen Instrs., Danville, Calif.
Mil Elctrns. Inc., Hudson, N.H.
NH Research, Inc., Santa Ana, Calif.
Northeast Scientific Corp., Acton, Mass.
Nuclear Corp. Amer., Denville, N.J.
Princeton Applied Resch. Corp., Princeton, N.J.
Rho Engrg. Co., Los Angeles, Calif
SBD Systems, Inc., Amityville, N.Y.
Schoeffel Instr. Corp., Westwood, N.J.
SSR Instrs. Co., Santa Monica, Cal.
Universal Transistor Prods., Copiague, N.Y.
Varo, Inc., Texas Div., Garland, Tex.
Velonex, Santa Clara, Calif.
Voltex Co., Inc., Farmingdale, N.Y.

Power Supplies, Programmable

Aaron-Davis Co., Los Angeles,, Cal.
ACDC Elctrns., Oceanside, Cal. p 635
Acoplan Corp., Easton, Pa.
Arnold Magnetics, Culver City, Cal.
Astro-Space Labs., Huntsville, Ala
Astrosystems, Lake Success, N.Y.
Behlman Div., San Diego, Cal..p 670,671
Beta Instr., Newton Upper Falls, Mass. p 337
CEA, Monrovia, Cal.
Christie Elec., Los Angeles, Cal.
Circuit Power, Inc., Portland, Conn.
CML-Macarr, Inc., Edison, N.J.
CPS, Sunnyvale, Calif. p 669
Del Elctrns. Corp., Mt. Vernon, N.Y.
Deltron, Inc., N. Wales, Pa. p 683-685
Dressen-Barnes Elctrns., Pasadena, Cal. p 686,687
Dynage, Bloomfield, Conn. p 692-694,696,697
Electro Sci. Inds., Portland, Ore.
Elctrn. Meas. Inc., Neptune, N.J.
Electronic Resch. Assocs., Cedar Grove, N.J.
Elgar Corp., San Diego, Cal. p 703
Elin Div., San Diego, Cal. p 671
Fluke, John Mfg. Co., Inc., Seattle, Wash. p 474,477
Hewlett-Packard, Palo Alto, Cal. p 729-732
Hewlett-Packard, Berkeley Hgts., N.J. p 729-732
Hi-G, Windsor Locks, Conn. p 724,725
Interelectronics Corp., Congers, N.Y.
Julie Research Lab., New York, N.Y.
Kepco, Inc., Flushing, N.Y.
p
Lambda Elctrns., Melville, N.Y. p 790,792-794,796,797,799-802
Light Elec. Corp., Rancocas, N.J.
Lorch-Adret Corp., Englewood, N.J.
Mid-Eastern Inds., Scotch Plains, N.J. p 812-814
NJE Corp., Kenilworth, N.J. p 818-825
North Elec. Co., Galion, Ohio p 827
North Hills Elctrns., Inc., Glen Cove, N.Y. p 817
Power Designs, Westbury, N.Y. p 833-835
Power/Mate, Hackensack, N.J. p 846-851
Powertec, Chatsworth, Cal. p 863
Precision Standards Corp., Santa Ana, Cal.
Raytheon Co., Manchester, N.H. p 878,879
Spellman High Voltage Elctrns. Corp., Bronx, N.Y. p 873,876
SRC Div., Newport Bch., Cal. p 871
Systron Donner Trygon Elctrns. Sub., Roosevelt, N.Y. p 933
Technipower, Ridgefield, Conn. p 928
Tektronix, Inc., Beaverton, Ore.
Thunder Int'l. Corp., Middletown, Conn.
Todd Prods., Farmingdale, N.Y. p 931
Topaz Elctrns., San Diego, Cal. p 896
Universal Elctrns. Co., Irvine, Cal.
Universal Voltronics Corp., Mt. Kisco, N.Y. p 940,941
Venus Scientific, Farmingdale, N.Y. p 944
Wagner Elec. Corp., Livingston, N.J.
Wanlass Div., Fort Washington, Pa.
Abtronics, Inc., Livermore, Calif.
Acme Elec. Corp., Cuba, N.Y.
Advanced Kinetics, Costa Mesa, Calif.
AMBAC Inds., Garden City, N.Y.
Analogic, Wakefield, Mass.
Anocut Engrg. Co., Elk Grove Village, Ill.
Armour Elctrns. Corp., Worcester, Mass.
Astro-Metrix, Burbank, Cal.
AUL Instrs., Inc., Flushng, N.Y.
Basler Elec. Co., Highland, Ill.
BECO Solid State Systems, Salem, Va.
Behlman Engrg. Corp., Santa Barbara, Cal.
Bertan Assocs., Inc., Plainview, N.Y.
B.H. Inds., Los Angeles, Cal.
California Instrs. Co., San Diego, Cal.
CGS Units, Inc., Rochester, N.Y.
Compu-Systems Co., Wakefield, Mass.
Constant Voltage Co., Chicago, Ill.
Controlled Power Corp., Farmington, Mich
Elasco-Eastern, Inc., Bloomfield, Conn.
Engrg. Svcs., Madison, N.J.
Gulton Inds., Hawthorne, Calif.
Hughes Aircraft Co, Culver City, Cal.
Incor Instr., Plainview, N.Y.
IPT Corp., Mountain View, Cal.
Keithley Instrs., Inc., Cleveland, Ohio
Keltron Corp., Waltham, Mass.
Ling Elctrns., Anaheim, Calif.
McKee-Pedersen Instrs., Danville, Calif.
MEM Controls, Inc., Wickliffe, Ohio
Mil Elctrns. Inc., Hudson, N.H.
Miller Elec. Mfg. Co., Appleton, Wisc.
Modular Devices, Inc., Gardena, Calif.
Modular Power, Inc., Poway, Cal.
Neutronic Corp., Bridgeton, Mo.
Novatronics, Inc., Pompano Beach, Fla.
Nuclear Corp. Amer., Denville, N.J.
Optimation, Inc., Sun Valley, Calif.
Princeton Applied Resch. Corp., Princeton, N.J.
Robicon Corp., Pittsburgh, Pa
Sel-Rex Corp., Nutley, N.J.
Semiconductor Circuits Inc., Woburn, Mass.
Sola Elec. Div., Elk Grove Village, Ill.
Spectran Elctrns., Pompano Beach, Fla.
Teledyne Inet, Gardena, Cal.
Transistor Devices, Cedar Knolls, N.J.
Transrex Div., Torrance, Cal.
Varo, Inc., Texas Div., Garland, Tex.
Velonex, Santa Clara, Calif.
Viking Modules, Waltham, Mass.
Walden Elctrns. Corp., Waltham, Mass.
ACDC Elctrns., Oceanside, Cal.
Amp Inc., Elizabethtown, Pa.
Astro-Space Labs., Huntsville, Ala
Automated Meas., Oakland, Calif.
Behlman Div., San Diego, Cal
Circuit Power, Inc., Portland, Conn.
CPS, Sunnyvale, Calif.
Del Elctrns. Corp., Mt. Vernon, N.Y.
Deltron, Inc., N. Wales, Pa.
Elctrn. Meas. Inc., Neptune, N.J.
Electronic Resch. Assocs., Cedar Grove, N.J.
Hewlett-Packard, Palo Alto, Cal.
Interelectronics Corp., Congers, N.Y.
Kepco, Inc., Flushing, N.Y.
Lorch-Adret Corp., Englewood, N.J.
Mid-Eastern Inds., Scotch Plains, N.J.
Power Designs, Westbury, N.Y.
Power/Mate, Hackensack, N.J.
Powertec, Chatsworth, Cal.
Raytheon Co., Manchester, N.H.
SRC Div., Newport Bch., Cal.
Systron Donner Trygon Elctrns. Sub., Roosevelt, N.Y.
Todd Prods., Farmingdale, N.Y.
Venus Scientific, Farmingdale, N.Y.
Wanlass Div., Fort Washington, Pa.
Acme Elec. Corp., Cuba, N.Y.
Bertan Assocs., Inc., Plainview, N.Y.
B.H. Inds., Los Angeles, Cal.
California Instrs. Co., San Diego, Cal.
Compu-Systems Co., Wakefield, Mass.
Constant Voltage Co., Chicago, Ill.
Control Sys. Resch., Inc., Pittsburgh, Pa.
Gulton Inds., Hawthorne, Calif.
IPT Corp., Mountain View, Cal.
Keithley Instrs., Inc., Cleveland, Ohio
Keltron Corp., Waltham, Mass.
MEM Controls, Inc., Wickliffe, Ohio
Mil Elctrns. Inc., Hudson, N.H.
Modular Devices, Inc., Gardena, Calif.
Rho Engrg. Co., Los Angeles, Calif
Transrex Div., Torrance, Cal.
Viking Modules, Waltham, Mass.
Walden Elctrns. Corp., Waltham, Mass.

Power Supplies, R-F

Cober Elctrns., Inc., Stamford, Conn.
CPS, Sunnyvale, Calif. p 669
Del Elctrns. Corp., Mt. Vernon, N.Y.
Kilovolt Corp., Hackensack, N.J.
Light Elec. Corp., Rancocas, N.J.
Multitech Power Sys., Costa Mesa, Cal. p 816
Opad Elec. Co., Inc., New York, N.Y.
Power Designs, Westbury, N.Y. p 833
Powertec, Chatsworth, Cal.
Spellman High Voltage Elctrns. Corp., Bronx, N.Y. p 873
Vector Engrg., Springfield, N.J.
Weinschel Engrg. Co., Gaithersburg, Md.
AMBAC Inds., Garden City, N.Y.
Avco Corp., Cincinnati, Ohio
Bertan Assocs., Inc., Plainview, N.Y.
Carco Elctrns., Menlo Park, Calif.

Constant Voltage Co., Chicago, Ill.
Cooke Vacuum Prods., S. Norwalk, Conn.
Dorsett Elctrns., Tulsa, Okla.
Granville-Phillips Co., Boulder, Colo.
Hanovia Lamp Div., Newark, N.J.
Hughes Aircraft Co, Fullerton, Cal.
Hyperion Inds. Corp., Watertown, Mass.
Lehighton Elctrns., Inc., Lehighton, Pa.
Litton Inds., San Carlos, Calif.
Materials Resch. Corp., Orangeburg, N.Y.
Maxwell Labs., Inc., San Diego, Calif.
Microwave Assocs., Inc., Burlington, Mass.
Mil Elctrns. Inc., Hudson, N.H.
Optimation, Inc., Sun Valley, Calif.
PRD Elctrns., Inc., Westbury, N.Y.
Reeve Elctrns., Inc., Chicago, Ill.
Robicon Corp., Pittsburgh, Pa
Scientific Elec., Inc., Garfield, N.J.
Scintillonics, Inc., Ft. Collins, Colo.
Semi/Dyne Elctrns. Corp., Freeport, N.Y.
Servo Corp. America, Hicksville, N.Y.
Taylor-Winfield Corp., Warren, Ohio
Transrex Div., Torrance, Cal.
Walden Elctrns. Corp., Waltham, Mass.
Westinghouse Elec. Corp., Pittsburgh, Pa.

Power Supplies, Readout & Display

ACDC Elctrns., Oceanside, Cal. p 634-637
Acopian Corp., Easton, Pa. ..... p 641
Alco Elctrn. Prods., Lawrence, Mass. p 1438
Arnold Magnetics, Culver City, Cal. p 645-648
Astro-Space Labs., Huntsville, Ala p 633
CELCO, Mahwah, N.J.
Computer Prods., Ft. Lauderdale, Fla. p 341
CPS, Sunnyvale, Calif.
Del Elctrns. Corp., Mt. Vernon, N.Y.
Ferrotran Elctrn., New York, N.Y. p 716
Interelectronics Corp., Congers, N.Y.
ITT Jennings, Div. Int'l. Telephone & Telegraph Corp., San Jose, Cal.
Lambda Elctrns., Melville, N.Y. ..... p 777
Lorch-Adret Corp., Englewood, N.J.
Mid-Eastern Inds., Scotch Plains, N.J.
North Elec. Co., Galion, Ohio
Pinlites, Fairfield, N.J.
Power/Mate, Hackensack, N.J. p 852,853,856,857
Powertec, Chatsworth, Cal. ..... p 861
Raytheon Co., Manchester, N.H.
RFL Inds., Instr. Div., Boonton, N.J.
RO Assocs., Menlo Pk., Cal. ..... p 865
Spellman High Voltage Elctrns. Corp., Bronx, N.Y.
Todd Prods., Farmingdale, N.Y. .... p 931
Venus Scientific, Farmingdale, N.Y. p 944
Wanlass Div., Fort Washington, Pa. p 946
Analogic, Wakefield, Mass.
Anocut Engrg. Co., Elk Grove Village, Ill.
Armour Elctrns. Corp., Worcester, Mass.
Bertan Assocs., Inc., Plainview, N.Y.
Burroughs Corp., Plainfield, N.J.
California Instrs. Co., San Diego, Cal.
Computer Diode, Fair Lawn, N.J.
Constant Voltage Co., Chicago, Ill.
Engrg. Svcs., Madison, N.J.
Fairlane Electronics, Inc., Long Valley, N.J.
Gencom Div., Plainview, N.Y.
Gentran Inc., Sunnyvale, Cal
Hughes Aircraft Co, Culver City, Cal.
Instrument Displays, Haverhill, Mass.
Integrated Circuit Elctrns., Inc., Waltham, Mass.
Keithley Instrs., Inc., Cleveland, Ohio
Mil Elctrns. Inc., Hudson, N.H.
Nuclear Corp. Amer., Denville, N.J.
Pioneer Magnetics, Santa Monica, Cal.
Shane Inds., Sunny Vale, Cal.
Statham Instrs., Inc., Oxnard, Cal.
TEC, Inc., Eden Prairie, Minn.
Transrex Div., Torrance, Cal.
Velonex, Santa Clara, Calif.

Power Supplies, Strain Gauge & Transducer

Acopian Corp., Easton, Pa. ..... p 641
Almond Instrs. Co., Covina, Cal.... p 329
Arnold Magnetics, Culver City, Cal. p 646
Avtel Corp., Covina, Cal. ..... p 659
California Elctrn. Mfg. Co., Alamo, Calif. p 1315
CEA, Monrovia, Cal.
Deltron, Inc., N. Wales, Pa. ..... p 682
Dynage, Bloomfield, Conn. ..... p 694
Dynamics Instr. Co., Monterey Pk., Cal. p 432
Ectron Corp., San Diego, Cal.
Elcor Prods. Welex Elctrns., Silver Spring, Md. ..... p 701
Electronic Resch. Assocs., Cedar Grove, N.J. ..... p 708
Hewlett-Packard, Palo Alto, Cal.
Honeywell, Denver, Colo.
Interelectronics Corp., Congers, N.Y.
Kepco, Inc., Flushing, N.Y.....p 755,760
Lambda Elctrns., Melville, N.Y. ..... p 777
Mid-Eastern Inds., Scotch Plains, N.J. p 813
Neff Instr. Corp., Duarte, Calif.
Power Designs, Westbury, N.Y..... p 835
Power/Mate, Hackensack, N.J. p 836,841,850
PPM, Inc., Bedford, Ohio ..... p 535
Rosemount Plug-In, Nashville, Tenn. p 870
SRC Div., Newport Bch., Cal.
Todd Prods., Farmingdale, N.Y. .... p 929
Universal Voltronics Corp., Mt. Kisco, N.Y.
Vector Engrg., Springfield, N.J.
Wanlass Div., Fort Washington, Pa.
Applied Control Co., Fairfield, N.J.
B & K Instrs., Inc., Cleveland, Ohio
Behlman Engrg. Corp., Santa Barbara, Cal.
B.H. Inds., Los Angeles, Cal.
Biocom, Inc., Culver City, Cal.
Bourns, Inc., Riverside, Calif.
Burr-Brown Resch. Corp., Tucson, Ariz.
Cal-Power Corp., El Segundo, Calif.
Celtic Inds., Inc., Van Nuys, Cal.
CGS/Datametrics, Watertown, Mass.
Crestronics, Crestline, Cal.
Doric Sci. Corp., San Diego, Calif.
Dynisco Div., Westwood, Mass.
EDC (Electro Dev.), Lynnwood, Wash.
Electronic Design Labs., Inc., Phila., Pa.
Endevco, Pasadena, Calif.
Gentran Inc., Sunnyvale, Cal
Glentek, Inc., Santa Monica, Calif.
Glentronics, Glendora, Cal.
Grafix, Inc., Albuquerque, N.M.
Gulton Inds., Hawthorne, Calif.
Houston Scientific Inds., Inc., Houston, Tex
Incor Instr., Plainview, N.Y.
Instrulab, Inc., Dayton, Ohio
Interface, Inc., Scottsdale, Ariz.
K West, Westminster, Calif.
MB Elctrns/Textron Co., New Haven, Conn.
Micro-Strain, Inc., Spring City, Pa.
Modular Power, Inc., Poway, Cal.
Newport Labs., Inc., Santa Ana, Cal.
SBD Systems, Inc., Amityville, N.Y.
Scintillonics, Inc., Ft. Collins, Colo.
Semiconductor Circuits Inc., Woburn, Mass.
Sensotec, Inc., Columbus, Ohio
Sparton Southwest, Inc., Albuquerque, N.M.
Stow Labs., Inc., Hudson, Mass.
Transducer Systems, Inc., Willow Grove, Pa.
Tyco Instr. Div., Waltham, Mass.
Unitek Corp., Monrovia, Calif.
Validyne Engrg. Corp., Northridge, Cal.
Wood, C.N. Mfg. Co., Newtown, Pa.

Power Supplies, Switch-Over Automatic (Self-Contained Battery)

Astro-Space Labs., Huntsville, Ala
ATR Elctrns., Inc., St. Paul, Minn. p 652
Avtel Corp., Covina, Cal.
Christie Elec., Los Angeles, Cal. .. p 674
Electronic Resch. Assocs., Cedar Grove, N.J.
Elgar Corp., San Diego, Cal. ..... p 704
Geo Space Sys., Tampa, Fla. ..... p 486
Hewlett-Packard, Palo Alto, Cal.
International Rectifier, El Segundo, Cal.
Mauratron, Inc., Dallas, Tex. ..... p 815
Mid-Eastern Inds., Scotch Plains, N.J.
Power Inc., Burnsville, Minn. ..... p 831
Powertec, Chatsworth, Cal.
Topaz Elctrns., San Diego, Cal. .... p 903
Unitron, Garland, Tex.
Advanced Energy Conversion, Menlo Pk., Cal.
Allis, Louis Co., Milwaukee, Wisc.
Allis Louis Co., Greendale, Wisc.
Armour Elctrns. Corp., Worcester, Mass.
Astro-Metrix, Burbank, Cal.
Behlman Engrg. Corp., Santa Barbara, Cal.
Bogue Elec. Mfg. Co., Paterson, N.J.
Delta Elctrn. Control, Costa Mesa, Cal.
Dual-Lite Co., Newtown, Conn.
Engrg. Svcs., Madison, N.J.
Gulton Inds., Hawthorne, Calif.
Magnetics, Sandy Lake, Pa.
Novatronics, Inc., Pompano Beach, Fla.
Power Conversion Prods. Inc., Crystal Lake, Ill.
Ratelco, Inc., Seattle, Wash.
Rho Engrg. Co., Los Angeles, Calif
Shane Inds., Sunny Vale, Cal.
Sola Elec. Div., Elk Grove Village, Ill.
Spectran Elctrns., Pompano Beach, Fla.
Stored Energy Systems, Mountain View, Calif.
Teledyne Inet, Gardena, Cal.
Terado Corp., St. Paul, Minn.
Transrex Div., Torrance, Cal.

Power Supplies, Thermoelectric

General Elec. Co., Schenectady, N.Y.
Harrel, Inc., E. Norwalk, Conn.
Interelectronics Corp., Congers, N.Y.
Kepco, Inc., Flushing, N.Y.
Ohio Semitronics, Columbus, Ohio
Opad Elec. Co., Inc., New York, N.Y.
Power/Mate, Hackensack, N.J.
Todd Prods., Farmingdale, N.Y.
Vector Engrg., Springfield, N.J.
AMBAC Inds., Garden City, N.Y.
Bailey Instrs., Inc., Saddle Brook, N.J.
Cambridge Thermionic, Cambridge, Mass
EG & G, Inc., Salem, Mass.
EG&G, Inc., Electro-Optics Div., Salem, Mass.
Grand Transformers, Grand Haven, Mich.
Hughes Aircraft Co, Culver City, Cal.
Nuclear Sys., Garland, Tex.
Permavolt Transformers, Inc., S. Bend, Ind.
Schoeffel Instr. Corp., Westwood, N.J.

Power Supplies, TWT

Abbott Transistor Labs., L.A., Cal. p 618
Amp Inc., Elizabethtown, Pa. ..... p 642
Amp Inc., Harrisburg, Pa.
Arnold Magnetics, Culver City, Cal.
Cober Elctrns., Inc., Stamford, Conn. p 601
Del Elctrns. Corp., Mt. Vernon, N.Y.
Electronic Resch. Assocs., Cedar Grove, N.J. ..... p 709
Fluke, John Mfg. Co., Inc., Seattle, Wash.
General Elec. Co., Schenectady, N.Y.
Hipotronics, Inc., Brewster, N.Y. .. p 726
Interelectronics Corp., Congers, N.Y.
Kepco, Inc., Flushing, N.Y.
Kilovolt Corp., Hackensack, N.J. .. p 773
Light Elec. Corp., Rancocas, N.J.
Mid-Eastern Inds., Scotch Plains, N.J.
Multitech Power Sys., Costa Mesa, Cal. p 816
Opad Elec. Co., Inc., New York, N.Y.
Power Designs, Westbury, N.Y..... p 833
Power/Mate, Hackensack, N.J.
Powertec, Chatsworth, Cal.
Raytheon Co., Manchester, N.H.
Ross Engrg. Corp., Campbell, Cal.
Topaz Elctrns., San Diego, Cal. .... p 896
Trio Labs, Inc., Plainview, N.Y.
Universal Voltronics Corp., Mt. Kisco, N.Y. ..... p 941
Vector Engrg., Springfield, N.J.
Vega Precision Labs., Vienna, Va.
Watkins Johnson Co., Palo Alto, Cal.
Advanced Energy Conversion, Menlo Pk., Cal.
Bertan Assocs., Inc., Plainview, N.Y.
Bogue Elec. Mfg. Co., Paterson, N.J.
Cal-Power Corp., El Segundo, Calif.
Crestronics, Crestline, Cal.
E.F.E. Labs., Inc., Horsham, Pa.
Electro Powerpacs Corp., Cambridge, Mass.
EMP Elctrns., Inc., Phoenix, Ariz.
Energy Systems, Palo Alto, Cal.
Glentronics, Glendora, Cal.
Grafix, Inc., Albuquerque, N.M.
Gulton Inds., Hawthorne, Calif.
Hughes Aircraft Co., Torrance, Cal.
Hyperion Inds. Corp., Watertown, Mass.
LAD Electro-Sys., Inc., Hicksville, N.Y.
Litton Inds., San Carlos, Calif.
Micro-Power, Inc., Long Island City, N.Y.
Microwave Assocs., Inc., Burlington, Mass.
Narda Microwave Corp., Plainview, N.Y.
Northeast Scientific Corp., Acton, Mass.
Nuclear Corp. Amer., Denville, N.J.
Permavolt Transformers, Inc., S. Bend, Ind.
Pioneer Magnetics, Santa Monica, Cal.
Rho Engrg. Co., Los Angeles, Calif
SBD Systems, Inc., Amityville, N.Y.
Semi/Dyne Elctrns. Corp., Freeport, N.Y.
Servo Corp. America, Hicksville, N.Y.
Sperry Elctrn. Tube, Gainesville, Fla.
Thomson-CSF Electron Tubes, N.Y., N.Y.
Transrex Div., Torrance, Cal.
Varian Assocs., Palo Alto, Cal.
Varian Assocs., Travel Wave Tube, Palo Alto, Cal.
Varo, Inc., Texas Div., Garland, Tex.
Velonex, Santa Clara, Calif.

Power Supplies, Xenon Lamp
—See Power Supplies, Arc Lamp

Preamplifiers, Audio—
See Vol 2

Preamplifiers, D-C—
See Vol 2

Preamplifiers, I-F—
See Vol 2

Preamplifiers, Meter

California Elctrn. Mfg. Co., Alamo, Calif.
DDC, Hicksville, N.Y.
Hewlett-Packard, Palo Alto, Cal.
Honeywell, Denver, Colo.
Ithaco, Inc., Ithaca, N.Y.
Precision Monolithics, Santa Clara, Cal.
Trio Labs, Inc., Plainview, N.Y.
Burr-Brown Resch. Corp., Tucson, Ariz.
Computer Dynamics, Torrington, Conn.
Doric Sci. Corp., San Diego, Calif.
Newport Labs., Inc., Santa Ana, Cal.
Philips Elctrns. Inds., Ltd., Toronto 17, Can.
Princeton Applied Resch. Corp., Princeton, N.J.
Singer - Tele-Signal, Woodbury, N.Y.

Preamplifiers, Microphone-See Preamplifiers, Audio—
Vol 2

Preamplifiers, Microwave

American Elctrn. Labs., Inc., Lansdale, Pa.
Applied Research Inc., Port Washington, N.Y.
Electro/Data, Inc., Garland, Tex.
General Elec. Co., Schenectady, N.Y.
Hewlett-Packard, Palo Alto, Cal.
RHG Elctrns. Lab., Farmingdale, N.Y.
Sierra Sys., Mountain View, Cal.
Vega Precision Labs., Vienna, Va.
Watkins Johnson Co., Palo Alto, Cal.
Aertech Inds., Sunnyvale, Calif.
AIL, Div. Cutler-Hammer, Inc., Deer Park, N.Y.
AMBAC Inds., Garden City, N.Y.
Applied Tech., Palo Alto, Cal.
Avantek, Inc., Santa Clara, Cal.
Dittmore-Freimuth Corp., Milwaukee, Wisc.
Elctrn. Resources Div., Los Angeles, Cal.
Fansteel Inc., N Chicago, Ill.
General Instr. Corp., Hicksville, N.Y.
Guide Inds., Inc., Sun Valley, Calif.
Harshaw Chem. Co., Cleveland, Ohio
HRB-Singer, Inc., State College, Pa.
Hughes Aircraft Co, Culver City, Cal.
Industrial Microwave, Scotch Plains, N.J.
Int'l. Microwave, Cos Cob, Conn.
Itek Corp., Lexington, Mass.
Locus, Inc, State College, Pa.
Loral Elctrn. Sys., Bronx, N.Y.
Merrimac Resch. & Dev., Inc., West Caldwell, N.J.
Microlab/FXR, Livingston, N.J.
Micromega, Los Angeles, Cal.
Microphase Corp., Cos Cob, Conn.
Microwave Assocs., Inc., Burlington, Mass.

Microwave Development Labs., Inc., Needham Hgts., Mass.
Microwave Div, Nashua, N.H.
MITEQ, Inc., Hauppauge, N.Y.
OMNI Spectra, Farmington, Mich.
Philco-Ford Corp., Washington, D.C.
Premier Microwave, Port Chester, N.Y.
Rodelco, Deer Park, N.Y.
Sage Labs. Inc., Natick, Mass.
Scientific Communications, Garland, Tex.
Semi/Dyne Elctrns. Corp., Freeport, N.Y.
Special Microwave Devices Oper., Waltham, Mass.
Trak Microwave, Tampa, Fla.
TRG Prods., E. Boston, Mass.
Varian Assocs., Palo Alto, Cal.
Varian Assocs.Electron Tube & Device Grp., Palo Alto, Cal.

Preamplifiers, Oscilloscope Plug-In—See Oscilloscope Preamplifier Plug-Ins

Preamplifiers, Receiver

Applied Research Inc., Port Washington, N.Y.
Arvee Engrg. Co., Torrance, Calif.
C-COR Elctrns., State College, Pa. p 1281
Electro/Data, Inc., Garland, Tex.
Honeywell, Denver, Colo.
Ithaco, Inc., Ithaca, N.Y. p 1287
Lorch Elctrns. Corp., Englewood, N.J.
RHG Elctrns. Lab., Farmingdale, N.Y.
Sierra Sys., Mountain View, Cal.
Watkins Johnson Co., Palo Alto, Cal.
Aertech Inds., Sunnyvale, Calif.
AIL, Div. Cutler-Hammer, Inc., Deer Park, N.Y.
AMBAC Inds., Garden City, N.Y.
Anzac Elctrns., Waltham, Mass.
Arvin Sys., Inc., Dayton, Ohio
Astro Comm. Lab., Gaithersburg, Md.
Avantek, Inc., Santa Clara, Cal.
Beukers Labs., Inc., Hauppauge, N.Y.
BF Elctrns., Solana Beach, Calif.
Fairchild Electro-Metrics, Amsterdam, N.Y.
General Instr. Corp., Hicksville, N.Y.
Gray Resch. & Dev. Co., E. Hartford, Conn.
Hope Elctrns., Clifton, N.J.
HRB-Singer, Inc., State College, Pa.
Hughes Aircraft Co, Fullerton, Cal.
Infrared Inds., Inc., Santa Barbara, Cal.
Int'l. Microwave, Cos Cob, Conn.
Itek Corp., Lexington, Mass.
Koch Inds., Anaheim, Cal.
Lear Siegler, Inc., Santa Monica, Calif.
Locus, Inc, State College, Pa.
Microwave Assocs., Inc., Burlington, Mass.
MITEQ, Inc., Hauppauge, N.Y.
Olektron Corp., Dudley, Mass.
Philco-Ford Corp., Washington, D.C.
Philips Elctrns. Inds., Ltd., Toronto 17, Can.
Philmore Mfg. Co., Richmond Hill, N.Y.
Pickard & Burns Inc., Lindenhurst, N.Y.
Rodelco, Deer Park, N.Y.
Sage Labs. Inc., Natick, Mass.
Scientific Communications, Garland, Tex.
Special Microwave Devices Oper., Waltham, Mass.
Trak Microwave, Tampa, Fla.

Preamplifiers, R-F—See Vol 2

Preamplifiers, Servo—See Vol 2

Preamplifiers, Telemetry

American Elctrn. Labs., Inc., Lansdale, Pa.
Applied Research Inc., Port Washington, N.Y.
C-COR Elctrns., State College, Pa.
Data-Control Systems, Danbury, Conn.
DDC, Hicksville, N.Y.
Electro/Data, Inc., Garland, Tex.
Hybrid Sys. Corp., Burlington, Mass.
Ithaco, Inc., Ithaca, N.Y.
Neff Instr. Corp., Duarte, Calif.
RHG Elctrns. Lab., Farmingdale, N.Y.
Sierra Sys., Mountain View, Cal.
Solid State Elctrns., Sepulveda, Cal.
Watkins Johnson Co., Palo Alto, Cal.
Aertech Inds., Sunnyvale, Calif.
AMBAC Inds., Garden City, N.Y.
Astro Comm. Lab., Gaithersburg, Md.
Avantek, Inc., Santa Clara, Cal.
Beukers Labs., Inc., Hauppauge, N.Y.
Biocom, Inc., Culver City, Cal.
Defense Elctrns., Inc., Rockville, Md.
Dorsett Elctrns., Tulsa, Okla.
Dynamic Precision Controls, Hagerstown, Ind.
EDC (Electro Dev.), Lynnwood, Wash.
General Instr. Corp., Hicksville, N.Y.
Guide Inds., Inc., Sun Valley, Calif.
HRB-Singer, Inc., State College, Pa.
Hughes Aircraft Co, Fullerton, Cal.
Industrial Microwave, Scotch Plains, N.J.
Int'l. Microwave, Cos Cob, Conn.
K West, Westminster, Calif.
Koch Inds., Anaheim, Cal.
Mennen-Greatbatch Elctrns., Inc., Clarence, N.Y.
Micromega, Los Angeles, Cal.
Microwave Assocs., Inc., Burlington, Mass.
MITEQ, Inc., Hauppauge, N.Y.
Nuclear Diodes, Prairie View, Ill.
Olektron Corp., Dudley, Mass.
Philco-Ford Corp., Washington, D.C.
Ramsay Engrg. Co., Anaheim, Calif.
Rantec Div., Calabasas, Calif.
Sage Labs. Inc., Natick, Mass.
Scientific Communications, Garland, Tex.
Servo Corp. America, Hicksville, N.Y.
Special Microwave Devices Oper., Waltham, Mass.
Stoelting Co., Chicago, Ill.
Taft Electrosystems, Inc., Metuchen, N. J.
Trak Microwave, Tampa, Fla.
Transidyne-General Corp., Ann Arbor, Mich.
Video Resch. Corp., Rockville, Md.

Preamplifiers, Transducer Signal-Also See Signal Conditioners—See Vol 2

Prebonding Etchants—See Chemicals, Etching—Vol 3

Predetection Equipment, Recorders(Playbacks

Hewlett-Packard, Palo Alto, Cal.
Auricord, Long Island City, N.Y.
Bell & Howell Co., Pasadena, Calif.
Communication Elctrns., Rockville, Md.
Echo Science Corp., Pasadena, Cal.
Ferranti Elec., Inc., Plainview, N.Y.
RCA Govt. & Comm. Sys., Moorestown, N.J.
Video Resch. Corp., Rockville, Md.

Preforms, Precious Metal -Also See Solder Preforms —See Vol 3

Preparation Systems, Paper-Tape

A. D. Data Sys., Inc., Rochester, N.Y. p 328
Atec, Inc., Houston, Tex.
(NES) Nationwide Elctrn. Sys., Itasca, Ill.
Control Logic, Natick, Mass.
Kemper Engrg. Co., Northridge, Cal.
Mohawk Data Sciences Corp., Herkimer, N.Y.
O E M Prods., Carlstadt, N.J.
Ohr-Tronics, King of Prussia, Pa.

Prescalers

Applied Research Inc., Port Washington, N.Y.
Frequency Engrg. Labs., Farmingdale, N.J.
Hewlett-Packard, Palo Alto, Cal.
Hickok Elect. Instr., Cleveland, Ohio
Systron-Donner Concord Instr. Div., Concord, Cal.
Instrumentation Tech. Corp., Northridge, Calif.
Intercontinental Elctrns., E. Rochester, N.Y.
Nanosecond Systems, Inc., Fairfield, Conn.
Soltec Corp., No. Hollywood, Cal.
Zehntel, Inc., Berkeley, Calif.

Preselector-Mixers—See Vol 2

Preselectors

EIP, Inc., Santa Clara, Cal.
Electro/Data, Inc., Garland, Tex.
Frequency Engrg. Labs., Farmingdale, N.J.
Hewlett-Packard, Palo Alto, Cal.
Microwave Cavity Labs., La Grange, Ill.
RHG Elctrns. Lab., Farmingdale, N.Y.
R L C Elctrns., Inc., Mt. Kisco, N.Y.
Ryka Scientific, Inc., Sunnyvale, Cal. p 1564
Sierra Sys., Mountain View, Cal.
AIL, Div. Cutler-Hammer, Inc., Deer Park, N.Y.
Arvin Sys., Inc., Dayton, Ohio
Avantek, Inc., Santa Clara, Cal.
Dittmore-Freimuth Corp., Milwaukee, Wisc.
Industrial Microwave, Scotch Plains, N.J.
K & L Microwave Inc., Salisbury, Md.
Maury Microwave Corp., Cucamonga, Calif.
Microlab/FXR, Livingston, N.J.
Microphase Corp., Cos Cob, Conn.
Microwave Assocs., Inc., Burlington, Mass.
Microwave Filter Co., Inc., East Syracuse, N.Y.
N-H Microwave, Inc., Red Bank, N.J.
Peninsula Microwave Labs., Mountain View, Cal.
Premier Microwave, Port Chester, N.Y.
Racal Communications, Rockville, Md.
Rantec Div., Calabasas, Calif.
Rodelco, Deer Park, N.Y.
Sage Labs. Inc., Natick, Mass.
Struthers Elctrns. Corp., Mamaroneck, N.Y.
Telectro Sys. Corp., Corona, N.Y.
Telonic Inds., Inc., Laguna Beach, Calif.
Vectronics Microwave Corp., Middlesex, N.J.

Pressure Sensitive Paint—See Coatings, Transducer Forming—Vol 2

Pressure Vessels—See Chambers, Pressure

Pressure Indicators—See Gauges, Pressure

Pressurization Equipment, Cable—See Cable Pressurization Equipment

Pressurization Systems, Equipment Cabinet—See Vol 3

Pressurization Units—See Chambers, Pressure

Primers, Bonding & Potting—See Vol 3

Printed Circuit Boards, Additive Process (Without Components)—See Vol 2

Printed Circuit Boards, Etched Process (Without Components)—See Vol 2

Printed Circuit Etchants—See Vol 3

Printed Circuit Screens—See Vol 2

Printed Circuits (With Components)—See Cards, Linear Function—Vol 2

Printed Circuits, Multilayer—See Vol 2

Printers, Dial, Meter Scale

A & M Instrument, Inc., Great Neck, N.Y.
Acromark Co., Berkeley Hts, N.J.
Detecto Scales, Inc., Brooklyn, N.Y.
Eastern Marking Mach. Corp., Island Pk., N.Y.
Eljay Corp., Columbia, Md.
Mechanics For Elctrns., Inc., Wilmington, Mass.
Podgor, Joseph E. Co., Inc., Phila., Pa.

Printers, Digital

Anadex Instrs., Inc., Van Nuys, Calif. p 396
Austron, Inc., Austin, Tex.
Beckman Instruments, Shiller Pk., Ill. p 413
Burroughs Corp., Los Angeles, Cal.
Digital Equip. Corp., Maynard, Mass.
Digitron Corp., Norristown, Pa. .... p 349
Dytro Corp., Hicksville, N.Y. ..... p 440
Electro-Numerics, Santa Clara, Cal. p 453
Gould, Inc., Cleveland, Ohio
Hecon Corp., New Shrewsbury, N.J. p 1332
Hewlett-Packard, Palo Alto, Cal.
Hickok Elect. Instr., Cleveland, Ohio p 488
Landis & Gyr, Inc., Elmsford, N.Y.
Monitor Labs, Inc., San Diego, Cal. p 364
Monsanto Company, Electronic Instruments, W. Caldwell, N.J.
PPM, Inc., Bedford, Ohio ..... p 535
Presin Co., Inc., Shelton, Conn. .. p 1345
Sonex, Inc., Bethayres, Pa.
Systron-Donner Corp., Concord, Cal. p 565
Systron-Donner Alpha Div., Oakland, Cal. ..... p 565
Systron-Donner Concord Instr. Div., Concord, Cal. ..... p 565
Systron-Donner Kruse Elctrns. Sub., Mountain View, Cal. ..... p 565
Tokyo Elec. Co., Ltd., Chiyoda-ku, Tokyo, Japan ..... p 1350
Veeder-Root, Hartford, Conn.
Artronix, Inc., St. Louis, Mo.
Automatic Timing & Controls, Inc., King of Prussia, Pa.
California Computer Prods., Anaheim, Cal
Clary Corp., San Gabriel, Calif.
Collins Radio Co., Dallas, Tex.
Computer Terminal Sys., Plainview, N.Y.
Data Prods. Corp., Woodland Hills, Calif.
Datadyne Corp., King of Prussia, Pa.
Datametrics Corp., Van Nuys, Calif.
Detecto Scales, Inc., Brooklyn, N.Y.
Di/An Controls, Inc., Boston, Mass.
Digitronics Corp., Albertson, N.Y.
Elctrns., Ltd., Marion, Iowa
Esterline Angus Div., Indianapolis, Ind.
Ferranti Ltd., Hollinwood, Lancs., England
Four-Phase Sys, Cupertino, Cal
Friden Div., San Leandro, Calif.
General Instr. Corp., Hicksville, N.Y.
Honeywell Information Systems, Wellesley Hills, Mass
Howell Instrs., Inc., Ft. Worth, Tex.
Hughes Aircraft Co, Culver City, Cal.
Japanese Prods. Corp., New Rochelle, N.Y.
KDI Adtrol, Inc., Broomall, Pa.
Keltron Corp., Waltham, Mass.
Lecroy Resch. Sys. Corp., West Nyack, N.Y.
Lehigh Valley Elctrn., Inc., Fogelsville, Pa.
Litton Inds., San Carlos, Calif.
Loral Elctrn. Sys., Bronx, N.Y.
Mechanics For Elctrns., Inc., Wilmington, Mass.
Mohawk Data Science, King of Prussia, Pa.
Mohawk Data Sciences Corp., Herkimer, N.Y.
Newport Labs., Inc., Santa Ana, Cal.
Non-Linear Sys., Inc., Del Mar, Cal.
O E M Prods., Carlstadt, N.J.
Pacific Photometric Instrs., Berkeley, Cal.
Philips Elctrns. Inds., Ltd., Toronto 17, Can.
Potter Instr. Co., Melville, N.Y.
Practical Automation, Inc., Shelton, Conn.
Royco Instrs., Inc., Menlo Pk., Cal.
Shepard Div., Richmond Hill, N.Y.
Teletype Corp., Skokie, Ill.
Texas Instruments, Inc., Houston, Tex.
United Sys. Corp., Dayton, Ohio
Varian Data Machines, Palo Alto, Cal.

Printers, High Speed—See Printers, Digital

Printers, Keyboard
Burroughs Corp., Los Angeles, Cal. p 338
Datametrics Corp., Van Nuys, Calif.
Di/An Controls, Inc., Boston, Mass.
Four-Phase Sys, Cupertino, Cal
General Elec., Lynchburg, Va.
Honeywell Information Systems, Wellesley Hills, Mass
Mechanics For Elctrns., Inc., Wilmington, Mass.
O E M Prods., Carlstadt, N.J.
Potter Instr. Co., Melville, N.Y.
Teletype Corp., Skokie, Ill.
Texas Instruments, Inc., Houston, Tex.

Printers, Line—See Printers, Digital

Printers, Microfilm To Paper
California Computer Prods., Anaheim, Cal
Mechanics For Elctrns., Inc., Wilmington, Mass.
Memorex Corp., Santa Clara, Cal.
3M Co., St. Paul, Minn.
Traid Corp., Glendale, Cal.

Printers, Tape-Listing—See Printers, Digital

Printing, Dry Transfer—See Kits, Marking (Dial Instrument)—Vol 2

Prisms—See Vol 2

Probability Distribution Analyzers—See Analyzers, Probability Density

Probes, Crystal
Hewlett-Packard, Palo Alto, Cal.
RCA Elctrns. Comps., Harrison, N.J.
Self-Organizing Sys., Inc., Dallas, Tex.
Smith, Herman H., Inc., Bklyn., N.Y.
Waveline, Inc., W. Caldwell, N.J.
Astrolab Inc., Linden, N J
Channel Inds., Santa Barbara, Cal.
Dittmore-Freimuth Corp., Milwaukee, Wisc.
Materials Resch. Corp., Orangeburg, N.Y.
Microlab/FXR, Livingston, N.J.
Narda Microwave Corp., Plainview, N.Y.
Packard Instrument Co., Inc., Downers Grove, Ill.
Soltec Corp., No. Hollywood, Cal.
Wentworth Labs, Inc., Broadfield, Conn.

Probes, Hall—See Vol 2

Probes, High-Voltage
Beckman Instrs., Cedar Grove, N.J.
Calico Div., San Diego, Cal.
CPS, Sunnyvale, Calif. ..... p 669
GC Elctrns., Rockford, Ill.
Genisco Tech. Corp., Genistron Div., Compton, Cal.
Hewlett-Packard, Palo Alto, Cal.
Hickok Elect. Instr., Cleveland, Ohio
Hipotronics, Inc., Brewster, N.Y.
IRC Boone Div. of TRW Inc., Boone, N.C.
ITT Jennings, Div. Int'l. Telephone & Telegraph Corp., San Jose, Cal. p 501
ITT Jennings, Dunellen,, N.J. ..... p 501
Pomona Elctrns. Co., Inc., Pomona, Cal. p 2696
RCA Elctrns. Comps., Harrison, N.J.
Ross Engrg. Corp., Campbell, Cal. p 1786
Rowe Inds., Div., Toledo, Ohio
Simpson Elec. Co., Chicago, Ill.
Slaughter Co., Ardmore, Okla.
Smith, Herman H., Inc., Bklyn., N.Y.
Tektronix, Inc., Beaverton, Ore.
BAC Elctrns., Pennsauken, N.J.
Beckman Instrs., (AISSD), Fullerton, Cal.
Components Specialties, Inc., Freeport, N.Y.
Dynascan Corp., Chicago, Ill.
Eico Electronic Instrument Co., Inc., Brooklyn, N.Y.
Heath Co., Benton Harbor, Mich.
Leader Instr. Corp., Long Island City, N.Y.
Neptune Elctrns. Co., New York, N.Y.
Peschel Instrs., Cape Coral, Fla.
Projects Unlimited, Inc., Dayton, Ohio
Tri-State Elctrns. Corp., Camden, N.J.
Wabash Magnetics, Inc., Huntington, Ind.

Probes, Microwave—See Vol 2

Probes, Oscilloscope—See Oscilloscope Probes

Probes, R-F
Boonton Elctrns., Parsippany, N.J.
Electro-Mechanics Co., Austin, Tex. p 452
Genisco Tech. Corp., Genistron Div., Compton, Cal.
Hewlett-Packard, Palo Alto, Cal.
Hickok Elect. Instr., Cleveland, Ohio
Honeywell, Denver, Colo.
IRC Boone Div. of TRW Inc., Boone, N.C.
Kay Elemetrics, Pine Brook, N.J.
RCA Elctrns. Comps., Harrison, N.J.
Simpson Elec. Co., Chicago, Ill.
Smith, Herman H., Inc., Bklyn., N.Y.
Texscan Corp., Indianapolis, Ind.
Astrolab Inc., Linden, N J
BAC Elctrns., Pennsauken, N.J.
Components Specialties, Inc., Freeport, N.Y.
Dittmore-Freimuth Corp., Milwaukee, Wisc.
Eico Electronic Instrument Co., Inc., Brooklyn, N.Y.
Fairchild Electro-Metrics, Amsterdam, N.Y.
Filmohm Div., Long Island City, N.Y.
General Microwave Corp., Farmingdale, N.Y.
General Radio Co., Concord, Mass.
Heath Co., Benton Harbor, Mich.
Honeywell, Aerospace & Def., Minneapolis, Minn.
Leader Instr. Corp., Long Island City, N.Y.
Microlab/FXR, Livingston, N.J.
Microwave Assocs., Inc., Burlington, Mass.
Narda Microwave Corp., Plainview, N.Y.
Neptune Elctrns. Co., New York, N.Y.
OMNI Spectra, Farmington, Mich.
PRD Elctrns., Inc., Westbury, N.Y.
Premier Microwave, Port Chester, N.Y.
Projects Unlimited, Inc., Dayton, Ohio
Pylon Co., Inc., Attleboro, Mass.
Rohde & Schwarz Sls., Passaic, N.J.
Sage Labs. Inc., Natick, Mass.
Solar Elctrns. Co., Hollywood, Calif.
Tri-State Elctrns. Corp., Camden, N.J.
Tru-Connector Corp., Peabody, Mass.

Probes, Temperature-Also See Thermocouples; Transducers—See Vol 2

Probes, Test Lead
Circon Corp., Goleta, Cal. ..... p 2937
Daburn Elctrns. & Cable Corp., Bronx, N.Y.
E-Z Hook, Test Prods., Arcadia, Cal. p 2623
Elctrn. Molding Corp., Woonsocket, R.I.
GC Elctrns., Rockford, Ill.
Hewlett-Packard, Palo Alto, Cal.
Hickok Elect. Instr., Cleveland, Ohio
National Tel-Tronics Corp., Great Neck, N.Y. ..... p 2650
Pomona Elctrns. Co., Inc., Pomona, Cal. p 2694,2695
Program Data Co., Torrance, Cal.
RCA Elctrns. Comps., Harrison, N.J.
Rye Inds., Inc., Mamaroneck, N.Y. p 2708
Sealectro Corp., Mamaroneck, N.Y.
Shallcross, Selma, N.C.
Simpson Elec. Co., Chicago, Ill.
Smith, Herman H., Inc., Bklyn., N.Y.
Tektronix, Inc., Beaverton, Ore.
Vector Elctrn. Co., Inc., Sylmar, Cal.
Adar Assocs., Cambridge, Mass.
Air-O-Tronics Prods., Morrisville, N.Y.
Amatom Elctrn. Hardware, New Rochelle, N.Y.
BAC Elctrns., Pennsauken, N.J.
Birnbach Co., Inc., Freeport, N.Y.
CGS Units, Inc., Rochester, N.Y.
Components Specialties, Inc., Freeport, N.Y.
Cooke Engrg. Co., Alexandria, Va.
De Soto Elec. Prods., De Soto, Mo.
Desco Mfg. Co., Glendale, Calif.
Device Seals, Inc., Sun Valley, Calif.
Dynascan Corp., Chicago, Ill.
Everett/Charles, Inc., Pomona, Cal.
Heath Co., Benton Harbor, Mich.
Horex Elctrns., Inc., Santa Monica, Calif.
IPT Corp., Mountain View, Cal.
Keystone Elctrns. Corp., New York, N.Y.
Moser Jewel Co., Perth Amboy, N.J.
Neptune Elctrns. Co., New York, N.Y.
Ostby & Barton Co., Providence, R.I.
Paraplegics Mfg., Bensenville, Ill.
Philmore Mfg. Co., Richmond Hill, N.Y.
Projects Unlimited, Inc., Dayton, Ohio
Pylon Co., Inc., Attleboro, Mass.
Robertson Instr., Azusa, Cal.
Seven Assocs., Sunnyvale, Calif.
Stark Elctrn. Instrs., Ltd., Ajax, Ont., Canada
Techni-Tool, Inc., Philadelphia, Pa.
Tri-State Elctrns. Corp., Camden, N.J.
Vytell Corp., Arlington Hgts., Ill.

Probes, Ultrasonic
Hewlett-Packard, Palo Alto, Cal.
Automation Inds., Los Angeles, Cal.
Automation Inds., Danbury, Conn.
Channel Inds., Santa Barbara, Cal.
Int'l. Transducer, Goleta, Cal.
Lewis Corp., Woodbury, Conn.
National Sonics, Farmingdale, N.Y.
Nuclear Equip. Chem. Corp., Farmingdale, N.Y.
NUS Corp., Paramus, N.J.
Shur-Lok Corp., Santa Ana, Calif.
VWR Scientific, San Francisco, Cal.

Profileometer—See Indicators, Surface Roughness

Profiling—See Engraving

Programmers, Broadcasting
Bowmar Instr. Corp., Ft. Wayne, Ind.
Chrono-log Corp., Broomall, Pa.
LVC Ind's., Inc., Corona, N.Y.
Parabam, Inc., Compton, Cal. ..... p 371
Agastat Div., Elizabeth, N.J.
Datatron, Inc., Santa Ana, Cal
Info-Lite Corp., Ft. Lee, N.J.
Kemper Engrg. Co., Northridge, Cal.
Port-O-Vox Enterprises, Corp., New York, N.Y.
RCA Corp., Camden, N.J.

Programmers, Computer
Behlman Div., San Diego, Cal
Bowmar Instr. Corp., Ft. Wayne, Ind.
Computer Prods., Ft. Lauderdale, Fla.
LVC Ind's., Inc., Corona, N.Y. ..... p 2617
Parabam, Inc., Compton, Cal. ..... p 371
Program Data Co., Torrance, Cal.
Sealectro Corp., Mamaroneck, N.Y.
Vector Elctrn. Co., Inc., Sylmar, Cal.
Virginia Panel Corp., Waynesboro, Va.
AMBAC Inds., Garden City, N.Y.
Applied Systems Corp., Detroit, Mich
Cintra Inc., Sunnyvale, Cal.
Collins Radio Co., Dallas, Tex.
Computer Methods, White Plains, N.Y.
Concord Control, Boston, Mass.
Design Automation, Inc., Lexington, Mass.
Elctrn. Control Sys., Fairmont, W. Va.
Fairchild Space & Defense Sys., Syosset, N.Y.
Frankel Engrg. Labs., Reading, Pa.
Goodyear Aerospace Corp., Akron, Ohio
Honeywell, Aerospace & Def., Minneapolis, Minn.
Hughes Aircraft Co, Culver City, Cal.
Hughes Aircraft Co, Fullerton, Cal.
Info-Lite Corp., Ft. Lee, N.J.
Leeds & Northrup Corp., No. Wales, Pa.
Petty Geophysical Engrg., San Antonio, Tex.
Philco-Ford Corp., Washington, D.C.
Ragen Precision Inds., Inc., N. Arlington, N.J.
RCA Service Co., Camden, N.J.
Signatron, Inc., Lexington, Mass.
Systems Resch. Labs., Dayton, Ohio
Varian Data Machines, Irvine, Cal.

Programmers, Curve Following
Bowmar Instr. Corp., Ft. Wayne, Ind.
Barber-Colman Co., Industrial Instrs. Div., Rockford, Ill.
Boston Digital Corp., Ashland, Mass.
Concord Control, Boston, Mass.
Elctrn. Control Sys., Fairmont, W. Va.
Honeywell, Ft. Washington, Pa.
Hughes Aircraft Co, Culver City, Cal.
Luft Instrs., Inc., Lincoln, Mass.
Research, Inc., Minneapolis, Minn.
Research Instr. Co., Westbury, N.Y.
Scientific-Atlanta, Inc., Atlanta, Ga.
Simmonds Precision Prods., Inc., Bellows Falls, Vt.

Programmers, Power Supply
Automation Dev., Culver City, Cal.
Bowmar Instr. Corp., Ft. Wayne, Ind.
Calico Div., San Diego, Cal.
Elgar Corp., San Diego, Cal.
Kepco, Inc., Flushing, N.Y.....p 763-765
Kilovolt Corp., Hackensack, N.J.
Light Elec. Corp., Rancocas, N.J.
Lorch-Adret Corp., Englewood, N.J.
LVC Ind's., Inc., Corona, N.Y.
Powertec, Chatsworth, Cal.
Agastat Div., Elizabeth, N.J.
AMBAC Inds., Garden City, N.Y.
Artronix, Inc., St. Louis, Mo.
CGS Units, Inc., Rochester, N.Y.
Guardian California, Culver City, Cal.
Incor Instr., Plainview, N.Y.
IPT Corp., Mountain View, Cal.
NH Research, Inc., Santa Ana, Calif.
Oxford Instr. Corp., Annapolis, Md.
Research Instr. Co., Westbury, N.Y.
Sparton Southwest, Inc., Albuquerque, N.M.
Teledyne Inet, Gardena, Cal.

Programmers, Punched Card
Amp Inc., Harrisburg, Pa..... p 331
Bowmar Instr. Corp., Ft. Wayne, Ind.
Program Data Co., Torrance, Cal.p 2706
Taurus Corp., Lambertville, N.J..... p 381
Automatic Timing & Controls, Inc., King of Prussia, Pa.
Datalogic Sys., Inc., Merrimac, Mass.
Foxboro Co., Foxboro, Mass.
Kemper Engrg. Co., Northridge, Cal.
Midland Standard Inc., Elgin, Ill.
Port-O-Vox Enterprises, Corp., New York, N.Y.
Tenor Co., Inc., New Berlin, Wisc.
Zehntel, Inc., Berkeley, Calif.

Projection Units, TV
Christie Elec., Los Angeles, Cal.
Buhl Optical Co., Pittsburgh, Pa.
General TV Network, Ferndale, Mich.
Goodyear Aerospace Corp., Akron, Ohio
Gordon Alan Entprs., N. Hollywood, Cal.
Gray Resch. & Dev. Co., E. Hartford, Conn.
Heitz, Karl, Inc., New York, N.Y.
Kalart Victor, Plainville, Conn.
Link Div., Binghamton, N.Y.
Multi Media Engrg., Inc., Rockville, Md.
RCA Corp., Camden, N.J.
Technical Mat'l., Mamaroneck, N.Y.
Traid Corp., Glendale, Cal.

Protectors, Contact—See Suppressors, Arc—Vol 2

Protectors, Surge-Also See Suppressors, Arc; Arresters, Electrical Surge—See Vol 2

Proximity Indicators—See Indicators, Proximity—Vol 2

Public Address Systems
Multitech Communications, Monterey Pk., Cal. ..... p 324
Nippon Electric/NEC America, N.Y., N.Y.
Allied Elctrns. Corp., Chicago, Ill.
Applied Electro Mechanics, Alexandria, Va.
Argos Prods. Co., Inc., Genoa, Ill.
Audio Instr. Co., Union City, N.J.
Bell P/A Prods. Corp., Columbus, Ohio
Bogen Div., Paramus, N.J.
Chamberlain Mfg. Corp., Elmhurst, Ill.
Clinton Instr. Co., Clinton, Conn.
Components Specialties, Inc., Freeport, N.Y.
Encom Prods. Co., Inc., Oxford, Pa.
Executone, Inc., Long Island City, N.Y.
Fedtro, Inc., Rockville Centre, N.Y.
Femco Div., Irwin, Pa.
Gai-Tronics Corp., Reading, Pa
Holmin, W.A. Corp., Rockford, Ill.
Lear Siegler, Inc., Santa Monica, Calif.

Multi Media Engrg., Inc., Rockville, Md.
Nelson-Hershfield Elctrns., Phoenix, Ariz.
Port-O-Vox Enterprises, Corp., New York, N.Y.
Sharpe Audio Div., Tonawanda, N.Y.
Smith-Meeker Engrg. Co., New York, N.Y.
VIKOA, Hoboken, N.J.
Whittaker Corp., Los Angeles, Cal.

Pullers, Circuit Board—See Vol 3

Pullers, Fuse—See Vol 3

Pullers, Lamp—See Vol 3

Pullers, Tube—See Vol 3

Pulse Analyzers—See Analyzers, Pulse

Pulse-Form Restorers—See Restorers, Pulse-Form

Pulse Networks—See Networks, Pulse—Vol 2

Pulse Rise Time Indicators—See Indicators, Pulse Rise Time

Pumps, Cryogenic

Electro-Mechanics Co., Austin, Tex.
Aero Vac Corp., Troy, N.Y.
Cole-Parmer Instr. Co., Chicago, Ill.
Eastern Inds. Div., Hamden, Conn.
Edwards High Vacuum, Grand Island, N.Y.
Fluorocarbon Co., Anaheim, Cal.
Hughes Aircraft Co, Culver City, Cal.
Pesco Prods., Bedford, Ohio
Task Corp., Anaheim, Calif.
Vacuum Equip. Div., Newton, Mass.
Varian Assocs., Palo Alto, Cal.
Varian Assocs., Vacuum Div., Palo Alto, Cal.

Pumps, Nonmetallic

Chemcut Corp., State College, Pa.
Eastern Inds. Div., Hamden, Conn.
Elmeco Engrg., Rockville, Md.
Fluorocarbon Co., Anaheim, Cal.
Molon Motors & Coil, Rolling Meadows, Ill.
Sethco Mfg. Corp., Freeport, N.Y.
Vanton Pump & Equip. Corp., Hillside, N.J.

Pumps, Sealless—See Pumps, Nonmetallic

Pumps, Vacuum

Ametek/Lamb Elec., Kent, Ohio
Amperex Electronic Corp., Hicksville, N.Y.
RCA Elctrns. Comps., Harrison, N.J.
Aero Vac Corp., Troy, N.Y.
Air-Vac Engrg. Co., Milford, Conn.
Allis-Chalmers, Milwaukee, Wisc.
Andonian Assocs., Inc., Waltham, Mass.
Bendix, Utica, N.Y.
Bendix, Rochester, N.Y.
Central Scientific Co., Chicago, Ill.
Coleman Instrs., Maywood, Ill.
Cooke Vacuum Prods., S. Norwalk, Conn.
Crowell Mfg. Corp., Brooklyn, N.Y.
Denton Vacuum, Inc., Cherry Hill, N.J.
Edwards High Vacuum, Oakville, Ont., Can.
Edwards High Vacuum, Grand Island, N.Y.
Ferranti Ltd., Hollinwood, Lancs., England
Gardner-Denver Co., Quincy, Ill.
Granville-Phillips Co., Boulder, Colo.
Heatron, Inc., York, Pa.
High Vacuum Equip. Corp., Hingham, Mass.
High Voltage Engrg. Corp., Burlington, Mass.
Hull Corp., Hatboro, Pa.
Kinney Vacuum Co., Boston, Mass.
Lear Siegler, Inc., Santa Monica, Calif.
Lear Siegler, Inc., Elyria, Ohio
Leybold-Heraeus, Monroeville, Pa.
Lindberg Hevi-Duty, Chicago, Ill.
Metal Bellows Corp., Sharon, Mass.
Middlesex Gen'l. Inds., Somerville, Mass.
Nester/Faust Mfg. Corp., Newark, Dela.
Norton Co., Newton, Mass.
Pennwalt Corp., Phila., Pa.
Precision Sci. Co., Chicago, Ill.
Red Point Corp., Burbank, Calif.
Sargent Welch Sci. Co., Skokie, Ill.
Scientific Inds., Inc., Mineola, N.Y.
Siemens Corp., Comps. Div., Iselin, N.J.
Soltec Corp., No. Hollywood, Cal.
T-M Vacuum Prods., Riverton, N.J.
Techni-Tool, Inc., Philadelphia, Pa.
Ultek Div., Palo Alto, Calif.
Vactronic Lab. Equip., Inc., E. Northport, N.Y.
Vacuum Equip. Div., Newton, Mass.
Vacuum Inds., Inc., Somerville, Mass.
Vacuum Resch. Mfg., San Ramon, Cal.
Varian Assocs., Palo Alto, Cal.
Varian Assocs., Vacuum Div., Palo Alto, Cal.
Veeco Instrs., Inc., Plainview, N.Y.
VWR Scientific, San Francisco, Cal.
Westinghouse Elec., Elmira, N.Y.

Punched Card Equipment

Amp Inc., Harrisburg, Pa. ..... **p 330**
Burroughs Corp., Los Angeles, Cal. p 338
Hickok Elect. Instr., Cleveland, Ohio p 351
Program Data Co., Torrance, Cal. p 2706
Sealectro Corp., Mamaroneck, N.Y. p 380
Taurus Corp., Lambertville, N.J. ..... **p 381**
American Pamcor, Inc., Paoli, Pa
Collins Radio Co., Dallas, Tex.
Colorado Instrs., Inc., Broomfield, Colo.
Data Products, Englewood, Col.
Data Prods. Corp., Woodland Hills, Calif.
Demex, Inc., Kansas City, Mo.
Digi-Data Corp., Bladensburg, Md.
Electro Fiberoptics Corp., W. Boylston, Mass.
Four-Phase Sys, Cupertino, Cal
Friden Div., San Leandro, Calif.
Honeywell Information Systems, Wellesley Hills, Mass
Micro Instr., Hawthorne, Cal.
Mohawk Data Sciences Corp., Herkimer, N.Y.
Nat'l. Midco Inds., Inc., Trenton, N.J.
O E M Prods., Carlstadt, N.J.
Shepard Div., Richmond Hill, N.Y.
Stark Elctrn. Instrs., Ltd., Ajax, Ont., Canada
Tyco Instr. Div., Waltham, Mass.
Western Telematic, Inc., Arcadia, Cal.

Punches, Chassis—See Vol 3

Pyrometers, Infrared

Astro-Space Labs., Huntsville, Ala
Harrel, Inc., E. Norwalk, Conn. .... **p 1973**
Automatic Control Elctrns. Co., San Antonio, Tex.
Bailey Meter Co., Wickliffe, Ohio
Barnes Engrg. Co., Stamford, Conn.
Bristol Div, Waterbury, Conn
Epic, Inc., New York, N.Y.
Honeywell, Apparatus Controls, Mpls., Minn.
Honeywell, Ft. Washington, Pa.
Infrared Inds., Inc., Santa Barbara, Cal.
Ircon Inc., Niles, Ill.
Mikron Instr. Co., Ridgewood, N.J.
Milletron, Inc., Pittsburgh, Pa.
Omega Engrg., Inc., Stamford, Conn.
Raytek, Inc., Mountain View, Cal.
Williamson Corp., Concord, Mass.

Pyrometers, Optical, Non-Infrared

Astro-Space Labs., Huntsville, Ala
Larson Instr. Co., Inc., Orangeburg, N.Y. p 513
Bailey Meter Co., Wickliffe, Ohio
Epic, Inc., New York, N.Y.
Hy-Cal Engrg., Santa Fe Springs, Cal.
Infrared Inds., Inc., Santa Barbara, Cal.
Ircon Inc., Niles, Ill.
Leeds & Northrup Corp., No. Wales, Pa.
Milletron, Inc., Pittsburgh, Pa.
Pyrometer Instr. Co., Inc., Northvale, N J
Schoeffel Instr. Corp., Westwood, N.J.
Yewtec Corporation, Larchmont, N.Y.

Pyrometers, Recording

General Elec. Co., Schenectady, N.Y.
Harrel, Inc., E. Norwalk, Conn. .... **p 1973**
Rustrak Instr. Div., Manchester, N.H. p 595
A & M Instrument, Inc., Great Neck, N.Y.
A. J. Abrams Co., Westport, Conn.
Amprobe Instr., Lynbrook, N.Y.
Amstro Corp., Fairfield, N.J.
Atkins Technical, Inc., Gainesville, Fla.
Bailey Meter Co., Wickliffe, Ohio
Barber-Colman Co., Industrial Instrs. Div., Rockford, Ill.
Bristol Div, Waterbury, Conn
Exotic Materials, Inc., Costa Mesa, Cal.
Honeywell, Ft. Washington, Pa.
Howell Instrs., Inc., Ft. Worth, Tex.
Ircon Inc., Niles, Ill.
Leeds & Northrup Corp., No. Wales, Pa.
Milletron, Inc., Pittsburgh, Pa.
Omega Engrg., Inc., Stamford, Conn.
Pyrometer Instr. Co., Inc., Northvale, N J
Raytek, Inc., Mountain View, Cal.
Thermo Elec. Co., Inc., Saddle Brook, N.J.
West Instr. Div., Schiller Pk., Ill.
Williamson Corp., Concord, Mass.

Pyrometers, Resistance-Type

General Elec. Co., Schenectady, N.Y.
Harrel, Inc., E. Norwalk, Conn. .... **p 1973**
Weed Instr. Co., Elgin, Tex. ..... **p 1984**
A & M Instrument, Inc., Great Neck, N.Y.
A. J. Abrams Co., Westport, Conn.
Alpha-Monarch Corp., Dallas, Tex.
American Standard, Franklin Pk., Ill.
Atkins Technical, Inc., Gainesville, Fla.
Bailey Meter Co., Wickliffe, Ohio
Barber-Colman Co., Industrial Instrs. Div., Rockford, Ill.
Bristol Div, Waterbury, Conn
Burns Engrg., Inc., Minneapolis, Minn.
Edison, Thomas A. Instr. Div., W. Orange, N.J.
Foxboro Co., Foxboro, Mass.
Honeywell, Apparatus Controls, Mpls., Minn.
Honeywell, Ft. Washington, Pa.
Howell Instrs., Inc., Ft. Worth, Tex.
Hy-Cal Engrg., Santa Fe Springs, Cal.
Int'l. Instrs., Orange, Conn.
Leeds & Northrup Corp., No. Wales, Pa.
Lewis Engrg. Co., Naugatuck, Conn.
Omega Engrg., Inc., Stamford, Conn.
West Instr. Div., Schiller Pk., Ill.
Yewtec Corporation, Larchmont, N.Y.

Pyrometers, Thermocouple-Type

API Instrs. Co., Waltham,, Mass. p 402,403
Beede Electrical Instr. Co., Inc., Penacook, N.H. ..... **p 416**
General Elec. Co., Schenectady, N.Y.
J-B-T Instrs., Inc., New Haven, Conn.
Larson Instr. Co., Inc., Orangeburg, N.Y.
Simpson Elec. Co., Chicago, Ill.
Sticht, Herman H. Co., Inc., New York, N.Y.
A & M Instrument, Inc., Great Neck, N.Y.
A. J. Abrams Co., Westport, Conn.
Alnor Instr. Co., Chicago, Ill.
American Standard, Franklin Pk., Ill.
Amstro Corp., Fairfield, N.J.
Bailey Instrs., Inc., Saddle Brook, N.J.
Bailey Meter Co., Wickliffe, Ohio
Barber-Colman Co., Industrial Instrs. Div., Rockford, Ill.
Bristol Div, Waterbury, Conn
Burling Instr. Co., Chatham, N.J.
Caig Labs., Inc., Westbury, N.Y.
Canadian Research Institute, Don Mills, Ont., Canada
Cole-Parmer Instr. Co., Chicago, Ill.
Edmund Scientific Co., Barrington, N.J.
Electro-Standards Labs., Inc., Miami, Fla.
Elctrn. Control Sys., Fairmont, W. Va.
Elctrn. Dev. Labs., Plainview, N.Y.
Exotic Materials, Inc., Costa Mesa, Cal.
Fenwal, Inc., Ashland, Mass.
Foxboro Co., Foxboro, Mass.
Hafstrom Tech. Prods., Inc., San Diego, Calif.
Honeywell, Apparatus Controls, Mpls., Minn.
Honeywell, Ft. Washington, Pa.
Howell Instrs., Inc., Ft. Worth, Tex.
Hy-Cal Engrg., Santa Fe Springs, Cal.
Int'l. Instrs., Orange, Conn.
Ircon Inc., Niles, Ill.
Leeds & Northrup Corp., No. Wales, Pa.
Lewis Engrg. Co., Naugatuck, Conn.
Marlin Mfg. Corp., Cleveland, Ohio
Omega Engrg., Inc., Stamford, Conn.
Pacific Transducer Corp., Los Angeles, Calif.
Pyrometer Instr. Co., Inc., Northvale, N J
Richards Arklay S., Newton Highlands, Mass.
Sunshine Sci. Instrs., Inc., Philadelphia, Pa.
Syscon Int'l., Inc., So. Bend, Ind.
Thermo Elec. Co., Inc., Saddle Brook, N.J.
VWR Scientific, San Francisco, Cal.
West Instr. Div., Schiller Pk., Ill.

Quartz, Fused

Amersil, Inc., Hillside, N.J. ..... **p 2816**
Engelhard Minerals & Chem., Murray Hill, N.J.
General Elec., Richmond Hgts., Ohio p 2811
Basic Ceramics Inc., Hawthorne, N.J.
Bram Metallurgical-Chem., Phila., Pa.
Corning Glass Works, Lab. Prods. Dept., Corning, N.Y.
Corning Glass Works, Tech. Prods. Div., Corning, N.Y.
Corning Glass Works, Television Prods. Div., Corning, N.Y.
Dell Optics Co., Inc., N. Bergen, N.J.
Dynasil Corp. America, Berlin, N J
E.B.L. Co, East Hartford, Conn.
Elctrn. Space Prods., Los Angeles, Cal.
Esco Products, Oak Ridge, NJ
Exotic Materials, Inc., Costa Mesa, Cal.
Glo-Quartz Elec. Heater Co., Mentor, Ohio
Mackay, A.D., Inc., New York, N.Y.
Materials Resch. Corp., Orangeburg, N.Y.
O & S Research, Inc., Riverton, N.J.
Oriel Optics Corp., Stamford, Conn.
Pan American Trade Dev., New York, N.Y.
Quartz & Silice, Paris 8e, France
Richards Arklay S., Newton Highlands, Mass.
Syncor Prods. Co., Inc., Malden, Mass.
Thermal Amer. Fused Quartz, Montville, N.J.

Quartz, Raw—See Crystals, Quartz—Vol 2

RFI Measuring Equipment

Electro/Data, Inc., Garland, Tex.
Electro-Mechanics Co., Austin, Tex. p 452
Elgenco, Inc., Santa Monica, Cal.
Genisco Tech. Corp., Genistron Div., Compton, Cal.
Hewlett-Packard, Palo Alto, Cal.
Honeywell, Denver, Colo.
Instrs. For Ind., Inc., Farmingdale, N.Y. p 1285
Nelson Ross Elctrns., Lake Success, N.Y.
Ohio Semitronics, Columbus, Ohio p 533
Polarad Elctrn. Instrs., Lake Success, N.Y.
Sprague Elec. Co., No. Adams, Mass.
Watkins Johnson Co., Palo Alto, Cal.
AUL Instrs., Inc., Flushng, N.Y.
Avco Corp., Cincinnati, Ohio
Collins Radio Co., Dallas, Tex.
Communication Elctrns., Rockville, Md.
Cooke Vacuum Prods., S. Norwalk, Conn.
Engineering Assocs., Dayton, Ohio
Fairchild Electro-Metrics, Amsterdam, N.Y.
Lingenfelter Applied Tech., Gaithersburg, Md.
Micro-Tel Corp., Baltimore, Md.
Philco-Ford Corp., Washington, D.C.
Rafec Elctrns., Temple City, Calif.
Rohde & Schwarz Sls., Passaic, N.J.
Siemens Corp., Comps. Div., Iselin, N.J.
Solar Elctrns. Co., Hollywood, Calif.
Velonex, Santa Clara, Calif.

RFI Shielding—See Shields, R-F—Vol 3

RFI Testing Services—See Services, Electrical Measurement—Vol 3

Racks, Aging—See Vol 3

Racks, Cabinet—See Vol 3

Racks, Desk & Console—See Vol 3

Racks, Circuit Board—See Vol 3

Racks, Module-Also See Racks, Circuit Board—See Vol 3

Racks, Relay & Mounting—See Vol 3

Radar Equipment—See Analyzers; Testers; Simulators; etc.

Radar Systems

Amp Inc., Elizabethtown, Pa. ..... p 643
Andersen Labs. Inc., Bloomfield, Conn.
Beta Instr., Newton Upper Falls, Mass.
Cober Elctrns., Inc., Stamford, Conn.
Electro/Data, Inc., Garland, Tex.
Frequency Engrg. Labs., Farmingdale, N.J.
Geo Space Sys., Tampa, Fla. ..... p 486
Inter-Computer Elctrns., Lansdale, Pa.
Microwave Cavity Labs., La Grange, Ill.
Nippon Electric/NEC America, N.Y., N.Y.
Norden Div., Norwalk, Conn.
Vega Precision Labs., Vienna, Va.
Aeg-Telefunken Corp., Englewood Cliffs, N.J.
Aerospace Resch. Inc., Boston, Mass.
Alden Elctrn. & Impulse Record. Equip., Westboro, Mass.
ASC Sys. Corp., Chicago, Ill.
Avco Corp., Cincinnati, Ohio
Bedford Div., Bedford, Mass.
Bludworth Marine Div., Linden, N.J.
Cardion Elctrns., Woodbury, N.Y.
Collins Radio Co., Cedar Rapids, Iowa
Collins Radio Co., Dallas, Tex.
Continental Elctrns. Mfg., Dallas, Tex.
Dalmo Victor, Belmont, Calif.
E.F.E. Labs., Inc., Horsham, Pa.
Ferranti Ltd., Hollinwood, Lancs., England
General Atronics, Military Elctrns., Phila., Pa.
General Dynamics, San Diego, Cal.
General Instr. Corp., Hicksville, N.Y.
Goodyear Aerospace Corp., Akron, Ohio
Granite State Machine Co., Inc., Manchester, N.H.
GTE Sylvania Inc., Elctrn. Sys. Gp., Waltham, Mass.
Honeywell, Aerospace & Def., Minneapolis, Minn.
Hughes Aircraft Co, Culver City, Cal.
Hughes Aircraft Co, Fullerton, Cal.
LAD Electro-Sys., Inc., Hicksville, N.Y.
Lockheed Elctrns. Co., Watchung, N.J.
Maxson Elctrns. Div., Great River, N.Y.
Microwave Assocs., Inc., Burlington, Mass.
Microwave/Sys., Inc., E. Syracuse, N.Y.
Moran Instr. Corp., Pasadena, Calif.
Nano Fast, Inc., Chicago, Ill.
Philips Elctrns. Inds., Ltd., Toronto 17, Can.
Radiation Sys., Inc., McLean, Va.
Raytheon Co., Lexington, Mass.
RCA Corp., Camden, N.J.
RCA Govt. & Comm. Sys., Moorestown, N.J.
RCA Service Co., Camden, N.J.
Research Chem., Phoenix, Ariz.
Rodale Elctrns., Inc., Garden City, N.Y.
Sage Labs. Inc., Natick, Mass.
Sanders Assocs., Nashua, N.H.
Scientific Communications, Garland, Tex.
Sedco Sys., Inc., Farmingdale, N.Y.
Signatron, Inc., Lexington, Mass.
Singer-General Precision, Inc., Little Falls, N.J.
Sperry Marine Sys., Charlottesville, Va.
Struthers Elctrns. Corp., Mamaroneck, N.Y.
Systron-Donner Microwave Div., Van Nuys, Cal.
Teledyne Micronetics, San Diego, Calif.
Thomson-CSF Inc., New York, N.Y.
United Telecontrol Elctrns., Asbury Park, N.J.
Westinghouse Elec. Corp., Pittsburgh, Pa.

Radar Testers—See Testers, Radar

Radiation Equip., Nuclear—See Dosimeters; Counters, Geiger;Counters, Scintillation; Film Badges

Radioactive Light Sources—See Sources, Light, Radioactive

Radio Comm. Systems—See Comm. Systems (As Modified)

Radiographic Equipment—See X-Ray Inspection Equipment

Radiometers

American Nucleonics Corp., Woodland Hills, Cal
Dynarad, Inc., Norwood, Mass. .... p 439
Teledyne Geotech, Dallas, Tex.
United Detector Tech., Santa Monica, Cal.
AIL, Div. Cutler-Hammer, Inc., Deer Park, N.Y.
Barnes Engrg. Co., Stamford, Conn.
Beckman Instrs., Advanced Tech., Fullerton, Cal.
Beckman Instrs., (AISSD), Fullerton, Cal.
Cintra Physics Int'l., Sunnyvale, Cal.
Edmund Scientific Co., Barrington, N.J.
EG & G, Inc., Salem, Mass.
EG&G, Inc., Electro-Optics Div., Salem, Mass.
Eppley Lab., Inc., Newport, R.I.
Exotic Materials, Inc., Costa Mesa, Cal.
High Temperature Instr., W. Conshohocken, Pa.
Honeywell, Aerospace & Def., Minneapolis, Minn.
HRB-Singer, Inc., State College, Pa.
Hughes Aircraft Co, Culver City, Cal.
Hy-Cal Engrg., Santa Fe Springs, Cal.
Infrared Inds., Inc., Santa Barbara, Cal.
International Light, Newburyport, Mass.
Kahl Scientific Instr. Corp., El Cajon, Calif.
Kollmorgen-Color Sys. Div., Attleboro, Mass.
MCS Corp., Monrovia, Calif.
Philco-Ford Corp., Washington, D.C.
Philips Broadcast Equipment Corp., Montvale, N.J.
Raytek, Inc., Mountain View, Cal.
Santa Barbara Resch. Ctr., Goleta, Calif.
Scientific Communications, Garland, Tex.
Sperry Microwave Elctrns., Clearwater, Fla.
TE Company, Santa Barbara, Cal.
TRG Prods., E. Boston, Mass.
Williamson Corp., Concord, Mass.
Yellow Springs Instr. Co., Inc., Yellow Springs, Ohio

Radomes

American Elctrn. Labs., Inc., Lansdale, Pa.
Amersil, Inc., Hillside, N.J.
General Elec., Richmond Hgts., Ohio
Parabam, Inc., Compton, Cal.
Advance Inds., Sioux City, Iowa
Andrew Corp., Orland Pk., Ill.
Basic Ceramics Inc., Hawthorne, N.J.
Brush Beryllium Co., Cleveland, Ohio
Ceram Corp., La Mesa, Calif.
Chu Assocs., Inc., Littleton, Mass.
Corning Glass Works, Tech. Prods. Div., Corning, N.Y.
Custom Materials, Inc., Chelmsford, Mass.
Daniels, C.R., Inc., Daniels, Md.
Decibel Prods., Inc., Dallas, Tex.
Eljay Corp., Columbia, Md.
Emerson & Cuming, Inc., Canton, Mass.
General Dynamics, San Diego, Cal.
Goodyear Aerospace Corp., Akron, Ohio
Granite State Machine Co., Inc., Manchester, N.H.
Hughes Aircraft Co, Culver City, Cal.
Instru-Lec Corp., Mt. Vernon, N.Y.
Insulating Shapes, Inc., Bronx, N.Y.
Laminair, Inc., Los Angeles, Calif.
Loral Elctrn. Sys., Bronx, N.Y.
McMillan Radiation Labs, Inc., Ipswich, Mass.
Microwave Div, Nashua, N.H.
National Beryllia Corp., Haskell, N.J.
Nurad, Inc., Baltimore, Md.
Radiation Sys., Inc., McLean, Va.
Sanders Assocs., Nashua, N.H.
TACO Div., Sherburne, N.Y.
Topper Mfg. Co., Inc., Great Neck, N.Y.

Range Finder Systems

American Elctrn. Labs., Inc., Lansdale, Pa.
Elctrn. Enterprises, Newark, N.J.
Astronautics Corp. of Amer., Milwaukee, Wisc.
Beukers Labs., Inc., Hauppauge, N.Y.
Bludworth Marine Div., Linden, N.J.
Electro-Optical Systems, Pasadena, Cal.
Electrophysics Corp., Nutley, N.J.
Ferranti Ltd., Hollinwood, Lancs., England
General Dynamics, San Diego, Cal.
GTE Sylvania Inc., Elctrn. Sys. Gp., Waltham, Mass.
ITT Aerospace, San Fernando, Cal.
Kollsman Instr. Corp., Syosset, N.Y.
Lear Siegler, Inc., Santa Monica, Calif.
Lockheed Elctrns. Co., Watchung, N.J.
Loral Elctrn. Sys., Bronx, N.Y.
Nano Fast, Inc., Chicago, Ill.
RCA Govt. & Comm. Sys., Moorestown, N.J.
Sanders Assocs., Nashua, N.H.
Teledyne Micronetics, San Diego, Calif.
Westinghouse Elec. Corp., Pittsburgh, Pa.

Rare Earths—See Metals, Rare —Vol 3

Rate-Of-Turn Tables—See Tables, Rate-of-Turn

Reactors, Charging—See Vol 3

Reactors, Epitaxial—See Machines, Semiconductor Manufacturing

Reactors, Filter—See Vol 3

Reactors, Loading—See Vol 3

Reactors, Saturable—See Vol 3

Readers, Character

Amp Inc., Harrisburg, Pa.
Sealectro Corp., Mamaroneck, N.Y. p 380
Dolan-Jenner Inds., Inc., Melrose, Mass.
Electro Fiberoptics Corp., W. Boylston, Mass.
Fiber Photics, Inc., Santa Cruz, Cal.
Honeywell Information Systems, Wellesley Hills, Mass
Litton Inds., San Carlos, Calif.
Motorola Instr. & Control, Phoenix, Ariz.
Philco-Ford Corp., Washington, D.C.
Potter Instr. Co., Melville, N.Y.

Readers, Magnetic Tape (Computer Type)

Burroughs Corp., Los Angeles, Cal.
Cook Electric Co., Morton Grove, Ill.
Datacom, Inc., Ft. Walton Bch., Fla. p 344
Digital Equip. Corp., Maynard, Mass. p 348
Hewlett-Packard, Palo Alto, Cal.
Bell & Howell Co., Pasadena, Calif.
Clary Corp., San Gabriel, Calif.
Data Prods. Corp., Woodland Hills, Calif.
Digi-Data Corp., Bladensburg, Md.
Genisco Tech. Corp., Data Div., Compton, Cal.
Gerber Sci. Instr. Co., Hartford, Conn.
Honeywell Information Systems, Wellesley Hills, Mass
Kennedy Co., Altadena, Calif.
Lockheed Elctrns. Co., Watchung, N.J.
Potter Instr. Co., Melville, N.Y.
Telectro Sys. Corp., Corona, N.Y.
3M Co., St. Paul, Minn.

Readers, Microfinche

Buhl Optical Co., Pittsburgh, Pa.
Heitz, Karl, Inc., New York, N.Y.
Information Handling Svc., Englewood, Colo.
Johnson Research Corp., Farmingdale, N.Y.
Keystone Micro Scan., Boston, Mass.
O E M Prods., Carlstadt, N.J.
3M Co., St. Paul, Minn.

Readers, Punched Card—See Punched Card Equipment

Readers, Punched Tape

Burroughs Corp., Los Angeles, Cal.
Cook Electric Co., Morton Grove, Ill.
Datascan, Inc., Clifton, N.J. ..... p 428
Digital Equip. Corp., Maynard, Mass.
Elctrn. Engrg. Co. Cal., Santa Ana, Cal.
Interswitch, Burlingame, Cal.
Remex Elctrns., Santa Ana, Cal. .. p 377
A C Electronics Co., Santa Monica, Cal.
Bendix, Sturbridge, Mass.
Chalco Engrg. Corp., Gardena, Cal.
Computer Mechanisms, Carlstadt, N.J.
Digitronics Corp., Albertson, N.Y.
Electro Fiberoptics Corp., W. Boylston, Mass.
Facit-Odhner, Inc., Secaucus, N.J.
Fischer & Porter Co., Warminster, Pa.
Friden Div., San Leandro, Calif.
Honeywell Information Systems, Wellesley Hills, Mass
Integrated Circuit Elctrns., Inc., Waltham, Mass.
KDI Adtrol, Inc., Broomall, Pa.
Lehigh Valley Elctrn., Inc., Fogelsville, Pa.
Mohawk Data Sciences Corp., Herkimer, N.Y.
Molex Prods. Co., Downers Grove, Ill.
O E M Prods., Carlstadt, N.J.
Ohr-Tronics, King of Prussia, Pa.
Potter Instr. Co., Melville, N.Y.
Robins Inds. Corp., Flushing, N Y
Rohde & Schwarz Sls., Passaic, N.J.
Scientific-Atlanta, Inc., Atlanta, Ga.
Superior Elec., Bristol, Conn.
Teletype Corp., Skokie, Ill.
Texas Instruments, Inc., Houston, Tex.
Universal Transistor Prods., Copiague, N.Y.

Readouts & Readout Devices—See Specific Types—Vol 2

Readouts, Dot Matrix—See Vol 2

Readouts, Edge-Lighted—See Vol 2

Readouts, Electroluminescent—See Vol 2

Readouts, Electro Mechanical—See Vol 2

Readouts, Lighted, Segmented—See Vol 2

Readouts, Rear-Projection—See Vol 2

Readouts, Semiconductor Type Incl. Light-Emitting Diodes & Switches—See Vol 2

Receivers, A-M (Precision Test)

Honeywell, Denver, Colo.
Lorch Elctrns. Corp., Englewood, N.J.
Marconi Instrs., Englewood, N.J... p 521
Polarad Elctrn. Instrs., Lake Success, N.Y.
RHG Elctrns. Lab., Farmingdale, N.Y.
AIL, Div. Cutler-Hammer, Inc., Deer Park, N.Y.
Astro Comm. Lab., Gaithersburg, Md.
Bogen Div., Paramus, N.J.
Collins Radio Co., Dallas, Tex.
Communication Elctrns., Rockville, Md.
Electrac, Inc., Anaheim, Calif.
Fairchild Electro-Metrics, Amsterdam, N.Y.
GTE Sylvania Inc., Elctrn. Sys. Gp., Waltham, Mass.
Micro-Tel Corp., Baltimore, Md.
Olektron Corp., Dudley, Mass.
Racal Communications, Rockville, Md.
Rohde & Schwarz Sls., Passaic, N.J.

Receivers, Beacon

American Elctrn. Labs., Inc., Lansdale, Pa.
Applied Research Inc., Port Washington, N.Y.
Vega Precision Labs., Vienna, Va.
Aerocom, Miami, Fla.
Aeronautical Comm. Equip. Inc., Miami, Fla.
Aerospace Resch. Inc., Boston, Mass.

A.R.F. Products, Inc., Boulder, Colo.
A.R.F. Products, Inc., Raton, N.M.
CCA Elctrns. Corp., Gloucester, N.J.
ComGeneral Corp., Dayton, Ohio
Dorsett Elctrns., Tulsa, Okla.
Elctrn. Comm., Inc., St. Petersburg, Fla.
General Instr. Corp., Hicksville, N.Y.
GTE Sylvania Inc., Elctrn. Sys. Gp., Waltham, Mass.
Hughes Aircraft Co, Culver City, Cal.
Hughes Aircraft Co, Fullerton, Cal.
ISC/Telephonics Div, Huntington, N.Y.
ITT Avionics Div, Nutley, N.J.
King Radio Corp., Olathe, Kans.
Loral Elctrn. Sys., Bronx, N.Y.
Motorola, Scottsdale, Ariz.
Philco-Ford Corp., Washington, D.C.
Philips Elctrns. Inds., Ltd., Toronto 17, Can.
Prodelin, Inc., Hightstown, N.J.
RCA Govt. & Comm. Sys., Moorestown, N.J.
RF Communications, Inc., Rochester, N.Y.

Receivers, Carrier Telegraph

Nippon Electric/NEC America, N.Y., N.Y.
Polarad Elctrn. Instrs., Lake Success, N.Y.
Quindar Elctrns., Inc., Springfield, N.J.
Anritsu Electric Co., Ltd., Tokyo, Japan
Electrocom Inds., So. Bend, Indiana
GTE Lenkurt Inc., San Carlos, Calif.
RFL Inds., Comms. Div., Boonton, N.J.
Siemens Corp., Comps. Div., Iselin, N.J.
Singer - Tele-Signal, Woodbury, N.Y.
Technical Mat'l., Mamaroneck, N.Y.

Receivers, Command

American Elctrn. Labs., Inc., Lansdale, Pa.
Lorch Elctrns. Corp., Englewood, N.J.
Vega Precision Labs., Vienna, Va.
Anritsu Electric Co., Ltd., Tokyo, Japan
A.R.F. Products, Inc., Boulder, Colo.
Arvin Sys., Inc., Dayton, Ohio
Avco Corp., Cincinnati, Ohio
BF Elctrns., Solana Beach, Calif.
CCA Elctrns. Corp., Gloucester, N.J.
Collins Radio Co., Cedar Rapids, Iowa
Collins Radio Co., Dallas, Tex.
Control Sci. Corp., Alexandria, Va.
Dorsett Elctrns., Tulsa, Okla.
Dyna Magnetic Devices, Inc., Hicksville, N.Y.
Elctrn. Comm., Inc., St. Petersburg, Fla.
General Instr. Corp., Hicksville, N.Y.
GTE Sylvania Inc., Elctrn. Sys. Gp., Waltham, Mass.
Hughes Aircraft Co, Culver City, Cal.
Linear Corp., Inglewood, Calif.
Loral Elctrn. Sys., Bronx, N.Y.
Motorola, Scottsdale, Ariz.
Philco-Ford Corp., Washington, D.C.
Racal Communications, Rockville, Md.
Radiation Sys., Inc., McLean, Va.
RCA Govt. & Comm. Sys., Moorestown, N.J.
RFL Inds., Comms. Div., Boonton, N.J.

Receivers, Communication & Amateur

Electronic Resch. Assocs., Cedar Grove, N.J.
Honeywell, Denver, Colo.
Marconi Instrs., Englewood, N.J... p 521
Watkins Johnson Co., Palo Alto, Cal.
Anritsu Electric Co., Ltd., Tokyo, Japan
Arvin Sys., Inc., Dayton, Ohio
Astro Comm. Lab., Gaithersburg, Md.
Brelonix, Inc., Seattle, Wash
Browning Labs., Laconia, N.H.
Collins Radio Co., Cedar Rapids, Iowa
Collins Radio Co., Dallas, Tex.
Communications Co., Inc., Coral Gables, Fla.
Dittmore-Freimuth Corp., Milwaukee, Wisc.
Drake, R.L., Co., Miamisburg, Ohio
Elctrn. Comm., Inc., St. Petersburg, Fla.
Fairchild Electro-Metrics, Amsterdam, N.Y.
Fanon Elctrns., Hillside, N.J.
General Instr. Corp., Hicksville, N.Y.
General Radiotelephone Co., Burbank, Cal.
GTE Sylvania Inc., Elctrn. Sys. Gp., Waltham, Mass.
Hammarlund Mfg. Co., Red Bank, N.J.
Heath Co., Benton Harbor, Mich.
International Scanatron Sys., Wyandanch, N.Y.
ITT Mackay Marine, Clark, N.J.
Kahn Resch. Labs., Inc., Freeport, N.Y.
King Radio Corp., Olathe, Kans.
Linear Sys., Inc., Watsonville, Calif.
Loral Elctrn. Sys., Bronx, N.Y.
Miles Reproducer Co., Inc., New York, N.Y.
Mobil Elctrns., Inc., Anderson, Ind.
Pearce-Simpson, Miami, Fla.
Racal Communications, Rockville, Md.
RCA Corp., Camden, N.J.
Regency Elctrns., Inc., Indianapolis, Ind.
RF Communications, Inc., Rochester, N.Y.
Rodelco, Deer Park, N.Y.
Siemens Corp., Comps. Div., Iselin, N.J.
Technical Mat'l., Mamaroneck, N.Y.
Unimetrics, Inc., Plainview, N.Y.
Weitermann Elctrns., Milwaukee, Wisc.

Receivers, Diplexer

Frequency Engrg. Labs., Farmingdale, N.J.
Nippon Electric/NEC America, N.Y., N.Y.
Aerospace Resch. Inc., Boston, Mass.
Anritsu Electric Co., Ltd., Tokyo, Japan
Collins Radio Co., Cedar Rapids, Iowa
Collins Radio Co., Dallas, Tex.
Dittmore-Freimuth Corp., Milwaukee, Wisc.
GTE Sylvania Inc., Elctrn. Sys. Gp., Waltham, Mass.
Guide Inds., Inc., Sun Valley, Calif.
Hughes Aircraft Co, Culver City, Cal.
Loral Elctrn. Sys., Bronx, N.Y.
Microlab/FXR, Livingston, N.J.
Microwave Assocs., Inc., Burlington, Mass.
Microwave Development Labs., Inc., Needham Hgts., Mass.
Philco-Ford Corp., Washington, D.C.
Rantec Div., Calabasas, Calif.
Special Microwave Devices Oper., Waltham, Mass.

Receivers, Diversity Reception

Frequency Engrg. Labs., Farmingdale, N.J.
Mid-Eastern Inds., Scotch Plains, N.J.
Nippon Electric/NEC America, N.Y., N.Y.
RHG Elctrns. Lab., Farmingdale, N.Y.
Aerospace Resch. Inc., Boston, Mass.
Anritsu Electric Co., Ltd., Tokyo, Japan
Barker & Williamson, Bristol, Pa.
Collins Radio Co., Cedar Rapids, Iowa
Collins Radio Co., Dallas, Tex.
Electrac, Inc., Anaheim, Calif.
General Instr. Corp., Hicksville, N.Y.
GTE Lenkurt Inc., San Carlos, Calif.
GTE Sylvania Inc., Elctrn. Sys. Gp., Waltham, Mass.
Hammarlund Mfg. Co., Red Bank, N.J.
International Scanatron Sys., Wyandanch, N.Y.
ITT Mackay Marine, Clark, N.J.
Kahn Resch. Labs., Inc., Freeport, N.Y.
Philco-Ford Corp., Washington, D.C.
Racal Communications, Rockville, Md.
Rohde & Schwarz Sls., Passaic, N.J.
Technical Mat'l., Mamaroneck, N.Y.

Receivers, Duplexer

Nippon Electric/NEC America, N.Y., N.Y.
AMBAC Inds., Garden City, N.Y.
Anritsu Electric Co., Ltd., Tokyo, Japan
Collins Radio Co., Cedar Rapids, Iowa
Collins Radio Co., Dallas, Tex.
Dittmore-Freimuth Corp., Milwaukee, Wisc.
GTE Sylvania Inc., Elctrn. Sys. Gp., Waltham, Mass.
Hughes Aircraft Co, Culver City, Cal.
Loral Elctrn. Sys., Bronx, N.Y.
Microlab/FXR, Livingston, N.J.
Microwave Assocs., Inc., Burlington, Mass.
Microwave Development Labs., Inc., Needham Hgts., Mass.
Philco-Ford Corp., Washington, D.C.
Premier Microwave, Port Chester, N.Y.
Rantec Div., Calabasas, Calif.
Special Microwave Devices Oper., Waltham, Mass.
Struthers Elctrns. Corp., Mamaroneck, N.Y.

Receivers, Facsimile

Nippon Electric/NEC America, N.Y., N.Y.
Alden Elctrn. & Impulse Record. Equip., Westboro, Mass.
Anritsu Electric Co., Ltd., Tokyo, Japan
International Scanatron Sys., Wyandanch, N.Y.
ITT Mackay Marine, Clark, N.J.
Philco-Ford Corp., Washington, D.C.
RF Communications, Inc., Rochester, N.Y.
Siemens Corp., Comps. Div., Iselin, N.J.
Telautograph Corp., Los Angeles, Cal.

Receivers, Field Intensity, Microwave—See Receivers, Microwave

Receivers, Fixed Frequency

American Elctrn. Labs., Inc., Lansdale, Pa.
Applied Research Inc., Port Washington, N.Y.
Frequency Engrg. Labs., Farmingdale, N.J.
Honeywell, Denver, Colo.
Lorch Elctrns. Corp., Englewood, N.J.
Polarad Elctrn. Instrs., Lake Success, N.Y.
Quindar Elctrns., Inc., Springfield, N.J.
RHG Elctrns. Lab., Farmingdale, N.Y.
Seg Elctrns., Richmond Hill, N.Y.
Sierra Sys., Mountain View, Cal.
Specific Products, Monrovia, Cal. p 325
Watkins Johnson Co., Palo Alto, Cal.
Aerocom, Miami, Fla.
Aeronautical Comm. Equip. Inc., Miami, Fla.
Aerospace Resch. Inc., Boston, Mass.
Anritsu Electric Co., Ltd., Tokyo, Japan
Arvin Sys., Inc., Dayton, Ohio
Astro Comm. Lab., Gaithersburg, Md.
Beukers Labs., Inc., Hauppauge, N.Y.
BF Elctrns., Solana Beach, Calif.
Brelonix, Inc., Seattle, Wash
CCA Elctrns. Corp., Gloucester, N.J.
Chamberlain Mfg. Corp., Elmhurst, Ill.
Collins Radio Co., Cedar Rapids, Iowa
Collins Radio Co., Dallas, Tex.
Communication Elctrns., Rockville, Md.
Communications Co., Inc., Coral Gables, Fla.
Dittmore-Freimuth Corp., Milwaukee, Wisc.
Dorsett Elctrns., Tulsa, Okla.
Edo Western Corp., Salt Lake City, Utah
General Instr. Corp., Hicksville, N.Y.
GTE Lenkurt Inc., San Carlos, Calif.
GTE Sylvania Inc., Elctrn. Sys. Gp., Waltham, Mass.
Hammarlund Mfg. Co., Red Bank, N.J.
HRB-Singer, Inc., State College, Pa.
International Scanatron Sys., Wyandanch, N.Y.
ISC/Telephonics Div, Huntington, N.Y.
Kahn Resch. Labs., Inc., Freeport, N.Y.
Linear Sys., Inc., Watsonville, Calif.
Lingenfelter Applied Tech., Gaithersburg, Md.
Loral Elctrn. Sys., Bronx, N.Y.
Micro-Tel Corp., Baltimore, Md.
Microwave Assocs., Inc., Burlington, Mass.
Olektron Corp., Dudley, Mass.
Philco-Ford Corp., Washington, D.C.
Racal Communications, Rockville, Md.
Regency Elctrns., Inc., Indianapolis, Ind.
RF Communications, Inc., Rochester, N.Y.
Servo Corp. America, Hicksville, N.Y.
Special Microwave Devices Oper., Waltham, Mass.
Systems Resch. Labs., Dayton, Ohio
Technical Mat'l., Mamaroneck, N.Y.
Wand Elctrns., Inc., Old Bethpage, N.Y.

Receivers, F-m (Precision Test)

Honeywell, Denver, Colo.
Lorch Elctrns. Corp., Englewood, N.J.
Marconi Instrs., Englewood, N.J... p 521
Polarad Elctrn. Instrs., Lake Success, N.Y.
RHG Elctrns. Lab., Farmingdale, N.Y.
Watkins Johnson Co., Palo Alto, Cal.
AMBAC Inds., Garden City, N.Y.
Anritsu Electric Co., Ltd., Tokyo, Japan
Astro Comm. Lab., Gaithersburg, Md.
Beukers Labs., Inc., Hauppauge, N.Y.
Bogen Div., Paramus, N.J.
Collins Radio Co., Dallas, Tex.
Communication Elctrns., Rockville, Md.
Communications Co., Inc., Coral Gables, Fla.
Dyna Magnetic Devices, Inc., Hicksville, N.Y.
Fairchild Electro-Metrics, Amsterdam, N.Y.
Fisher Radio, Long Island City, N.Y.
GTE Sylvania Inc., Elctrn. Sys. Gp., Waltham, Mass.
Hughes Aircraft Co, Fullerton, Cal.
Miles Reproducer Co., Inc., New York, N.Y.
Rohde & Schwarz Sls., Passaic, N.J.
Standard Elctrns. Corp., Freehold, N.J.
V-M Corp., Benton Harbor, Mich.
Wilkinson Elctrns., Woodlyn, Pa.

Receivers, Frequency Shift

Dynamics Instr. Co., Monterey Pk., Cal.
Honeywell, Denver, Colo.
Multitech Data Prods., Monterey Pk., Cal. ..... p 363
Quindar Elctrns., Inc., Springfield, N.J.
Aerocom, Miami, Fla.
Aeronautical Comm. Equip. Inc., Miami, Fla.
Anritsu Electric Co., Ltd., Tokyo, Japan
Cardion Communications, Woodbury, N.Y.
Collins Radio Co., Dallas, Tex.
Electrocom Inds., So. Bend, Indiana
Frederick Electronics Corp., Frederick, Md.
Gosh Instrs., Inc., Wethersfield, Conn.
GTE Lenkurt Inc., San Carlos, Calif.
Hammarlund Mfg. Co., Red Bank, N.J.
International Scanatron Sys., Wyandanch, N.Y.
Racal Communications, Rockville, Md.
RF Communications, Inc., Rochester, N.Y.
RFL Inds., Comms. Div., Boonton, N.J.
Singer - Tele-Signal, Woodbury, N.Y.

Receivers, Headphone—See Headphones

Receivers, I-F

Honeywell, Denver, Colo.
Polarad Elctrn. Instrs., Lake Success, N.Y.
RHG Elctrns. Lab., Farmingdale, N.Y.
Sierra Sys., Mountain View, Cal.
Anritsu Electric Co., Ltd., Tokyo, Japan
A.R.F. Products, Inc., Boulder, Colo.
Avco Corp., Cincinnati, Ohio
Communication Elctrns., Rockville, Md.
Dittmore-Freimuth Corp., Milwaukee, Wisc.
Hughes Aircraft Co, Fullerton, Cal.
Loral Elctrn. Sys., Bronx, N.Y.
Micro-Tel Corp., Baltimore, Md.
Philco-Ford Corp., Washington, D.C.
Racal Communications, Rockville, Md.
Rodelco, Deer Park, N.Y.
Servo Corp. America, Hicksville, N.Y.
Western Microwave Labs., Los Gatos, Cal.

Recievers, Infrared—See Vol 2

Receivers, Interrogation

Vega Precision Labs., Vienna, Va.
Aerospace Resch. Inc., Boston, Mass.
Astro Comm. Lab., Gaithersburg, Md.
Collins Radio Co., Cedar Rapids, Iowa
Collins Radio Co., Dallas, Tex.
Edo Western Corp., Salt Lake City, Utah
General Instr. Corp., Hicksville, N.Y.
GTE Sylvania Inc., Elctrn. Sys. Gp., Waltham, Mass.
Hughes Aircraft Co, Culver City, Cal.
Hughes Aircraft Co, Fullerton, Cal.
ITT Avionics Div, Nutley, N.J.

Receivers, Logarithmic

American Astronics, Hollywood, Cal
RHG Elctrns. Lab., Farmingdale, N.Y.
Arco Systems Inc., Palo Alto, Cal
Astro Comm. Lab., Gaithersburg, Md.
Communication Elctrns., Rockville, Md.
GTE Sylvania Inc., Elctrn. Sys. Gp., Waltham, Mass.
Scientific-Atlanta, Inc., Atlanta, Ga.

Receivers, Loran, Lab Test

Austron, Inc., Austin, Tex.
Aerospace Resch. Inc., Boston, Mass.
Beukers Labs., Inc., Hauppauge, N.Y.
Collins Radio Co., Dallas, Tex.
GTE Sylvania Inc., Elctrn. Sys. Gp., Waltham, Mass.

ITT Avionics Div, Nutley, N.J.
Lear Siegler, Grand Rapids, Mich.
RCA Corp., Camden, N.J.

Receivers, Loran, Timing

Austron, Inc., Austin, Tex.
Aerospace Resch. Inc., Boston, Mass.
Anritsu Electric Co., Ltd., Tokyo, Japan
Beukers Labs., Inc., Hauppauge, N.Y.
Conductron Corp., St. Charles, Mo.
Dittmore-Freimuth Corp., Milwaukee, Wisc.
ITT Avionics Div, Nutley, N.J.
ITT Mackay Marine, Clark, N.J.
Lear Siegler, Grand Rapids, Mich.
Pickard & Burns Inc., Lindenhurst, N.Y.

Receivers, Microwave

American Elctrn. Labs., Inc., Lansdale, Pa.
American Nucleonics Corp., Woodland Hills, Cal
Applied Research Inc., Port Washington, N.Y.
Electro/Data, Inc., Garland, Tex. p 1559
Frequency Engrg. Labs., Farmingdale, N.J.
Polarad Elctrn. Instrs., Lake Success, N.Y. ..... p 540
RHG Elctrns. Lab., Farmingdale, N.Y. p 612
Ryka Scientific, Inc., Sunnyvale, Cal. p 1564
Vega Precision Labs., Vienna, Va.
Watkins Johnson Co., Palo Alto, Cal.
Weinschel Engrg. Co., Gaithersburg, Md.
Aeg-Telefunken Corp., Englewood Cliffs, N.J.
Aertech Inds., Sunnyvale, Calif.
AIL, Div. Cutler-Hammer, Inc., Deer Park, N.Y.
Aircom, Inc., Union, N.H.
Anritsu Electric Co., Ltd., Tokyo, Japan
Applied Tech., Palo Alto, Cal.
A.R.F. Products, Inc., Raton, N.M.
Arco Systems Inc., Palo Alto, Cal
Astro Comm. Lab., Gaithersburg, Md.
Avantek, Inc., Santa Clara, Cal.
Collins Radio Co., Dallas, Tex.
Communication Elctrns., Rockville, Md.
Dittmore-Freimuth Corp., Milwaukee, Wisc.
Electrac, Inc., Anaheim, Calif.
Elctrn. Specialty, Thomaston, Conn.
Engineering Assocs., Dayton, Ohio
Fairchild Electro-Metrics, Amsterdam, N.Y.
Farinon Electric, San Carlos, Calif.
Foxboro Co., Foxboro, Mass.
General Elec., Lynchburg, Va.
General Instr. Corp., Hicksville, N.Y.
GTE Lenkurt Inc., San Carlos, Calif.
GTE Sylvania Inc., Elctrn. Sys. Gp., Waltham, Mass.
Guide Inds., Inc., Sun Valley, Calif.
HRB-Singer, Inc., State College, Pa.
Hughes Aircraft Co, Culver City, Cal.
Hughes Aircraft Co, Fullerton, Cal.
Int'l. Microwave, Cos Cob, Conn.
Itek Corp., Lexington, Mass.
ITT Aerospace, San Fernando, Cal.
Jerrold Elctrns. Corp., Philadelphia, Pa.
Jerrold/Watkins Div., Toronto, 395, Ont., Can.
Loral Elctrn. Sys., Bronx, N.Y.
Maury Microwave Corp., Cucamonga, Calif.
Maxson Elctrns. Div., Great River, N.Y.
Micro-Now Instr., Chicago, Ill.
Micro-Tel Corp., Baltimore, Md.
Microlab/FXR, Livingston, N.J.
Micromega, Los Angeles, Cal.
Microwave Assocs., Inc., Burlington, Mass.
Microwave/Sys., Inc., E. Syracuse, N.Y.
Motorola, Scottsdale, Ariz.
Narda Microwave Corp., Plainview, N.Y.
OKI Elctrns. America, Ft. Lauderdale, Fla.
Philco-Ford Corp., Washington, D.C.
PRD Elctrns., Inc., Westbury, N.Y.
Premier Microwave, Port Chester, N.Y.
Rantec Div., Calabasas, Calif.
Raytheon Data Systems Co., Norwood, Mass.
Raytheon Co., Lexington, Mass.
RCA Corp., Camden, N.J.
RCA Govt. & Comm. Sys., Moorestown, N.J.
RCA Service Co., Camden, N.J.
Rodelco, Deer Park, N.Y.
Rohde & Schwarz Sls., Passaic, N.J.
Sage Labs. Inc., Natick, Mass.
Sanders Assocs., Nashua, N.H.
Scientific-Atlanta, Inc., Atlanta, Ga.
Scientific Communications, Garland, Tex.
Servo Corp. America, Hicksville, N.Y.
Siemens Corp., Comps. Div., Iselin, N.J.
Special Microwave Devices Oper., Waltham, Mass.
Sperry Marine Sys., Charlottesville, Va.
Systron-Donner Microwave Div., Van Nuys, Cal.
Teledyne Micronetics, San Diego, Calif.
Trak Microwave, Tampa, Fla.
TRG Prods., E. Boston, Mass.
Varian Assocs., Palo Alto, Cal.
Varian Assocs.Electron Tube & Device Grp., Palo Alto, Cal.
Varian Assoc., Beverly, Mass
Western Microwave Labs., Los Gatos, Cal.
Westinghouse Elec. Corp., Pittsburgh, Pa.
Zeta Labs., Inc., Mountain View, Calif.

Receivers, Monitoring, Communications

American Elctrn. Labs., Inc., Lansdale, Pa.
Applied Research Inc., Port Washington, N.Y.
Electro/Data, Inc., Garland, Tex.
Honeywell, Denver, Colo.
Allied Elctrns. Corp., Chicago, Ill.
Anritsu Electric Co., Ltd., Tokyo, Japan
Arvin Sys., Inc., Dayton, Ohio
Brelonix, Inc., Seattle, Wash
Communication Elctrns., Rockville, Md.
Conrac Div., Covina, Calif.
Dittmore-Freimuth Corp., Milwaukee, Wisc.
Drake, R.L., Co., Miamisburg, Ohio
Electrac, Inc., Anaheim, Calif.
Elctrn. Comm., Inc., St. Petersburg, Fla.
Engineering Assocs., Dayton, Ohio
GTE Sylvania Inc., Elctrn. Sys. Gp., Waltham, Mass.
Hammarlund Mfg. Co., Red Bank, N.J.
Hermes Elctrns., Dartmouth N.S., Can.
Honeywell Information Systems, Wellesley Hills, Mass
Hughes Aircraft Co, Culver City, Cal.
Hughes Aircraft Co, Fullerton, Cal.
Itek Corp., Lexington, Mass.
ITT Mackay Marine, Clark, N.J.
Lear Siegler, Grand Rapids, Mich.
Linear Sys., Inc., Watsonville, Calif.
Lingenfelter Applied Tech., Gaithersburg, Md.
LTV Electrosystems, Dallas, Tex.
Maury Microwave Corp., Cucamonga, Calif.
Mobil Elctrns., Inc., Anderson, Ind.
Philco-Ford Corp., Washington, D.C.
Racal Communications, Rockville, Md.
RF Communications, Inc., Rochester, N.Y.
Scientific Communications, Garland, Tex.
Servo Corp. America, Hicksville, N.Y.
Siemens Corp., Comps. Div., Iselin, N.J.
Unimetrics, Inc., Plainview, N.Y.
Weitermann Elctrns., Milwaukee, Wisc.
Western Microwave Labs., Los Gatos, Cal.

Receivers, Multiplex

Nippon Electric/NEC America, N.Y., N.Y.
Aeg-Telefunken Corp., Englewood Cliffs, N.J.
AMBAC Inds., Garden City, N.Y.
Anritsu Electric Co., Ltd., Tokyo, Japan
Avco Corp., Cincinnati, Ohio
Bogen Div., Paramus, N.J.
Bristol Div, Waterbury, Conn
Browning Labs., Laconia, N.H.
Collins Radio Co., Dallas, Tex.
Components Specialties, Inc., Freeport, N.Y.
Dittmore-Freimuth Corp., Milwaukee, Wisc.
Electron Enterprises, Inc., Berwyn, Ill.
Fisher Radio, Long Island City, N.Y.
GTE Sylvania Inc., Elctrn. Sys. Gp., Waltham, Mass.
Heath Co., Benton Harbor, Mich.
Honeywell Information Systems, Wellesley Hills, Mass
Hughes Aircraft Co, Culver City, Cal.
Hughes Aircraft Co, Fullerton, Cal.
ISC/Telephonics Div, Huntington, N.Y.
Lear Siegler, Inc., Santa Monica, Calif.
Major Elctrns. Corp., Brooklyn, N.Y.
Philco-Ford Corp., Washington, D.C.
Philmore Mfg. Co., Richmond Hill, N.Y.
RCA Corp., Camden, N.J.
RCA Govt. & Comm. Sys., Moorestown, N.J.
RFL Inds., Comms. Div., Boonton, N.J.
Roberts Div., Los Angeles, Cal.
Rohde & Schwarz Sls., Passaic, N.J.
Singer - Tele-Signal, Woodbury, N.Y.
Technical Mat'l., Mamaroneck, N.Y.
V-M Corp., Benton Harbor, Mich.

Receivers, Panoramic

American Elctrn. Labs., Inc., Lansdale, Pa.
Electro/Data, Inc., Garland, Tex. p 1559
Honeywell, Denver, Colo.
Marconi Instrs., Englewood, N.J... p 521
Nelson Ross Elctrns., Lake Success, N.Y.
Polarad Elctrn. Instrs., Lake Success, N.Y.
Applied Tech., Palo Alto, Cal.
Arco Systems Inc., Palo Alto, Cal
AUL Instrs., Inc., Flushng, N.Y.
Avantek, Inc., Santa Clara, Cal.
Collins Radio Co., Dallas, Tex.
Dittmore-Freimuth Corp., Milwaukee, Wisc.
Fairchild Electro-Metrics, Amsterdam, N.Y.
Fairchild Space & Defense Sys., Syosset, N.Y.
General Dynamics, San Diego, Cal.
GTE Sylvania Inc., Elctrn. Sys. Gp., Waltham, Mass.
HRB-Singer, Inc., State College, Pa.
Hughes Aircraft Co, Culver City, Cal.
Hughes Aircraft Co, Fullerton, Cal.
Itek Corp., Lexington, Mass.
Loral Elctrn. Sys., Bronx, N.Y.
Racal Communications, Rockville, Md.
Rohde & Schwarz Sls., Passaic, N.J.
Scientific Communications, Garland, Tex.
Thomson-CSF Inc., New York, N.Y.

Receivers, Phase Lock

American Elctrn. Labs., Inc., Lansdale, Pa.
Austron, Inc., Austin, Tex.
Lorch Elctrns. Corp., Englewood, N.J.
Polarad Elctrn. Instrs., Lake Success, N.Y.
Specific Products, Monrovia, Cal. p 325
Aerospace Resch. Inc., Boston, Mass.
AMBAC Inds., Garden City, N.Y.
A.R.F. Products, Inc., Boulder, Colo.
Beukers Labs., Inc., Hauppauge, N.Y.
Electrac, Inc., Anaheim, Calif.
General Dynamics, San Diego, Cal.
Hughes Aircraft Co, Culver City, Cal.
Hughes Aircraft Co, Fullerton, Cal.
ITT Aerospace, San Fernando, Cal.
Lear Siegler, Inc., Santa Monica, Calif.
Lear Siegler, Grand Rapids, Mich.
Microwave Assocs., Inc., Burlington, Mass.
Philco-Ford Corp., Washington, D.C.
Pickard & Burns Inc., Lindenhurst, N.Y.
Racal Communications, Rockville, Md.
Scientific-Atlanta, Inc., Atlanta, Ga.
Trak Microwave, Tampa, Fla.

Receivers, Radar

Frequency Engrg. Labs., Farmingdale, N.J.
Lorch Elctrns. Corp., Englewood, N.J.
RHG Elctrns. Lab., Farmingdale, N.Y. p 612
Vega Precision Labs., Vienna, Va.
Aerospace Resch. Inc., Boston, Mass.
AIL, Div. Cutler-Hammer, Inc., Deer Park, N.Y.
Alden Elctrn. & Impulse Record. Equip., Westboro, Mass.
Arco Systems Inc., Palo Alto, Cal
ASC Sys. Corp., Chicago, Ill.
Avco Corp., Cincinnati, Ohio
Cardion Elctrns., Woodbury, N.Y.
Collins Radio Co., Cedar Rapids, Iowa
Collins Radio Co., Dallas, Tex.
Conductron Corp., St. Charles, Mo.
Dittmore-Freimuth Corp., Milwaukee, Wisc.
General Dynamics, San Diego, Cal.
General Instr. Corp., Hicksville, N.Y.
GTE Sylvania Inc., Elctrn. Sys. Gp., Waltham, Mass.
Hughes Aircraft Co, Culver City, Cal.
Hughes Aircraft Co, Fullerton, Cal.
Int'l. Microwave, Cos Cob, Conn.
Loral Elctrn. Sys., Bronx, N.Y.
Maxson Elctrns. Div., Great River, N.Y.
Microwave Assocs., Inc., Burlington, Mass.
Microwave/Sys., Inc., E. Syracuse, N.Y.
Motorola, Scottsdale, Ariz.
Philips Elctrns. Inds., Ltd., Toronto 17, Can.
Raytheon Co., Lexington, Mass.
RCA Corp., Camden, N.J.
RCA Govt. & Comm. Sys., Moorestown, N.J.
Regency Elctrns., Inc., Indianapolis, Ind.
Sage Labs. Inc., Natick, Mass.
Sanders Assocs., Nashua, N.H.
Special Microwave Devices Oper., Waltham, Mass.
Sperry Marine Sys., Charlottesville, Va.
Systems Resch. Labs., Dayton, Ohio
Westinghouse Elec. Corp., Pittsburgh, Pa.

Receivers, Radio Paging—See Comm. Systems, Selective Paging

Receivers, Radiometric—See Radiometers

Receivers, Rebroadcast

Conrac Div., Covina, Calif.
Fisher Radio, Long Island City, N.Y.
Microwave Assocs., Inc., Burlington, Mass.
Racal Communications, Rockville, Md.
Rodelco, Deer Park, N.Y.
Rohde & Schwarz Sls., Passaic, N.J.
Standard Elctrns. Corp., Freehold, N.J.

Receivers, Search & Countermeasure

American Elctrn. Labs., Inc., Lansdale, Pa.
Electro/Data, Inc., Garland, Tex.
Frequency Engrg. Labs., Farmingdale, N.J.
Honeywell, Denver, Colo.
Lorch Elctrns. Corp., Englewood, N.J.
Polarad Elctrn. Instrs., Lake Success, N.Y.
RHG Elctrns. Lab., Farmingdale, N.Y.
Ryka Scientific, Inc., Sunnyvale, Cal.
Watkins Johnson Co., Palo Alto, Cal.
AIL, Div. Cutler-Hammer, Inc., Deer Park, N.Y.
Amecom Div., College Park, Md.
Anaren Microwave, Inc., Syracuse, N.Y.
Applied Tech., Palo Alto, Cal.
A.R.F. Products, Inc., Raton, N.M.
Arco Systems Inc., Palo Alto, Cal
Arvin Sys., Inc., Dayton, Ohio
Astro Comm. Lab., Gaithersburg, Md.
Avantek, Inc., Santa Clara, Cal.
Avco Corp., Cincinnati, Ohio
Collins Radio Co., Dallas, Tex.
Communication Elctrns., Rockville, Md.
Conductron Corp., St. Charles, Mo.
Dalmo Victor, Belmont, Calif.
Defense Elctrns., Inc., Rockville, Md.
Dittmore-Freimuth Corp., Milwaukee, Wisc.
Dorsett Elctrns., Tulsa, Okla.
Engineering Assocs., Dayton, Ohio
Fairchild Electro-Metrics, Amsterdam, N.Y.
General Dynamics, San Diego, Cal.
General Instr. Corp., Hicksville, N.Y.
GTE Sylvania Inc., Elctrn. Sys. Gp., Waltham, Mass.
Hermes Elctrns., Dartmouth N.S., Can.
HRB-Singer, Inc., State College, Pa.
Hughes Aircraft Co, Culver City, Cal.
Hughes Aircraft Co, Fullerton, Cal.
ISC/Telephonics Div, Huntington, N.Y.
Itek Corp., Lexington, Mass.
ITT Aerospace, San Fernando, Cal.
ITT Mackay Marine, Clark, N.J.
Lear Siegler, Grand Rapids, Mich.
Loral Elctrn. Sys., Bronx, N.Y.
Micro-Tel Corp., Baltimore, Md.
Olektron Corp., Dudley, Mass.
Racal Communications, Rockville, Md.
Radiation Sys., Inc., McLean, Va.
Raytheon Co., Lexington, Mass.
RCA Govt. & Comm. Sys., Moorestown, N.J.
Sanders Assocs., Nashua, N.H.
Scientific Communications, Garland, Tex.
Servo Corp. America, Hicksville, N.Y.
Western Microwave Labs., Los Gatos, Cal.

Receivers, Single-Sideband

Frequency Engrg. Labs., Farmingdale, N.J.
Lorch Elctrns. Corp., Englewood, N.J.
Marconi Instrs., Englewood, N.J... p 521

Aerocom, Miami, Fla.
Aeronautical Comm. Equip. Inc., Miami, Fla.
Anritsu Electric Co., Ltd., Tokyo, Japan
Arvin Sys., Inc., Dayton, Ohio
Avco Corp., Cincinnati, Ohio
Barker & Williamson, Bristol, Pa.
Brelonix, Inc., Seattle, Wash
Collins Radio Co., Cedar Rapids, Iowa
Collins Radio Co., Dallas, Tex.
Communication Elctrns., Rockville, Md.
Dittmore-Freimuth Corp., Milwaukee, Wisc.
Drake, R.L., Co., Miamisburg, Ohio
Electrac, Inc., Anaheim, Calif.
Elctrn. Comm., Inc., St. Petersburg, Fla.
General Dynamics, San Diego, Cal.
General Instr. Corp., Hicksville, N.Y.
General Radiotelephone Co., Burbank, Cal.
GTE Sylvania Inc., Elctrn. Sys. Gp., Waltham, Mass.
Hammarlund Mfg. Co., Red Bank, N.J.
Heath Co., Benton Harbor, Mich.
ITT Mackay Marine, Clark, N.J.
Kahn Resch. Labs., Inc., Freeport, N.Y.
Linear Sys., Inc., Watsonville, Calif.
Micro-Tel Corp., Baltimore, Md.
Philips Elctrns. Inds., Ltd., Toronto 17, Can.
Prodelin, Inc., Hightstown, N.J.
Racal Communications, Rockville, Md.
Railway Comm., Raytown, Mo.
RCA Corp., Camden, N.J.
RCA Govt. & Comm. Sys., Moorestown, N.J.
Regency Elctrns., Inc., Indianapolis, Ind.
RF Communications, Inc., Rochester, N.Y.
RFL Inds., Comms. Div., Boonton, N.J.
Rohde & Schwarz Sls., Passaic, N.J.
Siemens Corp., Comps. Div., Iselin, N.J.
Technical Mat'l., Mamaroneck, N.Y.
Thomson-CSF Inc., New York, N.Y.
Weitermann Elctrns., Milwaukee, Wisc.

Receivers, Telemetry

American Elctrn. Labs., Inc., Lansdale, Pa.
Applied Research Inc., Port Washington, N.Y.
Bramco Controls, Piqua, Ohio
Frequency Engrg. Labs., Farmingdale, N.J.
Lorch Elctrns. Corp., Englewood, N.J.
Quindar Elctrns., Inc., Springfield, N.J. p 953
RHG Elctrns. Lab., Farmingdale, N.Y.
Vega Precision Labs., Vienna, Va.
Watkins Johnson Co., Palo Alto, Cal.
Aertech Inds., Sunnyvale, Calif.
AMBAC Inds., Garden City, N.Y.
Anritsu Electric Co., Ltd., Tokyo, Japan
A.R.F. Products, Inc., Raton, N.M.
Astro Comm. Lab., Gaithersburg, Md.
Autocon Inds., Inc., St. Paul, Minn.
Avco Corp., Cincinnati, Ohio
Bailey Meter Co., Wickliffe, Ohio
Beukers Labs., Inc., Hauppauge, N.Y.
BF Elctrns., Solana Beach, Calif.
Biocom, Inc., Culver City, Cal.
Bristol Div, Waterbury, Conn
Communication Elctrns., Rockville, Md.
Defense Elctrns., Inc., Rockville, Md.
Dorsett Elctrns., Tulsa, Okla.
Electrac, Inc., Anaheim, Calif.
Elctrn. Comm., Inc., St. Petersburg, Fla.
Fischer & Porter Co., Warminster, Pa.
Foxboro Co., Foxboro, Mass.
General Dynamics, San Diego, Cal.
Hughes Aircraft Co, Culver City, Cal.
Hughes Aircraft Co, Fullerton, Cal.
ITT Aerospace, San Fernando, Cal.
Lear Siegler, Inc., Santa Monica, Calif.
Leupold & Stevens, Inc., Beaverton, Ore.
Mennen-Greatbatch Elctrns., Inc., Clarence, N.Y.
Microwave Assocs., Inc., Burlington, Mass.
Philco-Ford Corp., Washington, D.C.
Prodelin, Inc., Hightstown, N.J.
RFL Inds., Comms. Div., Boonton, N.J.
Schneider Instr. Co., Cincinnati, Ohio
Scientific-Atlanta, Inc., Atlanta, Ga.
Scientific Communications, Garland, Tex.
Special Microwave Devices Oper., Waltham, Mass.
Stoelting Co., Chicago, Ill.
Trak Microwave, Tampa, Fla.
Wand Elctrns., Inc., Old Bethpage, N.Y.

Receivers, Time Code

Austron, Inc., Austin, Tex.
Chrono-log Corp., Broomall, Pa. .. p 340
Parabam, Inc., Compton, Cal.
Specific Products, Monrovia, Cal. p 325
Aerospace Resch. Inc., Boston, Mass.
AMBAC Inds., Garden City, N.Y.
Anritsu Electric Co., Ltd., Tokyo, Japan
Communication Elctrns., Rockville, Md.
Datatron, Inc., Santa Ana, Cal
Hughes Aircraft Co, Culver City, Cal.
Hughes Aircraft Co, Fullerton, Cal.
Loral Elctrn. Sys., Bronx, N.Y.

Receivers, Tone

Bramco Controls, Piqua, Ohio .... p 1406
Douglas Randall Div., Pawcatuck, Conn.
Honeywell, Denver, Colo.
Multitech Data Prods., Monterey Pk., Cal. ..... p 363
Quindar Elctrns., Inc., Springfield, N.J.
Seg Elctrns., Richmond Hill, N.Y.
Aerospace Resch. Inc., Boston, Mass.
Arvin Sys., Inc., Dayton, Ohio
Avco Corp., Cincinnati, Ohio
BF Elctrns., Solana Beach, Calif.
Cardion Communications, Woodbury, N.Y.
Collins Radio Co., Dallas, Tex.
Dorsett Elctrns., Tulsa, Okla.
Gosh Instrs., Inc., Wethersfield, Conn.
HB Engrg. Corp., Silver Spring, Md.
Lear Siegler, Inc., Santa Monica, Calif.
Linear Corp., Inglewood, Calif.
Mobil Elctrns., Inc., Anderson, Ind.
Philips Elctrns. Inds., Ltd., Toronto 17, Can.
Prodelin, Inc., Hightstown, N.J.
Reach Elctrns., Inc., Lexington, Neb.
Regency Elctrns., Inc., Indianapolis, Ind.
RFL Inds., Comms. Div., Boonton, N.J.
Secode Elctrns., Dallas, Texas
Singer - Tele-Signal, Woodbury, N.Y.
Stromberg Carlson Corp., Rochester, N.Y.
Trepac Corp. America, Englewood, N.J.

Receivers, Transmissometer

Winslow Tele-Tronics, Inc., Eatontown, N.J.

Receivers, Tropospheric Scatter

Frequency Engrg. Labs., Farmingdale, N.J.
RHG Elctrns. Lab., Farmingdale, N.Y.
Aerocom, Miami, Fla.
Aeronautical Comm. Equip. Inc., Miami, Fla.
GTE Sylvania Inc., Elctrn. Sys. Gp., Waltham, Mass.
Hughes Aircraft Co, Culver City, Cal.
Hughes Aircraft Co, Fullerton, Cal.
Philco-Ford Corp., Washington, D.C.

Receivers, Tv—See Monitors, Video

Receivers, UHF & VHF

American Elctrn. Labs., Inc., Lansdale, Pa.
Applied Research Inc., Port Washington, N.Y.
Electro/Data, Inc., Garland, Tex.
Frequency Engrg. Labs., Farmingdale, N.J.
Honeywell, Denver, Colo.
Lorch Elctrns. Corp., Englewood, N.J. p 609
Marconi Instrs., Englewood, N.J... p 521
RHG Elctrns. Lab., Farmingdale, N.Y.
Ryka Scientific, Inc., Sunnyvale, Cal.
Vega Precision Labs., Vienna, Va.
Watkins Johnson Co., Palo Alto, Cal.
Aerocom, Miami, Fla.
Aeronautical Comm. Equip. Inc., Miami, Fla.
Aerospace Resch. Inc., Boston, Mass.
AIL, Div. Cutler-Hammer, Inc., Deer Park, N.Y.
Allied Elctrns. Corp., Chicago, Ill.
AMBAC Inds., Garden City, N.Y.
Anritsu Electric Co., Ltd., Tokyo, Japan
A.R.F. Products, Inc., Boulder, Colo.
A.R.F. Products, Inc., Raton, N.M.
Arco Systems Inc., Palo Alto, Cal
Arvin Sys., Inc., Dayton, Ohio
Astro Comm. Lab., Gaithersburg, Md.
Audiotronics, N. Hollywood, Cal.
Avco Corp., Cincinnati, Ohio
Beukers Labs., Inc., Hauppauge, N.Y.
BF Elctrns., Solana Beach, Calif.
Cardion Communications, Woodbury, N.Y.
CCA Elctrns. Corp., Gloucester, N.J.
Collins Radio Co., Cedar Rapids, Iowa
Collins Radio Co., Dallas, Tex.
Communication Elctrns., Rockville, Md.
Communications Co., Inc., Coral Gables, Fla.
Components Specialties, Inc., Freeport, N.Y.
Concord Elctrns., Los Angeles, Cal.
Conductron Corp., St. Charles, Mo.
Defense Elctrns., Inc., Rockville, Md.
Dittmore-Freimuth Corp., Milwaukee, Wisc.
Dorsett Elctrns., Tulsa, Okla.
Electrac, Inc., Anaheim, Calif.
Elctrn. Comm., Inc., St. Petersburg, Fla.
Emcee Elctrns., Inc., New Castle, Del.
Engineering Assocs., Dayton, Ohio
Fairchild Electro-Metrics, Amsterdam, N.Y.
Fanon Elctrns., Hillside, N.J.
Fargo Co., San Francisco, Calif.
Farinon Electric, San Carlos, Calif.
General Dynamics, San Diego, Cal.
General Elec., Lynchburg, Va.
General Instr. Corp., Hicksville, N.Y.
General Radiotelephone Co., Burbank, Cal.
GTE Sylvania Inc., Elctrn. Sys. Gp., Waltham, Mass.
GTE Sylvania Inc., Batavia, N Y
Hammarlund Mfg. Co., Red Bank, N.J.
Heath Co., Benton Harbor, Mich.
HRB-Singer, Inc., State College, Pa.
Hughes Aircraft Co, Fullerton, Cal.
Instru-Lec Corp., Mt. Vernon, N.Y.
International Scanatron Sys., Wyandanch, N.Y.
ISC/Telephonics Div, Huntington, N.Y.
Itek Corp., Lexington, Mass.
ITT Aerospace, San Fernando, Cal.
Kahn Resch. Labs., Inc., Freeport, N.Y.
Lear Siegler, Inc., Santa Monica, Calif.
Lingenfelter Applied Tech., Gaithersburg, Md.
Loral Elctrn. Sys., Bronx, N.Y.
LTV Electrosystems, Dallas, Tex.
Micro-Tel Corp., Baltimore, Md.
Mobil Elctrns., Inc., Anderson, Ind.
Motorola, Scottsdale, Ariz.
Narco Avionics, Ft. Washington, Pa.
Olektron Corp., Dudley, Mass.
Pearce-Simpson, Miami, Fla.
Philco-Ford Corp., Washington, D.C.
Port-O-Vox Enterprises, Corp., New York, N.Y.
Rantec Div., Calabasas, Calif.
RCA Govt. & Comm. Sys., Moorestown, N.J.
Regency Elctrns., Inc., Indianapolis, Ind.
RF Communications, Inc., Rochester, N.Y.
Rodelco, Deer Park, N.Y.
Rohde & Schwarz Sls., Passaic, N.J.
Servo Corp. America, Hicksville, N.Y.
Shibaden Corp. Amer., Woodside, N.Y.
Special Microwave Devices Oper., Waltham, Mass.
Standard Elctrns. Corp., Freehold, N.J.
Standard Winding Co., Newsburgh, N.Y.
Systems Resch. Labs., Dayton, Ohio
Thomson-CSF Inc., New York, N.Y.
VIKOA, Hoboken, N.J.
Wand Elctrns., Inc., Old Bethpage, N.Y.
Western Microwave Labs., Los Gatos, Cal.

Receivers, Ultraviolet

Abtronics, Inc., Livermore, Calif.
Hughes Aircraft Co, Fullerton, Cal.

Receivers, VLF

Austron, Inc., Austin, Tex.
Fluke, John Mfg. Co., Inc., Seattle, Wash.
Frequency Elctrns., New Hyde Pk., N.Y.
Geo Space Sys., Tampa, Fla. ..... p 486
Hewlett-Packard, Palo Alto, Cal.
Honeywell, Denver, Colo.
Marconi Instrs., Englewood, N.J... p 521
Metric Sys., Ft. Walton Beach, Fla.p 358
Watkins Johnson Co., Palo Alto, Cal.
Aerospace Resch. Inc., Boston, Mass.
Anritsu Electric Co., Ltd., Tokyo, Japan
Beukers Labs., Inc., Hauppauge, N.Y.
CCA Elctrns. Corp., Gloucester, N.J.
Collins Radio Co., Dallas, Tex.
Communication Elctrns., Rockville, Md.
Drake, R.L., Co., Miamisburg, Ohio
Fairchild Electro-Metrics, Amsterdam, N.Y.
GTE Sylvania Inc., Elctrn. Sys. Gp., Waltham, Mass.
Hammarlund Mfg. Co., Red Bank, N.J.
HRB-Singer, Inc., State College, Pa.
Hughes Aircraft Co, Fullerton, Cal.
ITT Avionics Div, Nutley, N.J.
ITT Mackay Marine, Clark, N.J.
Lear Siegler, Grand Rapids, Mich.
Philips Elctrns. Inds., Ltd., Toronto 17, Can.
Pickard & Burns Inc., Lindenhurst, N.Y.
Racal Communications, Rockville, Md.
Railway Comm., Raytown, Mo.
RCA Govt. & Comm. Sys., Moorestown, N.J.
Rohde & Schwarz Sls., Passaic, N.J.
Systems Resch. Labs., Dayton, Ohio
Technical Mat'l., Mamaroneck, N.Y.
Tracor, Inc., Austin, Tex.
Westinghouse Elec. Corp., Pittsburgh, Pa.

Receivers, WWV

Austron, Inc., Austin, Tex.
Metric Sys., Ft. Walton Beach, Fla.p 358
Specific Products, Monrovia, Cal. p 325
Beukers Labs., Inc., Hauppauge, N.Y.
Collins Radio Co., Dallas, Tex.
Drake, R.L., Co., Miamisburg, Ohio
Engineering Assocs., Dayton, Ohio
General Microwave Corp., Farmingdale, N.Y.
Hammarlund Mfg. Co., Red Bank, N.J.
Hughes Aircraft Co, Fullerton, Cal.
ITT Mackay Marine, Clark, N.J.
Linear Sys., Inc., Watsonville, Calif.
Pickard & Burns Inc., Lindenhurst, N.Y.
Projects Unlimited, Inc., Dayton, Ohio
RF Communications, Inc., Rochester, N.Y.
Sprengnether, W.F. Instr. Co., Inc., St. Louis, Mo.
Weitermann Elctrns., Milwaukee, Wisc.

Receptacles—See Connectors; Jacks; Sockets—Vol 3

Receptacles, Antenna Tapping—See Vol 3

Recorders, Antenna Pattern

Datacom, Inc., Ft. Walton Bch., Fla.
Hughes Aircraft Co, Culver City, Cal.
Leeds & Northrup Corp., No. Wales, Pa.
Loral Elctrn. Sys., Bronx, N.Y.
Scientific-Atlanta, Inc., Atlanta, Ga.

Recorders, Blood Pressure

American Elctrn. Labs., Inc., Lansdale, Pa.
Computer Instrs., Hempstead, N.Y.
Dohrmann Div., Mountain View, Cal.
Gould, Inc., Cleveland, Ohio ....p 588,589
Hewlett-Packard, Palo Alto, Cal.
Honeywell, Denver, Colo.
Techni-Rite Elctrns., E. Greenwich, R.I.
Avionics Resch. Prods., Los Angeles, Calif.
Bio-Medical Elctrns., Inc., Rockville, Md.
Bionic Instrs., Inc., Bala Cynwyd, Pa.
Mechanics For Elctrns., Inc., Wilmington, Mass.
Mennen-Greatbatch Elctrns., Inc., Clarence, N.Y.
Remler Co., San Francisco, Calif.
Soltec Corp., No. Hollywood, Cal.
Stoelting Co., Chicago, Ill.
Systems Resch. Labs., Dayton, Ohio
Waters Instrs., Inc., Rochester, Minn

Recorders, Code

(NES) Nationwide Elctrn. Sys., Itasca, Ill. ..... p 365
Astro-Science, S. El Monte, Cal.
Computer Mate, Inc., San Clemento, Cal
Digi-Data Corp., Bladensburg, Md.
Echo Science Corp., Mountain View, Cal.
Hughes Aircraft Co, Fullerton, Cal.
KDI Adtrol, Inc., Broomall, Pa.
Leach Corp., Azusa,, Cal.
Marathon Instrs. Div., Pico Rivera, Calif.
McElroy Elctrns. Corp., Shirley, Mass.
O E M Prods., Carlstadt, N.J.
Rochester Instr. Sys., Rochester, N.Y.
Telectro Sys. Corp., Corona, N.Y.

Recorders, Computer Data—See Data Recorders, Computer

Recorders, Disc

Burroughs Corp., Los Angeles, Cal. p 338
Ampex Corp., Redwood City, Calif.
Barger Corp., Sunnyvale, Cal.
Beckman Instrs., (AISSD), Fullerton, Cal.
Computer Prods. Int'l., Inc., Santa Clara, Calif.
Data Disc Inc., Computer Prods., Sunnyvale, Cal.
Edison, Thomas A. Instr. Div., W. Orange, N.J.
Gotham Audio Corp., New York, N.Y.
Schoeffel Instr. Corp., Westwood, N.J.
Soltec Corp., No. Hollywood, Cal.
Video Resch. Corp., Rockville, Md.

Recorders, Electronic, Rotary Stylus

Computer Instrs., Hempstead, N.Y.
A & M Instrument, Inc., Great Neck, N.Y.
Bludworth Marine Div., Linden, N.J.
Echo Science Corp., Mountain View, Cal.
Edison, Thomas A. Instr. Div., W. Orange, N.J.
Edo Western Corp., Salt Lake City, Utah
Honeywell, Ft. Washington, Pa.
Japanese Prods. Corp., New Rochelle, N.Y.
Loral Elctrn. Sys., Bronx, N.Y.
Telmar, Inc., Columbus, Ohio

Recorders, Electrostatic

Gould, Inc., Cleveland, Ohio
Information Displays, Inc., Mt. Kisco, N.Y.
Kahl Scientific Instr. Corp., El Cajon, Calif.
KDI Adtrol, Inc., Broomall, Pa.
Litton Inds., San Carlos, Calif.
Miles Reproducer Co., Inc., New York, N.Y.
Raytheon Co., Lexington, Mass.
Varian Aerograph, Walnut Creek, Calif.
Varian Assocs., Palo Alto, Cal.
Varian Data Machines, Palo Alto, Cal.

Recorders, Event

Dohrmann Div., Mountain View, Cal. p 594
Gould, Inc., Cleveland, Ohio
Larson Instr. Co., Inc., Orangeburg, N.Y. p 513
PPM, Inc., Bedford, Ohio
Rustrak Instr. Div., Manchester, N.H. p 595
Techni-Rite Elctrns., E. Greenwich, R.I. p 596,597
Alden Elctrn. & Impulse Record. Equip., Westboro, Mass.
Amprobe Instr., Lynbrook, N.Y.
Artisan Elctrns. Corp., Parsippany, N.J.
Bell & Howell Co., Pasadena, Calif.
Borg-Warner Controls, Santa Ana, Cal.
Clary Corp., San Gabriel, Calif.
Engdahl Enterprises, Costa Mesa, Cal.
Engler Instr. Corp., Jersey City, N.J.
Essex Engrg. Co., Inc., Essex, Conn.
Esterline Angus Div., Indianapolis, Ind.
Geo Space, Houston, Tex.
Incre-Data Corporation, Albuquerque, N.M.
Instrument Data Products, Camarillo, Cal.
Japanese Prods. Corp., New Rochelle, N.Y.
Keithley Instrs., Inc., Cleveland, Ohio
Kenton Engrg. Corp., Skokie, Ill.
Lehigh Valley Elctrn., Inc., Fogelsville, Pa.
Mechanics For Elctrns., Inc., Wilmington, Mass.
Photron Instr. Co., Cleveland, Ohio
Soltec Corp., No. Hollywood, Cal.
Stoelting Co., Chicago, Ill.
Sunshine Sci. Instrs., Inc., Philadelphia, Pa.
Telectro Sys. Corp., Corona, N.Y.
Telmar, Inc., Columbus, Ohio
Texas Instruments, Inc., Houston, Tex.
Varian Assocs., Palo Alto, Cal.
Varian Data Machines, Palo Alto, Cal.

Recorders, F-M—See Recorders, Magnetic Tape

Recorders, Facsimile

Nippon Electric/NEC America, N.Y., N.Y.
Alden Elctrn. & Impulse Record. Equip., Westboro, Mass.
Alden Sys. Co., Inc., Westboro, Mass.
Bell & Howell Co., Pasadena, Calif.
International Scanatron Sys., Wyandanch, N.Y.
Litton Inds., San Carlos, Calif.
Muirhead, Inc., Mountainside, N.J.
Telmar, Inc., Columbus, Ohio
3M Co., St. Paul, Minn.

Recorders, Film—See Vol 2

Recorders, Film Strip, Magnetic

Int'l. Electro-Magnetics, Palatine, Ill. p 311
Edo Western Corp., Salt Lake City, Utah
Electronic Design Labs., Inc., Phila., Pa.
Hallmark Standards, Inc., Mt. Vernon, N.Y.
Hughes Aircraft Co, Fullerton, Cal.
Litton Inds., San Carlos, Calif.
Miles Reproducer Co., Inc., New York, N.Y.
Tensitron, Inc., Harvard, Mass.

Recorders, Flight

Cook Electric Co., Morton Grove, Ill.
Honeywell, Denver, Colo.
Ampex Corp., Redwood City, Calif.
Astro-Science, S. El Monte, Cal.
Borg-Warner Controls, Santa Ana, Cal.
Cardion Elctrns., Woodbury, N.Y.
Collins Radio Co., Cedar Rapids, Iowa
Conrac Corp., New York, N.Y.
Echo Science Corp., Mountain View, Cal.
Echo Science Corp., Pasadena, Cal.
Genisco Tech. Corp., Data Div., Compton, Cal.
Honeywell, Aerospace & Def., Minneapolis, Minn.
Hughes Aircraft Co, Culver City, Cal.
Hughes Aircraft Co, Fullerton, Cal.
Hydro-Aire Div., Burbank, Calif.
Incre-Data Corporation, Albuquerque, N.M.
Leach Corp., Azusa,, Cal.
Leach Corp., Los Angeles, Cal.
Lockheed Aircraft Svc., Ont., Cal.
Lockheed Aircraft Svce., Special Devices Div., Ontario, Calif.
Lockheed Elctrns. Co., Watchung, N.J.
Marathon Instrs. Div., Pico Rivera, Calif.
Miles Reproducer Co., Inc., New York, N.Y.
Odetics, Inc., Anaheim, Cal.
Pemco, Palo Alto, Calif.
Precision Instr. Co., Palo Alto, Calif.
Raymond Engrg., Inc., Middletown, Conn.
Rodale Elctrns., Inc., Garden City, N.Y.
Sanders Assocs., Nashua, N.H.
Soltec Corp., No. Hollywood, Cal.
Sundstrand Data Control, Redmond, Wash.

Recorders, Frequency

Electro/Data, Inc., Garland, Tex. p 1559
Hewlett-Packard, Palo Alto, Cal.
Larson Instr. Co., Inc., Orangeburg, N.Y. p 513
Nelson Ross Elctrns., Lake Success, N.Y.
Rustrak Instr. Div., Manchester, N.H.
Techni-Rite Elctrns., E. Greenwich, R.I. p 596
Westinghouse Elec. Corp., Newark, N.J.
A & M Instrument, Inc., Great Neck, N.Y.
Esterline Angus Div., Indianapolis, Ind.
Honeywell, Ft. Washington, Pa.
Leeds & Northrup Corp., No. Wales, Pa.
Listening, Inc., Arlington, Mass.
Mechanics For Elctrns., Inc., Wilmington, Mass.
Rohde & Schwarz Sls., Passaic, N.J.
Sanders Assocs., Nashua, N.H.
Siemens Corp., Measuring Instrs. Div., Iselin, N.J.
Sloan Technology Corp., Santa Barbara, Calif.
Soltec Corp., No. Hollywood, Cal.
Telmar, Inc., Columbus, Ohio
3M Co., St. Paul, Minn.
Westronics, Inc., Ft. Worth, Tex.

Recorders, Graphic—See Recorders (As Modified)

Recorders, Humidity (Electronic)

Dohrmann Div., Mountain View, Cal.
Rustrak Instr. Div., Manchester, N.H.
A. J. Abrams Co., Westport, Conn.
Atkins Technical, Inc., Gainesville, Fla.
Bacharach Instr. Co., Pittsburgh, Pa.
Bell & Howell Co., Pasadena, Calif.
Bristol Div, Waterbury, Conn
Esterline Angus Div., Indianapolis, Ind.
Foxboro Co., Foxboro, Mass.
Hill, E. Vernon, Inc., San Francisco, Calif.
Honeywell, Ft. Washington, Pa.
Hughes Aircraft Co, Culver City, Cal.
Hygrodynamics, Inc., Silver Spring, Md.
Integrated Dev. & Mfg. Co., Chagrin Falls, Ohio
Japanese Prods. Corp., New Rochelle, N.Y.
Kahl Scientific Instr. Corp., El Cajon, Calif.
Leeds & Northrup Corp., No. Wales, Pa.
Mechanics For Elctrns., Inc., Wilmington, Mass.
Taylor Instr. Process Control Div., Rochester, N.Y.
Telmar, Inc., Columbus, Ohio
Westronics, Inc., Ft. Worth, Tex.

Recorders, Long-Term Tape —See Recorders, Magnetic Tape

Recorders, Magnetic Tape (Lab Type)

American Astrionics, Hollywood, Cal
Austron, Inc., Austin, Tex.
Computer Instrs., Hempstead, N.Y.
Cook Electric Co., Morton Grove, Ill.
Crown Int'l., Elkhart, Ind. p 951
Dytro Corp., Hicksville, N.Y. p 440
Hewlett-Packard, Palo Alto, Cal.
Honeywell, Denver, Colo. p 590
Int'l. Electro-Magnetics, Palatine, Ill. p 311
Sangamo Elec. Co., Pickens, S.C.
Sangamo Elec. Co., Springfield, Ill. p 379
Teledyne Geotech, Dallas, Tex. p 950
Alcor, Inc., Ithaca, N.Y.
Alden Elctrn. & Impulse Record. Equip., Westboro, Mass.
Ampex Corp., Redwood City, Calif.
Artronix, Inc., St. Louis, Mo.
Astro-Science, S. El Monte, Cal.
Audio Instr. Co., Union City, N.J.
Audiotronics, N. Hollywood, Cal.
Auricord, Long Island City, N.Y.
Avionics Resch. Prods., Los Angeles, Calif.
Bell & Howell Co., Pasadena, Calif.
Borg-Warner Controls, Santa Ana, Cal.
Carolina Medical Elctrns., Inc., King, N.C.
Computer Mate, Inc., San Clemento, Cal
Data Recording Sys., Sunnyvale, Cal.
Defense Elctrns., Inc., Rockville, Md.
Digi-Data Corp., Bladensburg, Md.
Echo Science Corp., Mountain View, Cal.
Eico Electronic Instrument Co., Inc., Brooklyn, N.Y.
Electronic Design Labs., Inc., Phila., Pa.
General Radio Co., Concord, Mass.
Genisco Tech. Corp., Data Div., Compton, Cal.
Heitz, Karl, Inc., New York, N.Y.
Hughes Aircraft Co, Fullerton, Cal.
Incre-Data Corporation, Albuquerque, N.M.
Instrument Data Products, Camarillo, Cal.
Kennedy Co., Altadena, Calif.
Leach Corp., Azusa,, Cal.
Leach Corp., Los Angeles, Cal.
Lockheed Aircraft Svc., Ont., Cal.
Lockheed Elctrns. Co., Watchung, N.J.
Major Elctrns. Corp., Brooklyn, N.Y.
Miles Reproducer Co., Inc., New York, N.Y.
Multi Media Engrg., Inc., Rockville, Md.
Non-Linear Sys., Inc., Del Mar, Cal.
Nuclear Data, Inc., Palatine, Ill.
Orion Prods. Co., Sunnyvale, Cal.
Ortofon Div., New Hyde Park, N.Y.
Pemco, Palo Alto, Calif.
Peripheral Equip. Corp., Chatsworth, Cal.
Philips Elctrn. Instrs., Mt. Vernon, N.Y.
Potter Instr. Co., Melville, N.Y.
Precision Instr. Co., Palo Alto, Calif.
RCA Corp., Camden, N.J.
RCA Govt. & Comm. Sys., Moorestown, N.J.
RIL Elctrns., Inc., Southampton, Pa.
Tandberg of America, Inc., Pelham, N.Y.
TEAC Corp. of Amer., Santa Monica, Cal
Telectro Sys. Corp., Corona, N.Y.
Telex Comm. Div., Minneapolis, Minn.
Texas Instruments, Inc., Houston, Tex.
3M Co., St. Paul, Minn.
Transducer Controls Corp., Covina, Calif.
United Resch. Lab., Corp., New York, N.Y.
V-M Corp., Benton Harbor, Mich.
Vetter, A.R., Co., Rebersburg, Pa
Video Resch. Corp., Rockville, Md.
Visual Educom, Michigan City, Ind.
Wolff Industries, San Marino, Cal

Recorders, Moisture (Electronic)

Dohrmann Div., Mountain View, Cal.
Bell & Howell Co., Pasadena, Calif.
Esterline Angus Div., Indianapolis, Ind.
Foxboro Co., Foxboro, Mass.
General Elec. Co., W. Lynn, Mass.
Hygrodynamics, Inc., Silver Spring, Md.
Leach Corp., Azusa,, Cal.
Mechanics For Elctrns., Inc., Wilmington, Mass.
Rank Precision Inds., W. Nyack, N.Y.
Strandberg Engrg. Labs., Inc., Greensboro, N.C.
Telmar, Inc., Columbus, Ohio
Westronics, Inc., Ft. Worth, Tex.

Recorders, Oxygen(Ozone

Dohrmann Div., Mountain View, Cal.
Rustrak Instr. Div., Manchester, N.H. p 595
Anderson, W.E., Inc., Kansas City, Mo.
Beckman Instrs., Advanced Tech., Fullerton, Cal.
Beckman Instrs., (AISSD), Fullerton, Cal.
Beckman Instrs., Process Instrs., Fullerton, Cal.
Leach Corp., Azusa,, Cal.
Leeds & Northrup Corp., No. Wales, Pa.
Mast Dev. Co., Davenport, Iowa
Mechanics For Elctrns., Inc., Wilmington, Mass.
Telmar, Inc., Columbus, Ohio

Recorders, Polar

Techni-Rite Elctrns., E. Greenwich, R.I.
B & K Instrs., Inc., Cleveland, Ohio
Leeds & Northrup Corp., No. Wales, Pa.
Scientific-Atlanta, Inc., Atlanta, Ga.

Recorders, Power-Level

Austron, Inc., Austin, Tex.
Dohrmann Div., Mountain View, Cal.
Hewlett-Packard, Palo Alto, Cal.
Rustrak Instr. Div., Manchester, N.H. p 595
Sangamo Elec. Co., Springfield, Ill.
A & M Instrument, Inc., Great Neck, N.Y.
Bristol Div, Waterbury, Conn
Esterline Angus Div., Indianapolis, Ind.
Hallmark Standards, Inc., Mt. Vernon, N.Y.
Japanese Prods. Corp., New Rochelle, N.Y.
Mechanics For Elctrns., Inc., Wilmington, Mass.
Telmar, Inc., Columbus, Ohio

Recorders, Pressure (Electronic)

Austron, Inc., Austin, Tex.
Dohrmann Div., Mountain View, Cal.
General Elec. Co., Schenectady, N.Y.
Harrel, Inc., E. Norwalk, Conn. p 1973
Hewlett-Packard, Palo Alto, Cal.
Multitech Automation Prods., Monterey Pk., Cal.
Rustrak Instr. Div., Manchester, N.H. p 595
Bailey Meter Co., Wickliffe, Ohio
Barber-Colman Co., Industrial Instrs. Div., Rockford, Ill.
Beckman Instrs., Process Instrs., Fullerton, Cal.
Bell & Howell Co., Pasadena, Calif.
Bristol Div, Waterbury, Conn
Edison, Thomas A. Instr. Div., W. Orange, N.J.
Esterline Angus Div., Indianapolis, Ind.
Fischer & Porter Co., Warminster, Pa.
Foxboro Co., Foxboro, Mass.
Hill, E. Vernon, Inc., San Francisco, Calif.
Honeywell, Ft. Washington, Pa.
Integrated Dev. & Mfg. Co., Chagrin Falls, Ohio
Japanese Prods. Corp., New Rochelle, N.Y.
Leach Corp., Azusa,, Cal.
Lockheed Aircraft Svc., Ont., Cal.

Mechanics For Elctrns., Inc., Wilmington, Mass.
Robertshaw Controls Co., Ananeim, Cal.
Sensotec, Inc., Columbus, Ohio
Stoelting Co., Chicago, Ill.
Taylor Instr. Process Control Div., Rochester, N.Y.
Telmar, Inc., Columbus, Ohio
Vacuum Equip. Div., Newton, Mass.
West Coast Resch. Corp., Los Angeles, Calif.
West Instr. Div., Schiller Pk., Ill.
Westronics, Inc., Ft. Worth, Tex.

Recorders, Pyrometer—See Pyrometers, Recording

Recorders, Smoke & Combustion (Electronic)

Dohrmann Div., Mountain View, Cal.
General Elec. Co., Schenectady, N.Y.
Bailey Meter Co., Wickliffe, Ohio
Beckman Instrs., Process Instrs., Fullerton, Cal.
Edison, Thomas A. Instr. Div., W. Orange, N.J.
Electronic Control Corp., Detroit, Mich.
Esterline Angus Div., Indianapolis, Ind.
Honeywell, Ft. Washington, Pa.
Leeds & Northrup Corp., No. Wales, Pa.
Mechanics For Elctrns., Inc., Wilmington, Mass.
Photomation, Inc., Mountain View, Calif.
RIL Elctrns., Inc., Southampton, Pa.
Telmar, Inc., Columbus, Ohio
Westronics, Inc., Ft. Worth, Tex.

Recorders, Sound Level

Dohrmann Div., Mountain View, Cal.
Hewlett-Packard, Palo Alto, Cal.
Amstro Corp., Fairfield, N.J.
Astro-Science, S. El Monte, Cal.
B & K Instrs., Inc., Cleveland, Ohio
Borg-Warner Controls, Santa Ana, Cal.
Esterline Angus Div., Indianapolis, Ind.
General Radio Co., Concord, Mass.
Genisco Tech. Corp., Data Div., Compton, Cal.
Leach Corp., Azusa,, Cal.
Leach Corp., Los Angeles, Cal.
Marathon Instrs. Div., Pico Rivera, Calif.
Mechanics For Elctrns., Inc., Wilmington, Mass.
Scientific-Atlanta, Inc., Atlanta, Ga.
Sprengnether, W.F. Instr. Co., Inc., St. Louis, Mo.
Telmar, Inc., Columbus, Ohio

Recorders, Stereophonic Tape (Nonentertainment)

Alcor, Inc., Ithaca, N.Y.
Ampex Corp., Redwood City, Calif.
Amplifier Corp. America, Westbury, N.Y.
Audio Instr. Co., Union City, N.J.
Auricord, Long Island City, N.Y.
Barger Corp., Sunnyvale, Cal.
Borg-Warner Controls, Santa Ana, Cal.
Fargo Co., San Francisco, Calif.
Gotham Audio Corp., New York, N.Y.
Leach Corp., Azusa,, Cal.
Marathon Instrs. Div., Pico Rivera, Calif.
Stancil-Hoffman Corp., Hollywood, Calif.
Tandberg of America, Inc., Pelham, N.Y.
Telectro Sys. Corp., Corona, N.Y.
Telex Comm. Div., Minneapolis, Minn.
3M Co., St. Paul, Minn.
United Resch. Lab., Corp., New York, N.Y.
V-M Corp., Benton Harbor, Mich.
Vetter, A.R., Co., Rebersburg, Pa
Video Resch. Corp., Rockville, Md.
Visual Educom, Michigan City, Ind.

Recorders, Strain

Austron, Inc., Austin, Tex.
Dohrmann Div., Mountain View, Cal. p 592
Gould, Inc., Cleveland, Ohio ....p 588,589
Honeywell, Denver, Colo.
Houston Instr., Bellaire, Tex. ..... p 591
PPM, Inc., Bedford, Ohio ..... p 535
Rustrak Instr. Div., Manchester, N.H. p 595
Techni-Rite Elctrns., E. Greenwich, R.I. p 596,597
Barber-Colman Co., Industrial Instrs. Div., Rockford, Ill.
Bell & Howell Co., Pasadena, Calif.
Bristol Div, Waterbury, Conn
Doric Sci. Corp., San Diego, Calif.
Esterline Angus Div., Indianapolis, Ind.
Hallmark Standards, Inc., Mt. Vernon, N.Y.
Houston Scientific Inds., Inc., Houston, Tex
Japanese Prods. Corp., New Rochelle, N.Y.
Leeds & Northrup Corp., No. Wales, Pa.
Magnaflux Corp., Chicago, Ill.
Mennen-Greatbatch Elctrns., Inc., Clarence, N.Y.
Photron Instr. Co., Cleveland, Ohio
San-ei Instrument Co., Ltd., Shinjuku-ku, Tokyo 160, Japan
Sensotec, Inc., Columbus, Ohio
Soltec Corp., No. Hollywood, Cal.
Stoelting Co., Chicago, Ill.
Strandberg Engrg. Labs., Inc., Greensboro, N.C.
Taylor Instr. Process Control Div., Rochester, N.Y.
Telmar, Inc., Columbus, Ohio
Tensitron, Inc., Harvard, Mass.
Varian Aerograph, Walnut Creek, Calif.
West Coast Resch. Corp., Los Angeles, Calif.
Westronics, Inc., Ft. Worth, Tex.

Recorders, Strip-Chart

API Instrs. Co., Waltham,, Mass.
Digitron Corp., Norristown, Pa.
Dohrmann Div., Mountain View, Cal. p 592-594
Electro/Data, Inc., Garland, Tex. p 1559
General Elec. Co., Schenectady, N.Y. p 485
Gould, Inc., Cleveland, Ohio ....p 588,589
Hewlett-Packard, Palo Alto, Cal.
Honeywell, Denver, Colo. ..... p 590
Houston Instr., Bellaire, Tex. ..... p 591
Larson Instr. Co., Inc., Orangeburg, N.Y. p 513
Precision Standards Corp., Santa Ana, Cal. ..... p 541
Rustrak Instr. Div., Manchester, N.H. p 595
Simpson Elec. Co., Chicago, Ill.... p 557
Techni-Rite Elctrns., E. Greenwich, R.I. p 596,597
Teledyne Geotech, Dallas, Tex.
Westinghouse Elec. Corp., Newark, N.J.
A & M Instrument, Inc., Great Neck, N.Y.
Amprobe Instr., Lynbrook, N.Y.
Automatic Timing & Controls, Inc., King of Prussia, Pa.
B & K Instrs., Inc., Cleveland, Ohio
Bacharach Instr. Co., Pittsburgh, Pa.
Bailey Meter Co., Wickliffe, Ohio
Barber-Colman Co., Industrial Instrs. Div., Rockford, Ill.
Beckman Instrs., Advanced Tech., Fullerton, Cal.
Beckman Instrs., (AISSD), Fullerton, Cal.
Beckman Instrs., Process Instrs., Fullerton, Cal.
Bell & Howell Co., Pasadena, Calif.
Biocom, Inc., Culver City, Cal.
BLH Elctrns., Inc., Waltham, Mass.
Brinkmann Instrs., Inc., Westbury, N.Y.
Bristol Div, Waterbury, Conn
Cole-Parmer Instr. Co., Chicago, Ill.
Coleman Instrs., Maywood, Ill.
Conklin Instr. Corp., Pleasant Valley, N.Y.
Electric Tachometer Corp., Philadelphia, Pa.
Elctrn. Control Sys., Fairmont, W. Va.
Esterline Angus Div., Indianapolis, Ind.
Fairbanks Morse Weighing Sys., St. Johnsbury, Vt.
Fischer & Porter Co., Warminster, Pa.
Foxboro Co., Foxboro, Mass.
General Radio Co., Concord, Mass.
General Scanning, Watertown, Mass.
Hallmark Standards, Inc., Mt. Vernon, N.Y.
Heath Co., Benton Harbor, Mich.
Honeywell, Ft. Washington, Pa.
Hughes Aircraft Co, Fullerton, Cal.
IMPACT-O-GRAPH Div., Bedford, Ohio
Integrated Dev. & Mfg. Co., Chagrin Falls, Ohio
Japanese Prods. Corp., New Rochelle, N.Y.
Keithley Instrs., Inc., Cleveland, Ohio
Kikusui Elctrns. Corp., Kawasaki City, Kanagawa-Pref., Japan
Laboratory Data Control, Riviera Beach, Fla.
Leeds & Northrup Corp., No. Wales, Pa.
Leupold & Stevens, Inc., Beaverton, Ore.
Matsushita Comm. Ind'l. Co., Ltd., Yokohama, Japan
McKee-Pedersen Instrs., Danville, Calif.
Mechanics For Elctrns., Inc., Wilmington, Mass.
Medistor Instr. Co., Seattle, Wash.
Mennen-Greatbatch Elctrns., Inc., Clarence, N.Y.
Nuclear Equip. Chem. Corp., Farmingdale, N.Y.
Nuclear Supply Co., Washington, D.C.
Photovolt Corp., New York, N.Y.
Photron Instr. Co., Cleveland, Ohio
Robertshaw Controls Co., Anaheim, Cal.
Rohde & Schwarz Sls., Passaic, N.J.
Ross Labs., Inc., Seattle, Wash.
Rust Corp., Everett, Mass.
San-ei Instrument Co., Ltd., Shinjuku-ku, Tokyo 160, Japan
Sensotec, Inc., Columbus, Ohio
Sloan Technology Corp., Santa Barbara, Calif.
Soltec Corp., No. Hollywood, Cal.
Stoelting Co., Chicago, Ill.
Sunshine Sci. Instrs., Inc., Philadelphia, Pa.
Taylor Instr. Process Control Div., Rochester, N.Y.
Telmar, Inc., Columbus, Ohio
Ten Bosch, M., Inc., Pleasantville, N.Y.
Tensitron, Inc., Harvard, Mass.
Texas Instruments, Inc., Houston, Tex.
Transidyne-General Corp., Ann Arbor, Mich.
Varian Aerograph, Walnut Creek, Calif.
Varian Assocs., Palo Alto, Cal.
VWR Scientific, San Francisco, Cal.
Waters Instrs., Inc., Rochester, Minn
West Instr. Div., Schiller Pk., Ill.
Westronics, Inc., Ft. Worth, Tex.
Yewtec Corporation, Larchmont, N.Y.

Recorders, Synchronized Film-Tape

Computer Instrs., Hempstead, N.Y.
Kalart Victor, Plainville, Conn.
Miles Reproducer Co., Inc., New York, N.Y.
Stancil-Hoffman Corp., Hollywood, Calif.
Tandberg of America, Inc., Pelham, N.Y.
Tensitron, Inc., Harvard, Mass.
Traid Corp., Glendale, Cal.
V-M Corp., Benton Harbor, Mich.

Recorders, Tape Loop (Lab Type)

Almond Instrs. Co., Covina, Cal
Hewlett-Packard, Palo Alto, Cal.
Int'l. Electro-Magnetics, Palatine, Ill. p 311
American Geloso Elctrns., Inc., New York, N.Y.
Ampex Corp., Redwood City, Calif.
Amplifier Corp. America, Westbury, N.Y.
Audio Instr. Co., Union City, N.J.
Auricord, Long Island City, N.Y.
Barger Corp., Sunnyvale, Cal.
Bell & Howell Co., Pasadena, Calif.
Bergen Labs., Inc., Paterson, N.J.
Borg-Warner Controls, Santa Ana, Cal.
Echo Science Corp., Pasadena, Cal.
Geo Space, Houston, Tex.
Himmelstein, S. & Co., Elk Grove Village, Ill.
Leach Corp., Azusa,, Cal.
Leach Corp., Los Angeles, Cal.
Marathon Instrs. Div., Pico Rivera, Calif.
Nuclear Resch. Corp., Southampton, Pa.
Precision Instr. Co., Palo Alto, Calif.
R-Columbia Prods., Inc., Highland Park, Ill.
RIL Elctrns., Inc., Southampton, Pa.
Tandberg of America, Inc., Pelham, N.Y.
TEAC Corp. of Amer., Santa Monica, Cal
Telectro Sys. Corp., Corona, N.Y.
Telex Comm. Div., Minneapolis, Minn.
Tensitron, Inc., Harvard, Mass.
3M Co., St. Paul, Minn.
Vetter, A.R., Co., Rebersburg, Pa
Video Resch. Corp., Rockville, Md.
Yewtec Corporation, Larchmont, N.Y.

Recorders, Telemetering

Almond Instrs. Co., Covina, Cal
American Astrionics, Hollywood, Cal
Data-Control Systems, Danbury, Conn.
Hewlett-Packard, Palo Alto, Cal.
Honeywell, Denver, Colo.
Teledyne Geotech, Dallas, Tex.
Ampex Corp., Redwood City, Calif.
Bailey Meter Co., Wickliffe, Ohio
Barber-Colman Co., Industrial Instrs. Div., Rockford, Ill.
Bell & Howell Co., Pasadena, Calif.
Biocom, Inc., Culver City, Cal.
Borg-Warner Controls, Santa Ana, Cal.
Bristol Div, Waterbury, Conn
Data Recording Sys., Sunnyvale, Cal.
Desman Elctrns., Rochester, N.Y.
Echo Science Corp., Mountain View, Cal.
Echo Science Corp., Pasadena, Cal.
Esterline Angus Div., Indianapolis, Ind.
Fairchild Space & Defense Sys., Syosset, N.Y.
Foxboro Co., Foxboro, Mass.
General Dynamics, San Diego, Cal.
Genisco Tech. Corp., Data Div., Compton, Cal.
Himmelstein, S. & Co., Elk Grove Village, Ill.
Honeywell, Aerospace & Def., Minneapolis, Minn.
Honeywell, Ft. Washington, Pa.
Hughes Aircraft Co, Culver City, Cal.
Hughes Aircraft Co, Fullerton, Cal.
Leach Corp., Azusa,, Cal.
Leach Corp., Los Angeles, Cal.
Leeds & Northrup Corp., No. Wales, Pa.
Leupold & Stevens, Inc., Beaverton, Ore.
Lockheed Aircraft Svc., Ont., Cal.
Lockheed Elctrns. Co., Watchung, N.J.
Mennen-Greatbatch Elctrns., Inc., Clarence, N.Y.
Pemco, Palo Alto, Calif.
Stoelting Co., Chicago, Ill.
TEAC Corp. of Amer., Santa Monica, Cal
Telectro Sys. Corp., Corona, N.Y.
Telmar, Inc., Columbus, Ohio
3M Co., St. Paul, Minn.
Vetter, A.R., Co., Rebersburg, Pa
Video Resch. Corp., Rockville, Md.

Recorders, Teletype

Dynamics Instr. Co., Monterey Pk., Cal.
Multitech Data Prods., Monterey Pk., Cal.
(NES) Nationwide Elctrn. Sys., Itasca, Ill.
Clary Corp., San Gabriel, Calif.
Dataprobe, Inc., So. Hackensack, N.J.
Honeywell Information Systems, Wellesley Hills, Mass
Teletype Corp., Skokie, Ill.

Recorders, Temperature (Electronic)

API Instrs. Co., Waltham,, Mass.
Austron, Inc., Austin, Tex.
Dohrmann Div., Mountain View, Cal. p 593
Harrel, Inc., E. Norwalk, Conn. .... p 1973
Hewlett-Packard, Palo Alto, Cal.
Houston Instr., Bellaire, Tex.
PPM, Inc., Bedford, Ohio ..... p 535
Rustrak Instr. Div., Manchester, N.H. p 595
A & M Instrument, Inc., Great Neck, N.Y.
A. J. Abrams Co., Westport, Conn.
Amprobe Instr., Lynbrook, N.Y.
A.O.I.P., 75/Paris 12eme, France
Atkins Technical, Inc., Gainesville, Fla.
Bacharach Instr. Co., Pittsburgh, Pa.
Bailey Meter Co., Wickliffe, Ohio
Barber-Colman Co., Industrial Instrs. Div., Rockford, Ill.
Beckman Instrs., Process Instrs., Fullerton, Cal.
BLH Elctrns., Inc., Waltham, Mass.
Bristol Div, Waterbury, Conn
Conklin Instr. Corp., Pleasant Valley, N.Y.
Doric Sci. Corp., San Diego, Calif.
Edison, Thomas A. Instr. Div., W. Orange, N.J.
Elctrn. Control Sys., Fairmont, W. Va.
Electronic Design Labs., Inc., Phila., Pa.
Engler Instr. Corp., Jersey City, N.J.
Esterline Angus Div., Indianapolis, Ind.
Fischer & Porter Co., Warminster, Pa.
Foxboro Co., Foxboro, Mass.
Hallmark Standards, Inc., Mt. Vernon, N.Y.
Honeywell, Aerospace & Def., Minneapolis, Minn.
Honeywell, Ft. Washington, Pa.
Howell Instrs., Inc., Ft. Worth, Tex.
Infrared Inds., Inc., Santa Barbara, Cal.
Integrated Dev. & Mfg. Co., Chagrin Falls, Ohio

Japanese Prods. Corp., New Rochelle, N.Y.
Kahl Scientific Instr. Corp., El Cajon, Calif.
Leach Corp., Azusa,, Cal.
Leeds & Northrup Corp., No. Wales, Pa.
Lockheed Aircraft Svc., Ont., Cal.
Marlin Mfg. Corp., Cleveland, Ohio
Mechanics For Elctrns., Inc., Wilmington, Mass.
Mennen-Greatbatch Elctrns., Inc., Clarence, N.Y.
Robertshaw Controls Co., Anaheim, Cal.
San-ei Instrument Co., Ltd., Shinjuku-ku, Tokyo 160, Japan
Soltec Corp., No. Hollywood, Cal.
Stoelting Co., Chicago, Ill.
Sunshine Sci. Instrs., Inc., Philadelphia, Pa.
Taylor Instr. Process Control Div., Rochester, N.Y.
Telmar, Inc., Columbus, Ohio
Texas Instruments, Inc., Houston, Tex.
Thermo Elec. Co., Inc., Saddle Brook, N.J.
United Elec. Controls Co., Watertown, Mass.
Varian Aerograph, Walnut Creek, Calif.
Waters Instrs., Inc., Rochester, Minn
West Instr. Div., Schiller Pk., Ill.
Westronics, Inc., Ft. Worth, Tex.

Recorders, Timing

Chrono-log Corp., Broomall, Pa.
Larson Instr. Co., Inc., Orangeburg, N.Y. p 513
Pennwood Numechron, Pittsburgh, Pa.
PPM, Inc., Bedford, Ohio
Rustrak Instr. Div., Manchester, N.H.
Alden Sys. Co., Inc., Westboro, Mass.
Annis, R.B. Co., Indianapolis, Ind.
Automatic Timing & Controls, Inc., King of Prussia, Pa.
Barber-Colman Co., Industrial Instrs. Div., Rockford, Ill.
Bristol Div, Waterbury, Conn
Data Dynamics Div., Englewood, N.J.
Electric Tachometer Corp., Philadelphia, Pa.
Engler Instr. Corp., Jersey City, N.J.
Esterline Angus Div., Indianapolis, Ind.
Heitz, Karl, Inc., New York, N.Y.
KDI Adtrol, Inc., Broomall, Pa.
Rapidprint Time Recorders, Inc., Middletown, Conn.
Soltec Corp., No. Hollywood, Cal.
Taylor Instr. Process Control Div., Rochester, N.Y.
Telmar, Inc., Columbus, Ohio
USM Corp., Wakefield, Mass.
Varian Aerograph, Walnut Creek, Calif.
Wakmann Watch Co., Inc., New York, N.Y.

Recorders, Torque (Electronic)

Rustrak Instr. Div., Manchester, N.H.
Ametek/Instrs. & Controls, Feasterville, Pa.
Himmelstein, S. & Co., Elk Grove Village, Ill.
McNab, Inc., New York, N.Y.
Mechanics For Elctrns., Inc., Wilmington, Mass.
Miles Reproducer Co., Inc., New York, N.Y.
Sunshine Sci. Instrs., Inc., Philadelphia, Pa.
Telmar, Inc., Columbus, Ohio
Tensitron, Inc., Harvard, Mass.
Tyco Instr. Div., Waltham, Mass.
Varian Aerograph, Walnut Creek, Calif.
West Coast Resch. Corp., Los Angeles, Calif.
Westronics, Inc., Ft. Worth, Tex.

Recorders, Transient

American Astrionics, Hollywood, Cal
E-H Resch. Labs., Inc., Oakland, Cal.
Bell & Howell Co., Pasadena, Calif.
Bergen Labs., Inc., Paterson, N.J.
Biomation Corp., Palo Alto, Cal
Data Disc, Video Div., Sunnyvale, Cal.
Endevco, Pasadena, Calif.
Engdahl Enterprises, Costa Mesa, Cal.
Himmelstein, S. & Co., Elk Grove Village, Ill.
Kenton Engrg. Corp., Skokie, Ill.
Leach Corp., Los Angeles, Cal.
Mechanics For Elctrns., Inc., Wilmington, Mass.
Micro Instr., Hawthorne, Cal.
Miles Reproducer Co., Inc., New York, N.Y.
Resalab Inc., Advanced Development Lab., Los Angeles, Cal.
Sprengnether, W.F. Instr. Co., Inc., St. Louis, Mo.
Varian Aerograph, Walnut Creek, Calif.
Westronics, Inc., Ft. Worth, Tex.

Recorders, Vacuum—See Recorders, Pressure

Recorders, Vibration

General Elec. Co., Schenectady, N.Y.
Hewlett-Packard, Palo Alto, Cal.
Honeywell, Denver, Colo.
Teledyne Geotech, Dallas, Tex.
B & K Instrs., Inc., Cleveland, Ohio
Bell & Howell Co., Pasadena, Calif.
Endevco, Pasadena, Calif.
Epic, Inc., New York, N.Y.
General Radio Co., Concord, Mass.
Indikon Co., Watertown, Mass.
IRD Mechanalysis, Inc., Columbus, Ohio
Japanese Prods. Corp., New Rochelle, N.Y.
Leach Corp., Azusa,, Cal.
Leach Corp., Los Angeles, Cal.
Listening, Inc., Arlington, Mass.
Lockheed Aircraft Svc., Ont., Cal.
Lockheed Aircraft Svce., Special Devices Div., Ontario, Calif.
Lockheed Elctrns. Co., Watchung, N.J.
Mechanics For Elctrns., Inc., Wilmington, Mass.
Robertshaw Controls Co., Anaheim, Cal.
Sprengnether, W.F. Instr. Co., Inc., St. Louis, Mo.
Telmar, Inc., Columbus, Ohio
Varian Aerograph, Walnut Creek, Calif.
Zonic Tech. Labs., Cincinnati, Ohio

Recorders, Video Tape

Circon Corp., Goleta, Cal.
Nippon Electric/NEC America, N.Y., N.Y.
Norman Inds., Chicago, Ill.
Ampex Corp., Redwood City, Calif.
Borg-Warner Controls, Santa Ana, Cal.
Concord Elctrns., Los Angeles, Cal.
Conductron Corp., St. Charles, Mo.
Echo Science Corp., Mountain View, Cal.
Echo Science Corp., Pasadena, Cal.
Edo Western Corp., Salt Lake City, Utah
GTE Sylvania Inc., Batavia, N Y
Multi Media Engrg., Inc., Rockville, Md.
Odetics, Inc., Anaheim, Cal.
Precision Instr. Co., Palo Alto, Calif.
RCA Corp., Camden, N.J.
RCA Govt. & Comm. Sys., Moorestown, N.J.
Shibaden Corp. Amer., Woodside, N.Y.
Telectro Sys. Corp., Corona, N.Y.
3M Co., St. Paul, Minn.
Video Resch. Corp., Rockville, Md.

Recorders, X-Y

Bolt Beranek & Newman, Santa Ana, Calif. p 587
Dohrmann Div., Mountain View, Cal. p 594
Gould, Inc., Cleveland, Ohio p 589
Hewlett-Packard, Palo Alto, Cal.
Honeywell, Denver, Colo. p 590
Houston Instr., Bellaire, Tex. p 591
Alden Elctrn. & Impulse Record. Equip., Westboro, Mass.
Artronix, Inc., St. Louis, Mo.
Arvin Sys., Inc., Dayton, Ohio
California Computer Prods., Anaheim, Cal
Central Scientific Co., Chicago, Ill.
Esterline Angus Div., Indianapolis, Ind.
Gerber Sci. Instr. Co., Hartford, Conn.
Hallmark Standards, Inc., Mt. Vernon, N.Y.
Japanese Prods. Corp., New Rochelle, N.Y.
Laboratory Data Control, Riviera Beach, Fla.
Larson Aero Dev., Concord, Calif.
Leeds & Northrup Corp., No. Wales, Pa.
Lehigh Valley Elctrn., Inc., Fogelsville, Pa.
Loral Elctrn. Sys., Bronx, N.Y.
Matsushita Comm. Ind'l. Co., Ltd., Yokohama, Japan
Milgo Electrn. Corp., Miami, Fla.
Optomechanisms, Inc., Plainview, N.Y.
Rohde & Schwarz Sls., Passaic, N.J.
Soltec Corp., No. Hollywood, Cal.
Texas Instruments, Inc., Houston, Tex.
Traid Corp., Glendale, Cal.
USM Corp., Wakefield, Mass.
Varian Aerograph, Walnut Creek, Calif.
Varian Assocs., Palo Alto, Cal.
Visual Elctrns. Corp., New York, N.Y.
Xynetics, Inc., Canoga Pk., Cal.
Yewtec Corporation, Larchmont, N.Y.

Recording Paper (For Strip-Chart Recorders, Oscillographs, X-Y)—See Paper, Graphic Recording

Recording Tape, Magnetic—See Tapes, Recording, Magnetic

Records, Frequency Test

GC Elctrns., Rockford, Ill.
CBS Laboratories, Stamford, Conn.
Components Corp., Denville, N.J.
Electronic Engrs., Inc., Chicago, Ill.
Pacific Transducer Corp., Los Angeles, Calif.

Records, Instruction-Code, Language, etc.

Electronic Engrs., Inc., Chicago, Ill.
General Elctrn. Labs., Boston, Mass.
Hayden Book Co., New York, N.Y.
3M Co., St. Paul, Minn.
Viewlex, Holbrook, N.Y.
Rho Engrg. Co., Los Angeles, Calif

Rectifier Power Units (Power Supply Type)

Christie Elec., Los Angeles, Cal. .. p 674
CML-Macarr, Inc., Edison, N.J.
Del Elctrns. Corp., Mt. Vernon, N.Y.
Dressen-Barnes Elctrns., Pasadena, Cal. p 690
Ferrotran Elctrn., New York, N.Y.
Gates Elctrn. Co., Bronx, N.Y. p 720,721
International Rectifier, El Segundo, Cal.
Kepco, Inc., Flushing, N.Y.
Kilovolt Corp., Hackensack, N.J.
Light Elec. Corp., Rancocas, N.J.
Mid-Eastern Inds., Scotch Plains, N.J.
NJE Corp., Kenilworth, N.J.
Opad Elec. Co., Inc., New York, N.Y.
Power Designs, Westbury, N.Y.
Rectifier Comps. Corp., Freeport, N.Y.
Schauer Mfg. Corp., Cincinnati, Ohio
Spellman High Voltage Elctrns. Corp., Bronx, N.Y.
SRC Div., Newport Bch., Cal.
Technipower, Ridgefield, Conn.
Todd Prods., Farmingdale, N.Y.
Vemaline Prods. Co., Wyckoff, N.J.
Anocut Engrg. Co., Elk Grove Village, Ill.
Basler Elec. Co., Highland, Ill.
Bludworth Marine Div., Linden, N.J.
Bullock Magnetics Corp., Pomona, Calif.
Constant Voltage Co., Chicago, Ill.
Controlled Power Corp., Farmington, Mich
Cyberex Inc., Willoughby, Ohio
Darrah Elec. Co., Inc., Cleveland, Ohio
Dual-Lite Co., Newtown, Conn.
Eastern Delta Corp., Fair Lawn, N.J.
Electro-Standards Labs., Inc., Miami, Fla.
Electroid Co., Union, N.J.
Elgin Elctrns., Waterford, Pa.
Energy Systems, Palo Alto, Cal.
Engineering Assocs., Dayton, Ohio
Green Elec. Corp., Fair Lawn, N.J.
M & T Chemicals Inc., Rahway, N.J.
Magnetics, Sandy Lake, Pa.
Miller, Sanford Corp., Brooklyn, N.Y.
Peschel Instrs., Cape Coral, Fla.
Philips Elctrns. Inds., Ltd., Toronto 17, Can.
Queensboro Transformer & Mach., College Pt., N.Y.
Ramm Rectifier Co., Inc., Bronx, N.Y.
Rapid Elec. Co., Bronx, N.Y.
Rectifier Engrg. & Supply, St. Louis, Mo.
Sarkes Tarzian, Inc., Bloomington, Ind.
Semicon Inc., Burlington, Mass.
Shigoto Inds., Ltd., New York, N.Y.
Sifco Metachemical, Cleveland, Ohio
Sola Elec. Div., Elk Grove Village, Ill.
Standard Elctrns. Corp., Freehold, N.J.
Teledyne Inet, Gardena, Cal.
Transrex Div., Torrance, Cal.
Underwriters Safety Device Co., Chicago, Ill.
Varo, Inc., Texas Div., Garland, Tex.
Warren Communications, Littleton, Mass.
Westinghouse Elec., Buffalo, N. Y.
Westinghouse Elec., Sykesville, Md.
Westinghouse Elec. Corp., Pittsburgh, Pa.
Wolfson, P.J. Co., New Rochelle, N.Y.
Y.T. & T. Corp., Roslyn Hgts., N.Y.

Rectifiers, Copper Oxide—See Vol 2

Rectifiers, Copper Sulfide—See Vol 2

Rectifiers, Electron Tube—See Tubes, Rectifying—Vol 2

Rectifiers, Germanium—See Vol 2

Rectifiers, Germanium Stack—See Vol 2

Rectifiers, Selenium—See Vol 2

Rectifiers, Selenium Stack—See Vol 2

Rectifiers, Silicon—See Vol 2

Rectifiers, Silicon Controlled—See Thyristors—Vol 2

Rectifiers, Silicon Stack—See Vol 2

Rectifiers, Thyratron—See Tubes, Thyratron—Vol 2

Reducers, Speed-Also See Gear Mechanisms—See Vol 2

Reels, Cord & Cable—See Vol 3

Reels, Tape—See Tape Recording Accessories

Reference Books—See Technical Books—Vol 3

References, D-C Voltage

CEA, Monrovia, Cal.
Chronetics, Inc., Mt. Vernon, N.Y.
Digital Equip. Corp., Maynard, Mass.
Dynage, Bloomfield, Conn. p 700
Elcor Prods. Welex Elctrns., Silver Spring, Md.
Electronic Dev. Corp., Boston, Mass. p 457
Fluke, John Mfg. Co., Inc., Seattle, Wash. p 476
General Resistance, Mt. Vernon, N.Y.
Hewlett-Packard, Palo Alto, Cal.
Hybrid Sys. Corp., Burlington, Mass.
International Rectifier, El Segundo, Cal.
Julie Research Lab., New York, N.Y. p 503
Kepco, Inc., Flushing, N.Y.
North Hills Elctrns., Inc., Glen Cove, N.Y. p 1339
Precision Monolithics, Santa Clara, Cal.
Signalite, Neptune, N.J.
Tempo/UTI Div., Chatsworth, Cal.
Todd Prods., Farmingdale, N.Y.
Victoreen Instr., Cleveland, Ohio
Advanced Energy Conversion, Menlo Pk., Cal.
AMBAC Inds., Garden City, N.Y.
Analog Devices, Inc., Norwood, Mass.
Components, Inc., Biddeford, Me.
Computer Diode, Fair Lawn, N.J.
Constant Voltage Co., Chicago, Ill.
Delta-Tronics Corp., Tempe, Ariz.
Electronic Design Labs., Inc., Phila., Pa.
Ferranti Ltd., Hollinwood, Lancs., England
Heath Co., Benton Harbor, Mich.
Instrulab, Inc., Dayton, Ohio
Motorola Semiconductor Prods., Phoenix, Ariz.
Rawco Instrs., Inc., Ft. Worth, Tex.
Weston Instruments, Inc., Newark, N.J.

Reflectors, Passive—See Antenna Reflectors

Refrigerants, Spray—See Vol 3

Refrigerated Cooling Equipment—See Air Conditioners—Vol 3

Regulators, Current

American Aerospace Controls, Farmingdale, N.Y.
Elcor Prods. Welex Elctrns., Silver Spring, Md.
Electronic Resch. Assocs., Cedar Grove, N.J.
Flight Sys., Inc., Mechanicsburg, Pa.
General Elec. Co., Schenectady, N.Y.
Harrel, Inc., E. Norwalk, Conn.
Kepco, Inc., Flushing, N.Y. p 739,749,755
Lambda Elctrns., Melville, N.Y..... p 802
Mid-Eastern Inds., Scotch Plains, N.J.
North Elec. Co., Galion, Ohio
North Hills Elctrns., Inc., Glen Cove, N.Y. ..... p 817
Opad Elec. Co., Inc., New York, N.Y.
Power Designs, Westbury, N.Y.
Powertec, Chatsworth, Cal.
Raytheon Co., Manchester, N.H.
Tecnetics, Inc., Boulder, Colo.
Todd Prods., Farmingdale, N.Y.
Topaz Elctrns., San Diego, Cal.... p 897
Trio Labs, Inc., Plainview, N.Y.
Victoreen Instr., Cleveland, Ohio
Wanlass Div., Fort Washington, Pa.
AMBAC Inds., Garden City, N.Y.
American Elctrns., Inc., Fullerton, Cal.
AMF Electrosystems Div., Vandalia, Ohio
Applied Control Co., Fairfield, N.J.
Burr-Brown Resch. Corp., Tucson, Ariz.
CGS Units, Inc., Rochester, N.Y.
Constant Voltage Co., Chicago, Ill.
Coral Magnetics Co., Farmingdale, N.Y.
Davidson Elctrn. Dev. Co., Erie, Pa.
Delta Elctrn. Control, Costa Mesa, Cal.
Delta-Tronics Corp., Tempe, Ariz.
Elasco-Eastern, Inc., Bloomfield, Conn.
Electronic Modules, Inc., Pasadena, Cal.
Elctrn. Resources Div., Los Angeles, Cal.
Elgin Elctrns., Waterford, Pa.
Grafix, Inc., Albuquerque, N.M.
GTE Sylvania Inc., Danvers, Mass.
H-B Instr. Co., Phila., Pa.
Halmar Elctrns., Inc., Columbus, Ohio
Honeywell, Apparatus Controls, Mpls., Minn.
Hyperion Inds. Corp., Watertown, Mass.
Joliet Control Corp., Joliet, Ill.
Lear Siegler, Inc., Santa Monica, Calif.
Loyola Industries, Inc., El Segundo, Calif.
Magnetics, Inc., Butler, Pa.
Magnetics, Sandy Lake, Pa.
Motorola Semiconductor Prods., Phoenix, Ariz.
Polyphase Instr. Co., Bridgeport, Pa.
Preferred Electronics, Inc., Westfield, Mass.
Rho Engrg. Co., Los Angeles; Calif
Robicon Corp., Pittsburgh, Pa
SKG Assocs., Inc., Boston, Mass.
Space Age Microcircuits, Long Valley, N.J.
Sunshine Sci. Instrs., Inc., Philadelphia, Pa.
Superior Elec., Bristol, Conn.
Teledyne Inet, Gardena, Cal.
Telemodem, Inc., Queens Village, N.Y.
Transrex Div., Torrance, Cal.
Varo, Inc., Texas Div., Garland, Tex.
Weltronic Co., Southfield, Mich.
Westinghouse Elec. Corp., Pittsburgh, Pa.
Zenrad Controls Co., Santa Barbara, Cal.

Regulators, Frequency

Austron, Inc., Austin, Tex..... p 653
Autronics Corp., Pasadena, Calif.
Elgar Corp., San Diego, Cal..... p 705
Fork Standards, W. Chicago, Ill.
General Elec. Co., Schenectady, N.Y.
Gibbs Mfg. & Resch., Janesville, Wisc.
Lambda Elctrns., Melville, N.Y..... p 802
Nova Electric Mfg. Co., Nutley, N.J.
Raytheon Co., Manchester, N.H.
Topaz Elctrns., San Diego, Cal.... p 897
Allis-Chalmers, Milwaukee, Wisc.
AMBAC Inds., Garden City, N.Y.
American Elctrns., Inc., Fullerton, Cal.
AMF Electrosystems Div., Vandalia, Ohio
Applied Control Co., Fairfield, N.J.
Basler Elec. Co., Highland, Ill.
Bogue Elec. Mfg. Co., Paterson, N.J.
California Instrs. Co., San Diego, Cal.
Collins Radio Co., Dallas, Tex.
Elctrn. Resources Div., Los Angeles, Cal.
Paraplegics Mfg., Bensenville, Ill.
Philco-Ford Corp., Washington, D.C.
Task Corp., Anaheim, Calif.
Teledyne Inet, Gardena, Cal.
Westinghouse Elec. Corp., Pittsburgh, Pa.

Regulators & References, Silicon-Also See Diodes, Zener—See Vol 2

Regulators & Stabilizers, Voltage Also See Transformers, Voltage Regulating

Abbott Transistor Labs., L.A., Cal.
Arnold Magnetics, Culver City, Cal. p 648
Austron, Inc., Austin, Tex..... p 653
Avtel Corp., Covina, Cal. ..... p 655
Beckman Instrs., Cedar Grove, N.J.
Behlman Div., San Diego, Cal
Calico Div., San Diego, Cal.
Cober Elctrns., Inc., Stamford, Conn.
Del Elctrns. Corp., Mt. Vernon, N.Y.
Dressen-Barnes Elctrns., Pasadena, Cal. ..... p 689
Elcor Prods. Welex Elctrns., Silver Spring, Md.
Electronic Resch. Assocs., Cedar Grove, N.J. ..... p 709
Elgar Corp., San Diego, Cal..... p 705
Elin Div., San Diego, Cal.
Flight Sys., Inc., Mechanicsburg, Pa.
Freed Transformer Co., Bklyn., N.Y. p 482
General Elec. Co., Schenectady, N.Y.
General Magnetics, Bloomfield, N.J.
Kepco, Inc., Flushing, N.Y..... p 743
Lambda Elctrns., Melville, N.Y. p 803-806
Microtran Co., Valley Stream, N.Y.
Mid-Eastern Inds., Scotch Plains, N.J.
North Elec. Co., Galion, Ohio
Power Designs, Westbury, N.Y.
Raytheon Co., Manchester, N.H.
Rosemount Plug-In, Nashville, Tenn.
Signalite, Neptune, N.J.
Stevens-Arnold, Inc., So. Boston, Mass.
Syracuse Elctrns. Corp., Syracuse, N.Y.
Technipower, Ridgefield, Conn.
Tecnetics, Inc., Boulder, Colo..... p 884
Teledyne Philbrick, Dedham, Mass.
Tempo/UTI Div., Chatsworth, Cal.
Todd Prods., Farmingdale, N.Y.
Topaz Elctrns., San Diego, Cal.... p 897
Trio Labs, Inc., Plainview, N.Y..... p 932
United Transformer Co. Div. of TRW Inc., New York, N.Y.
Universal Voltronics Corp., Mt. Kisco, N.Y.
Victoreen Instr., Cleveland, Ohio
Wagner Elec. Corp., Livingston, N.J.
Wanlass Div., Fort Washington, Pa.
Acme Elec. Corp., Cuba, N.Y.
Advanced Energy Conversion, Menlo Pk., Cal.
Allis-Chalmers, Milwaukee, Wisc.
AMBAC Inds., Garden City, N.Y.
American Elctrns., Inc., Fullerton, Cal.
American Rectifier Corp., College Point, N.Y.
AMF Electrosystems Div., Vandalia, Ohio
Analog Devices, Inc., Norwood, Mass.
Arizona Elctrns., Inc., Benson, Ariz.
Astronics, Inc., Dallas, Tex.
Barnes & Reinecke, Inc., Chicago, Ill.
Basler Elec. Co., Highland, Ill.
Beckman Instrs., Helipot Div., Fullerton, Cal.
Bogue Elec. Mfg. Co., Paterson, N.J.
Burr-Brown Resch. Corp., Tucson, Ariz.
Cal-Power Corp., El Segundo, Calif.
California Instrs. Co., San Diego, Cal.
Central Transformer Co., Chicago, Ill.
CGS Units, Inc., Rochester, N.Y.
Computer Diode, Fair Lawn, N.J.
Constant Voltage Co., Chicago, Ill.
Coral Magnetics Co., Farmingdale, N.Y.
Cyberex Inc., Willoughby, Ohio
Davidson Elctrn. Dev. Co., Erie, Pa.
Delta-Tronics Corp., Tempe, Ariz.
Dickson Elctrns. Corp., Scottsdale, Ariz
E-Tronics, Van Nuys, Cal.
Electrical Instr. Svc., Inc., Mt. Vernon, N.Y.
Electronic Devices, Cleve., Ohio
Elctrn. Resources Div., Los Angeles, Cal.
Elgin Elctrns., Waterford, Pa.
Fairchild Semiconductor, Mountain View, Calif.
Firing Circuits Div., Norwalk, Conn
GAR Enterprises, Pasadena, Cal.
General Instr. Corp., Hicksville, N.Y.
General Radio Co., Concord, Mass.
Geo Space, Houston, Tex.
Glentronics, Glendora, Cal.
Grafix, Inc., Albuquerque, N.M.
GTE Sylvania Inc., Danvers, Mass.
Gulton Inds., Hawthorne, Calif.
Halmar Elctrns., Inc., Columbus, Ohio
Honeywell, Aerospace & Def., Minneapolis, Minn.
Hyperion Inds. Corp., Watertown, Mass.
ITT Semiconductors, W. Palm Beach, Fla.
Joliet Control Corp., Joliet, Ill.
Kelk, George Ltd., Don Mills, Ont., Canada
Loyola Industries, Inc., El Segundo, Calif.
Mag-Con Engrg. Co., St. Paul, Minn.
Magnetics, Inc., Butler, Pa.
Micro Networks, Worcester, Mass.
Modular Devices, Inc., Gardena, Calif.
Motorola Semiconductor Prods., Phoenix, Ariz.
Mullard, Inc., Farmingdale, N.Y.
NH Research, Inc., Santa Ana, Calif.
Oeco Corp., Portland, Ore.
Pace-Tronics, Newark, N.J.
Parker Instr. Corp., Stamford, Conn.
Permavolt Transformers, Inc., S. Bend, Ind.
Polyphase Instr. Co., Bridgeport, Pa.
Preferred Electronics, Inc., Westfield, Mass.
Rapid Elec. Co., Bronx, N.Y.
Ratelco, Inc., Seattle, Wash.
Rho Engrg. Co., Los Angeles, Calif
Signetics Corp., Sunnyvale, Calif.
Silicon Gen'l., Inc., Westminster, Cal.
SKG Assocs., Inc., Boston, Mass.
Sola Elec. Div., Elk Grove Village, Ill.
Space Age Microcircuits, Long Valley, N.J.
Superior Elec., Bristol, Conn.
Task Corp., Anaheim, Calif.
Tel-Instr. Elctrns. Corp., Carlstadt, N.J.
Teledyne Inet, Gardena, Cal.
Tempo Instr., Plainview, N.Y.
Terado Corp., St. Paul, Minn.
Transitron Elctrn. Corp., Wakefield, Mass.
Transrex Div., Torrance, Cal.
Triad Distributor Div., Huntington, Ind.
Triad-Utrad, Huntington, Ind.
Unitron Inds. Corp., Taipei, Taiwan, Republic of China
Ward Leonard, Mt. Vernon, N.Y.
Welco Inds. Inc., Cincinnati, Ohio
Weltronic Co., Southfield, Mich.

Relay Covers, Cases, Enclosures—See Cans, Relay—Vol 3

Relay Tools—See Tools, Relay Servicing—Vol 3

Relays, Antenna—See Relays, R-F (Including Antenna & Coaxial)—Vol 2

Relays, Audio Operated—See Relays, Frequency Selective —Vol 2

Relays, Coaxial—See Relays, R-F (Including Antenna And Coaxial)—Vol 2

Relays, Contact—See Relays, Power—Vol 2

Relays, Crystal Can—See Relays, Miniature & Subminiature—Vol 2

Relays, Current Sensing—See Vol 2

Relays, Differential—See Vol 2

Relays, Electrostrictive—See Vol 2

Relays, Frequency Selective —See Vol 2

Relays, General Purpose—See Vol 2

Relays, High-Speed—See Vol 2

Relays, High Voltage—See Vol 2

Relays, Impulse—See Vol 2

Relays, Indicating Light—See Vol 2

Relays, Keying & Break-In—See Vol 2

Relays, Latching, Magnetic—See Vol 2

Relays, Latching, Mechanical —See Vol 2

Relays, Mercury Displacement—See Vol 2

Relays, Mercury-Wetted Contacts—See Vol 2

Relays, Meter—See Vol 2

Relays, Miniature & Subminiature—See Vol 2

Relays, Motor Driven—See Vol 2

Relays, Overload—See Vol 2

Relays, Over-Current & Under-Current—See Vol 2

Relays, Over-Frequency & Under-Frequency—See Vol 2

Relays, Over-Voltage & Under-Voltage—See Vol 2

Relays, Phase-Sensing—See Vol 2

Relays, Photoelectric—See Vol 2

Relays, Plate Circuit—See Vol 2

Relays, Plunger—See Vol 2

Relays, Polarized—See Vol 2

Relays, Power—See Vol 2

Relays, Proximity—See Vol 2

Relays, Pulse & Telegraph—See Vol 2

Relays, R-F (Including Antenna & Coaxial)—See Vol 2

Relays, Reed—See Vol 2

Relays, Resistance-Sensitive —See Vol 2

Relays, Reverse-Current—See Vol 2

Relays, Rotary—See Vol 2

Relays, Sensitive—See Vol 2

Relays, Sequence—See Vol 2

Relays, Solenoid—See Relays, Plunger—Vol 2

Relays, Solid-State—See Vol 2

Relays, Stepping, Ratchet—See Vol 2

Relays, Telephone—See Vol 2

Relays, Temperautre-Compensated —See Vol 2

Relays, Thermal—See Vol 2

Relays, Time-Delay—See Vol 2

Relays, Transmitting—See Relays, Keying & Break-In—Vol 2

Relays, Vacuum Contact—See Vol 2

Relays, Vibrating Reed—See Vol 2

Relays, Vibration-Sensitive—See Vol 2

Relays, Voltage Sensitive—See Vol 2

Relays, Wire Contact—See Vol 2

Repeaters, Passive, Microwave
Int'l. Microwave, Cos Cob, Conn.
Microwave Assocs., Inc., Burlington, Mass.
Philco-Ford Corp., Washington, D.C.
Raytheon Data Systems Co., Norwood, Mass.
RF Systems, Inc., Cohasset, Mass.
Scientific Communications, Garland, Tex.

Repeaters, Servo—See Vol 2

Repeaters, Teletype
Multitech Data Prods., Monterey Pk., Cal.
(NES) Nationwide Elctrn. Sys., Itasca, Ill.
Solid State Elctrns., Sepulveda, Cal.
Diamond Repeater Co., Madison, N.J.
Iso-Switch Corp., Costa Mesa, Cal.
Singer - Tele-Signal, Woodbury, N.Y.
Telemodem, Inc., Queens Village, N.Y.
Trepac Corp. America, Englewood, N.J.
Universal Transistor Prods., Copiague, N.Y.
Western Telematic, Inc., Arcadia, Cal.

Repeating Equipment, Broadcast
Audio Instr. Co., Union City, N.J.
CCA Elctrns. Corp., Gloucester, N.J.
Jerrold Elctrns. Corp., Philadelphia, Pa.
Microwave Assocs., Inc., Burlington, Mass.
Rodelco, Deer Park, N.Y.

Resins, Encapsulating—See Compounds, Encapsulating—Vol 3

Resins, Synthetic—See Plastic Raw Materials—Vol 3

Resistance Adjusting Equipment For Hybrid Microcircuits-Also See Machines, Resistance Adjusting
A. D. Data Sys., Inc., Rochester, N.Y.
Boonton Electronics Corp., Parsippany, N.J.
Arvin Sys., Inc., Dayton, Ohio
Hughes Aircraft Co., Torrance, Cal.
Korad Mat'ls. Sys. Div., Santa Monica, Cal.
Larson Aero Dev., Concord, Calif.
Neutronic Corp., Bridgeton, Mo.
Research Instr. Co., Westbury, N.Y.

Resistance Comparators—See Bridges, Resistance

Resistance Thermometers—See Networks, Resistance—Vol 2

Resistor Networks—See Networks, Resistance—Vol 2

Resistors, Adjustable-Also See Potentiometers—See Vol 3

Resistors, Ballast Tube—See Tubes, Ballast—Vol 2

Resistors, Barretter—See Vol 3

Resistors, Beryllia Core—See Resistors, Integral Heat Dissapator—Vol 3

Resistors, Carbon Film—See Vol 3

Resistors, Ceramic—See Vol 3

Resistors, Chip (For Microcircuits)—See Vol 3

Resistors, Composition, Carbon—See Vol 3

Resistors, Decade—See Vol 3

Resistors, Disc-Also See Resistors By Material Type—See Vol 3

Resistors, Film, Metal—See Vol 3

Resistors, Film, Nonmetallized—See Vol 3

Resistors, Flexible—See Vol 3

Resistors, Flux-Sensitive—See Vol 3

Resistors, Fuse—See Vol 2

Resistors, Glass—See Vol 3

Resistors, Heat Sink Encased—See Resistors, Integral Heat Dissipator—Vol 3

Resistors, High Frequency—See Vol 3

Resistors, High Megohm—See Vol 3

Resistors, High Temperature—See Vol 3

Resistors, High Voltage—See Vol 3

Resistors, Hot Molded—See Vol 3

Resistors, Integral Heat Dissipator—See Vol 3

Resistors, Low Temperature Coefficient—See Vol 3

Resistors, Metal Glazed—See Vol 3

Resistors, Microwave—See Vol 3

Resistors, Negative Temperature Coefficient—See Vol 2

Resistors, Non-Inductive—See Vol 3

Resistors, Oil Filled—See Vol 3

Resistors, Plug-In—See Vol 3

Resistors, Positive Temperature Coefficient—See Vol 3

Resistors, Power—See Vol 3

Resistors, Pressure Sensitive—See Vol 3

Resistors, Rectilinear—See Vol 3

Resistors, Rheostat—See Rheostats—Vol 3

Resistors, Standards—See Standards, Resistance

Resistors, Strip—See Vol 3

Resistors, Suppressor—See Vol 3

Resistors, Surge—See Vol 3

Resistors, Tapped—See Vol 3

Resistors, Temperature Sensitive—See Thermistors—Vol 2

Resistors, Tin Oxide—See Vol 3

Resistors, Variable—See Potentiometers—Vol 3

Resistors, Voltage-Sensitive—See Vol 3

Resistors, Wirewound—See Vol 3

Resistors, Wire Woven—See Vol 3

Resists—See Coatings, Films, Transfers, Etchant Resisting—Vol 3

Resolver Testers—See Testers, Synchro / Resolver

Resolvers, Synchro—See Vol 2

Resonators, Microwave—See Vol 2

Restorers, Pulse Form
Hewlett-Packard, Palo Alto, Cal.
Singer - Tele-Signal, Woodbury, N.Y.

Retainers, Battery—See Vol 3

Retainers, Relay—See Vol 2

Retainers, Transistor & Diode—See Vol 2

Retainers, Tube—See Vol 2

Reticles—See Scales & Reticles—Vol 2

Retractile Cords—See Cords, Retractile—Vol 3

Rheostats—See Vol 3

Rings, Brazing—See Vol 3

Rings, Carbon Packing—See Seals, Carbon—Vol 3

Rings, Oil Sealing—See Seals, Oil—Vol 3

Rings, Retaining—See Vol 3

Rings, Slip-Brush Assemblies—See Slip Ring Assemblies—Vol 2

Rivets—See Vol 3

Rods & Clamps, Ground
GC Elctrns., Rockford, Ill.
Amatom Elctrn. Hardware, New Rochelle, N.Y.
Atlas Fibre Co., Chicago, Ill.
Baumker Mfg. Co., Toledo, Ohio
Birnbach Co., Inc., Freeport, N.Y.
Bland Co., Bloomfield, Conn.
British Insulated Callender's Cables, Ltd., London WC1B 3QN, Eng.
Cam-Lok Div., Cincinnati, Ohio
Copperweld Steel Co., Glassport, Pa.
Crown Metal Products Co., Wyano, Pa.
Helitronics Corp., Newark, N.J.
Int'l. Wire & Cable, Chicago, Ill.
Javex Elctrns., Cherry Valley, Calif.
Lincoln Elec. Co., Cleveland, Ohio
Norelcom Inds., Inc., Farmingdale, N.Y.
Porcelain Prods. Co., Carey, Ohio
Premax Prods. Div., Niagara Falls, N.Y.
Rohn Mfg. Co., Peoria, Ill.
Royal Inds, El Segundo, Calif
Sterling Instr., New Hyde Pk., NY
Thomas & Betts Co., Elizabeth, N.J.
Utilities Svc. Co., Allentown, Pa.
Western Coil & Elec. Co., Racine, Wisc.

Rooms, Clean, Dust-Free
Agnew-Higgins, Inc., Garden Grove, Calif.
American Air Filter, Louisville, Ky.
Baker Co., Inc., Biddeford, Me.
Bendix, Dayton, Ohio
Clean Rooms Constr., Westminster, Cal.
Controlled Environment Equip. Corp., Newton Upper Falls, Mass.
Dri-Clave Corp., Westbury, N.Y.
Edcraft Inds., Inc., Linden, N.J.
General Acoustics Corp., Los Angeles, Calif.
Matthews Resch., Inc., Alexandria, Va.
Merix Chem. Co., Chicago, Ill.
Standard Cabinet Co., Inc., Totowa, N.J.
Westinghouse Elec., Grand Rapids, Mich.

Rooms, Environmental
Associated Testing Labs., Inc., Wayne, N.J. ..... **p 388**
American Air Filter, Louisville, Ky.
Atlas Engrg. Corp., W. Hartford, Conn.
Bendix, Dayton, Ohio
Develco, Inc., Norwalk, Conn.
Harris Mfg. Co., Inc., Cambridge, Mass.
Hotpack Corp., Phila., Pa.
Hughes Aircraft Co, Culver City, Cal.
Hughes Aircraft Co, Fullerton, Cal.
Integrated Dev. & Mfg. Co., Chagrin Falls, Ohio
Lab-Line Instrs., Inc., Melrose Park, Ill.
Ray Proof Corp., Norwalk, Conn.
Standard Cabinet Co., Inc., Totowa, N.J.
Tenney Engrg., Inc., Union, N.J.
VWR Scientific, San Francisco, Cal.
Westinghouse Elec., Grand Rapids, Mich.

Rooms, Screen—See Screen Rooms

Rooms, Shielded—See Screen Rooms

Rotary Joints, Microwave—See Joints, Rotary, Microwave

Rotators—See Antenna Rotators

Rotors, Motor & Generator—See Motor & Generator Armatures, Rotors, Stators—Vol 2

Rubber, Conductive—See Vol 3

Rubber Guards (For Equipment)—See Bumpers—Vol 3

Rubber, Silicone—See Vol 3

Sapphire Parts—See Vol 3

Saws For Semiconductor Crystals
Avco Felker Corp., Torrance, Calif.
Laser Technology, Inc., N. Hollywood, Calif.
Norton Co., Worcester, Mass.
Universal Shellac & Supply Co., Inc., Hicksville, NY
Vacuum Equip. Div., Newton, Mass.

Scale Expanders, Meter—See Multipliers, Meter

Scalers, Binary, Decade
Atec, Inc., Houston, Tex.
Fork Standards, W. Chicago, Ill.
General Elec. Co., Schenectady, N.Y.
Hewlett-Packard, Palo Alto, Cal.
Metric Sys., Ft. Walton Beach, Fla. **p 359,360**
Norden Div., Norwalk, Conn.
Pinlites, Fairfield, N.J.
Allis, Louis Co., Milwaukee, Wisc.
Central Scientific Co., Chicago, Ill.
Controlcraft Corp., West Chicago, Ill.
Digital Displays, Mendham, N.J.
Fischer & Porter Co., Warminster, Pa.
Harshaw Chem. Co., Cleveland, Ohio
Instrumentation Tech. Corp., Northridge, Calif.
Lecroy Resch. Sys. Corp., West Nyack, N.Y.
Micro-Line, Jamestown, N.Y.
Milletron, Inc., Pittsburgh, Pa.
Moore Inds., Van Nuys, Cal.
Mullard, Inc., Farmingdale, N.Y.

Nanosecond Systems, Inc., Fairfield, Conn.
Nuclear-Chicago, Des Plaines, Ill.
Nuclear Data, Inc., Palatine, Ill.
Nuclear Equip. Chem. Corp., Farmingdale, N.Y.
Nuclear Meas. Corp., Indianapolis, Ind.
Nuclear Resch. Corp., Southampton, Pa.
Packard Instrument Co., Inc., Downers Grove, Ill.
Projects Unlimited, Inc., Dayton, Ohio
Soltec Corp., No. Hollywood, Cal.
3M Co., St. Paul, Minn.
Tyco Instr. Div., Waltham, Mass.
United Aircraft Corp., Norwalk, Conn.

Scales & Reticles, Optical—
See Vol 2

Scales, Dial—See Vol 2

Scales, Production Weight
PPM, Inc., Bedford, Ohio
BLH Elctrns., Inc., Waltham, Mass.
Chatillon John & Sons, Kew Gardens, N.Y.
Detecto Scales, Inc., Brooklyn, N.Y.
Elctrns., Ltd., Marion, Iowa
Exact Weight Scale Co., Columbus, Ohio
Fairbanks Morse Weighing Sys., St. Johnsbury, Vt.
Howe Richardson Scale Co., Clifton, N.J.
Innovatek Enterprise, Millerton, N.Y.
Revere Elctrn. Div., Wallingford, Conn.
Toledo Scale, Toledo, Ohio
Torsion Balance Co., Clifton, N.J.
Transducers, Inc., Santa Fe Springs, Calif.
Yaskawa Elec. America, Inc., Oak Brook, Ill.

Scanners, Crossbar
Amp Inc., Harrisburg, Pa..... p 331
Cunningham, Honeoye Falls, N.Y. p 322
Hewlett-Packard, Palo Alto, Cal.
Monitor Labs, Inc., San Diego, Cal. p 364
PPM, Inc., Bedford, Ohio
Elctrn. Modules Corp., Timonium, Md.
Lear Siegler, Anaheim, Cal.
Matrix Sys. Corp., Chatsworth, Cal.
Non-Linear Sys., Inc., Del Mar, Cal.

Scanners, Flying Spot
Beta Instr., Newton Upper Falls, Mass.
Raytheon Co., Quincy, Mass. .....p 2005
Artronix, Inc., St. Louis, Mo.
Electro-Optical Systems, Pasadena, Cal.
Ferranti Ltd., Hollinwood, Lancs., England
Fiber Photics, Inc., Santa Cruz, Cal.
General Scanning, Watertown, Mass.
Goodyear Aerospace Corp., Akron, Ohio
Litton Inds., San Carlos, Calif.
Rank Precision Inds., W. Nyack, N.Y.
Thomson-CSF Electron Tubes, N.Y., N.Y.
Traid Corp., Glendale, Cal.

Scanners, Infrared
American Time Products, Woodside, N.Y. ..... p 1642
Bulova Watch Elctrns. Div. Amer. Time Prods., Woodside, N.Y. ..... p 1642
Dynarad, Inc., Norwood, Mass. .... p 439
Automation Inds., Danbury, Conn.
Avco Corp., Cincinnati, Ohio
Barnes Engrg. Co., Stamford, Conn.
Bendix Corp., Ann Arbor, Mich.
Dolan-Jenner Inds., Inc., Melrose, Mass.
Honeywell, Aerospace & Def., Minneapolis, Minn.
HRB-Singer, Inc., State College, Pa.
Hughes Aircraft Co, Culver City, Cal.
Hughes Aircraft Co, Fullerton, Cal.
Philips Broadcast Equipment Corp., Montvale, N.J.
Rank Precision Inds., W. Nyack, N.Y.
Santa Barbara Resch. Ctr., Goleta, Calif.
Servo Corp. America, Hicksville, N.Y.

Scanners, Instrument, Input/Output
A. D. Data Sys., Inc., Rochester, N.Y. p 328
Beckman Instrs., Cedar Grove, N.J.
Bendix Environmtl. Sci., Baltimore, Md.
Computer Prods., Ft. Lauderdale, Fla. p 341
Cunningham, Honeoye Falls, N.Y. p 322
Electro Sci. Inds., Portland, Ore.
Electronic Research Co., Shawnee Mission, Kans.
General Elec. Co., Schenectady, N.Y.
Hewlett-Packard, Palo Alto, Cal.
Honeywell, Denver, Colo.
Matrix Corp., Beech Grove, Ind. .. p 361
Monitor Labs, Inc., San Diego, Cal. p 364
Monsanto Company, Electronic Instruments, W. Caldwell, N.J.
Multitech Automation Prods., Monterey Pk., Cal.
(NES) Nationwide Elctrn. Sys., Itasca, Ill.
Nelson Ross Elctrns., Lake Success, N.Y.
Parabam, Inc., Compton, Cal.
PPM, Inc., Bedford, Ohio ..... p 535
Quindar Elctrns., Inc., Springfield, N.J.
Aerotronic Assocs., Inc., Contoocook, N.H.
Autocon Inds., Inc., St. Paul, Minn.
Automation Dynamics, Northvale, N.J.
Aydin Data Systems, Ft. Washington, Pa
Bristol Div, Waterbury, Conn
CGS Units, Inc., Rochester, N.Y.
Control Equip. Corp., New England, Lowell, Mass.
Datum, Inc., Anaheim, Calif.
Dolan-Jenner Inds., Inc., Melrose, Mass.
Elctrn. Modules Corp., Timonium, Md.
Elctrns., Ltd., Marion, Iowa
Fifth Dimension, Princeton, N.J.
General Devices, Inc., Princeton, N.J.
General Radio Co., Concord, Mass.
Gerber Sci. Instr. Co., Hartford, Conn.
Harshaw Chem. Co., Cleveland, Ohio
Heitz, Karl, Inc., New York, N.Y.
Howell Instrs., Inc., Ft. Worth, Tex.
Instrument Data Products, Camarillo, Cal.
Instrumentation Tech. Corp., Northridge, Calif.
Kollsman Instr. Corp., Syosset, N.Y.
Lear Siegler, Inc., Santa Monica, Calif.
Lear Siegler, Anaheim, Cal.
Litton Inds., San Carlos, Calif.
Matrix Sys. Corp., Chatsworth, Cal.
Micro Instr., Hawthorne, Cal.
Microwave Magnetics Inc., Danvers, Mass.
Midland Standard Inc., Elgin, Ill.
Non-Linear Sys., Inc., Del Mar, Cal.
Parker Instr. Corp., Stamford, Conn.
Philco-Ford Corp., Washington, D.C.
Rosemount, Minneapolis, Minn.
Rosemount Engrg. Co., Minneapolis, Minn.
Rosemount Plug-In, Inc., Nashville, Tenn.
Scanivalve, Inc., San Diego, Calif.
Schoeffel Instr. Corp., Westwood, N.J.
Teradyne, Inc., Boston, Mass.
3M Co., St. Paul, Minn.
United Sys. Corp., Dayton, Ohio
Vidar Corp., Mountain View, Cal.
Wyle Labs., El Segundo, Calif.

Scanners, Magnetic Tape—
See Readers, Magnetic Tape

Scanners, Radiochromatogram
Nuclear-Chicago, Des Plaines, Ill.
Rosemount Plug-In, Inc., Nashville, Tenn.
Schoeffel Instr. Corp., Westwood, N.J.

Scanners, Solid State
Bendix Environmtl. Sci., Baltimore, Md.
Computer Prods., Ft. Lauderdale, Fla.
Hewlett-Packard, Palo Alto, Cal.
Monitor Labs, Inc., San Diego, Cal.
(NES) Nationwide Elctrn. Sys., Itasca, Ill.
Autocon Inds., Inc., St. Paul, Minn.
Bio-Medical Elctrns., Inc., Rockville, Md.
CGS Units, Inc., Rochester, N.Y.
Dynamic Sys. Elctrns. Corp., Tempe, Ariz.
Elctrn. Modules Corp., Timonium, Md.
Fifth Dimension, Princeton, N.J.
General Radio Co., Concord, Mass.
HB Engrg. Corp., Silver Spring, Md.
Hughes Aircraft Co, Culver City, Cal.
Isomet Corp., Oakland, N.J.
Kollsman Instr. Corp., Syosset, N.Y.
Nat'l. Midco Inds., Inc., Trenton, N.J.
Nuclear-Chicago, Des Plaines, Ill.
Rosemount, Minneapolis, Minn.
Warner Elec. Brake & Clutch Co., Beloit, Wisc.

Scintillation Crystals—See Crystals, Scintillation

Scissors—See Vol 3

Scope Dollies—See Carts, Instrument & Equipment—Vol 3

Scopes—See Oscilloscopes

SCR's—See Thyristors—Vol 2

SCR Firing Controls—See Controls, SCR—Vol 2

Scramblers, Speech
Data-Control Systems, Danbury, Conn.
Collins Radio Co., Dallas, Tex.
Ground Data Corp., Fla., 33308
GTE Sylvania Inc., Elctrn. Sys. Gp., Waltham, Mass.
Hughes Aircraft Co, Fullerton, Cal.
ISC/Telephonics Div, Huntington, N.Y.
Lynch Communication Systems, San Francisco, Calif.
Philco-Ford Corp., Washington, D.C.
Signatron, Inc., Lexington, Mass.
Singer - Tele-Signal, Woodbury, N.Y.
Technical Mat'l., Mamaroneck, N.Y.
Teledyne Micronetics, San Diego, Calif.
Trepac Corp. America, Englewood, N.J.

Screen Room Filters—See Filters, Screen Room—Vol 2

Screen Rooms
Sprague Elec. Co., No. Adams, Mass.
Emerson & Cuming, Inc., Canton, Mass.
LectroMagnetics, Los Angeles, Cal.
Lindgren, Erik A. & Assoc., Chicago, Ill.
Ray Proof Corp., Norwalk, Conn.
Siemens Corp., Comps. Div., Iselin, N.J.

Screwdrivers—See Vol 3

Screws, Lead, Feed & Translatory—See Drives & Drive Mechanisms—Vol 2

Screws—See Fasteners—Vol 3

Scribers, Wafer-Also See Machines & Accessories, Semiconductor Manufacturing
Dixie Diamond Tool, Miami, Fla.
General Hardware Mfg. Co., New York, N.Y.
Korad Mat'ls. Sys. Div., Santa Monica, Cal.
Moser Jewel Co., Perth Amboy, N.J.
Quantronix Corp., Smithtown, N.Y.
Rank Precision Inds., W. Nyack, N.Y.
Research Instr. Co., Westbury, N.Y.
Wentworth Labs, Inc., Broadfield, Conn.

Sealers—See Coatings—Vol 3

Sealing Kits, Cable End—See Kits, Cable-End Sealing—Vol 3

Sealing Service, Hermetic—See Services, Hermetic Sealing—Vol 3

Seals & Feedthrust, Environmental-See Feedthrust & Seals, Environmental—See Vol 3

Seals, Carbon—See Vol 3

Seals, Ceramic To Metal—See Vol 3

Seals, Glass To Metal—See Vol 3

Seals, Hermetic-Also See Services, Hermetic Sealing—See Vol 3

Seals, Metal To Metal—See Vol 3

Seals, Microwave—See Gaskets, Shielding, R-F; Seals, Waveguide—Vol 3

Seals, Oil—See Vol 3

Seals, Plastic—See Vol 3

Seals, Rubber—See Vol 3

Seals, Rubber To Metal—See Vol 3

Seals, Silicone Rubber—See Vol 3

Search Unit, Magnetic Tape—See Tape Search Equipment

Selective Calling Devices—See Comm. Systems, Selective Paging

Self-Lubricating Materials—See Materials, Self-Lubricating—Vol 3

Selsyns—See Motors, Synchronous—Vol 2

Semiconductor Cases—See Cans, Semiconductor—Vol 3

Semiconductor Joint Compound—See Vol 2

Semiconductor Material—See Crystals, Semiconductor

Semiconductor Readouts—See Readouts, Semiconductor—Vol 2

Semiconductor Wafer Fabrication, Artwork (Precision)—See Vol 2

Semiconductor Wafer Fabrication, Assembling (Packaging)—See Vol 2

Semiconductor Wafer Fabrication, Designing (Topological)—See Vol 2

Semiconductor Wafer Fabrication, Maskmaking (Tooling)—See Vol 2

Semiconductor Wafer Fabrication, Processing—See Vol 2

Semiconductor Wafer Fabrication, Testing—See Vol 2

Semiconductors—See Diodes; Rectifiers; Transistors—Vol 2

Sensors, Ice, Sleet & Snow—See Detectors, Ice, Sleet & Snow—Vol 2

Sensors, Temperature—See Bolometers, Thermistors, Transducers—Vol 2

Services, Assembly & Fabrication—See Vol 3

Services, Calibration & Instrument Repair—See Vol 3

Services, Coating (All-Types)—See Vol 3

Services, Design (Circuits, Components, Equipment, Systems, etc.)—See Vol 3

Services, Electrical Measurement—See Vol 3

Services, Encapsulation—See Vol 3

Services, Engraving & Profiling—See Vol 3

Services, Environmental Testing—See Vol 3

Services, Film Badge—See Vol 3

Services, Glass Blowing & Fabrication—See Vol 3

Services, Hermetic Sealing—See Vol 3

Services, High Vacuum—See Vol 3

Services, Hydraulic Assembly—See Vol 3

Services, Mask Making—See Vol 3

Services, Metallizing—See Vol 3

Services, Molding—See Vol 3

Services, Plastics Fabrication—See Vol 3

Services, Plating

American Elctrn. Labs., Inc., Lansdale, Pa.
Astro-Space Labs., Huntsville, Ala
Berg Elctrns., Inc., New Cumberland, Pa.
All Star Prods., Inc., Defiance, Ohio
Alloys Unlimited, Inc., Encino, Calif.
Auto-Swage Products, Inc., Shelton, Conn.
Bron-Shoe Co., Columbus, Ohio
Brooks & Perkins, Inc., Livonia, Mich.
Buckbee-Mears Co., St. Paul, Minn.
Burton Resch. Labs., Culver City, Calif.
Cambridge Plating Co., Inc., Belmont, Mass.
Centerline Specialties, Boulder, Colo.
Dittmore-Freimuth Corp., Milwaukee, Wisc.
Electro-Optical Systems, Pasadena, Cal.
Electrochemical Inds., Inc., Worcester, Mass.
Etchit, Inc., S. Hopkins, Minn.
Flexible Circuits, Inc., Warrington, Pa.
GAF Corp., New York, N.Y.
Glasseal Prods. Co., Linden, N.J.
Harper-Leader, Inc., Waterbury, Conn.
Hughes Aircraft Co, Culver City, Cal.
Kawecki Berylco Inds., Inc., New York, N.Y.
Keystone Micro Scan., Boston, Mass.
Lehighton Elctrns., Inc., Lehighton, Pa.
Materials Technology, Inc., Somerset, N.J.
Matthey Bishop Inc., Malvern, Pa.
Merit Plating Co., Inc., Bronx, N.Y.
Metaplast Electrochemicals, Bronx, N.Y.
Plastiglide Mfg. Corp., Santa Monica, Cal.
Richardson Co., Des Plaines, Ill.
Sifco Metachemical, Cleveland, Ohio
Tekform Prods. Co., Anaheim, Cal.
Union Carbide, Indpls., Ind.
Unitron Inds. Corp., Taipei, Taiwan, Republic of China
Vernon Plating Works, Woodside, N.Y.
Viking Inds., Inc., Chatsworth, Calif.

Services, Qualification—See Services, Environmental Testing—Vol 3

Services, Rental, Electronic Instrumentation—See Vol 3

Services, RFI Measuring—See Services, Electrical Measurement—Vol 3

Services, Silk Screening—See Vol 3

Services, Tower Erection & Maintenance

Advance Inds., Sioux City, Iowa
American Tower Co., Shelby, Ohio
Avco Corp., Cincinnati, Ohio
Camusat Gueguen Telecom. Int'l., White Plains, N.Y.
E-Z Way Prods., Inc., Tampa, Fla.
General Dynamics, San Diego, Cal.
Hughes Aircraft Co, Fullerton, Cal.
Kline Iron & Steel Co., Inc., Columbia, S.C.
Microflect Co., Salem, Ore.
Philco-Ford Corp., Washington, D.C.
Rohn Mfg. Co., Peoria, Ill.
Stainless, Inc., N. Wales, Pa.
Topper Mfg. Co., Inc., Great Neck, N.Y.

Services, Training Aids—See Vol 3

Services, Vibration Surveys—See Vol 3

Services, Waveform Analysis—See Vol 3

Services, Wire Cutting & Stripping—See Vol 3

Services, Wire Wrapping—See Vol 3

Servo Analyzers—See Analyzers, Servo—Vol 2

Servo Controls—See Controls, Servo System—Vol 2

Servo Dampers—See Dampers, Servo—Vol 2

Servo Indicators—See Indicators, Servo—Vol 2

Servo Motors—See Motors, Servo—Vol 2

Servo Multipliers—See Multipliers, Servo—Vol 2

Servo Repeaters—See Repeaters, Servo—Vol 2

Servo Systems—See Vol 2

Servo Testers—See Testers, Servo

Shaft Couplings—See Couplings, Shaft—Vol 2

Shaft Encoders, Shaft Position

Shafts & Adapters, Flexible-Also See Couplings, Shaft—See Vol 2

Shafts, Rigid-Also See Couplings, Shaft—See Vol 2

Shafts, Threaded—See Vol 3

Shake Tables—See Vibration Test Systems

Shells, Encapsulation—See Cups, Encapsulation—Vol 3

Shelters, Outdoor Equipment—See Laboratories, Mobile & Field

Shields, Cathode-Ray Tube—See Vol 2

Shields, Coil—See Vol 3

Shields, Corona—See Vol 3

Shields, Electrostatic—See Shields, Tube—Vol 2

Shields, Heat—See Tube Heat Dissipators—Vol 2

Shields, Indicator Light—See Vol 3

Shields, Magnetic—See Vol 3

Shields, Nuclear Radiation

Victoreen Instr., Cleveland, Ohio
Beckman Instrs., (AISSD), Fullerton, Cal.
Bram Metallurgical-Chem., Phila., Pa.
Brooks & Perkins, Inc., Livonia, Mich.
Corning Glass Works, Tech. Prods. Div., Corning, N.Y.
Division Lead Co., Summit, Ill.
Franklin Fibre-Lamitex, Wilmington, Del.
Jenaer Glaswerk Schott & Gen. Inc., New York, N.Y.
Kennametal Inc., Latrobe, Pa.
LectroMagnetics, Los Angeles, Cal.
Nuclear-Chicago, Des Plaines, Ill.
Nuclear Data, Inc., Palatine, Ill.
Nuclear Equip. Chem. Corp., Farmingdale, N.Y.
Nuclear Meas. Corp., Indianapolis, Ind.
Nuclear Resch. Corp., Southampton, Pa.
Nuclear Supply Co., Washington, D.C.
Packard Instrument Co., Inc., Downers Grove, Ill.
Penberthy Div., Seattle, Wash.
Permaluster, Inc., Burbank, Calif.
Ray Proof Corp., Norwalk, Conn.
Raybestos-Manhattan, Inc., Bridgeport, Conn.
Soltec Corp., No. Hollywood, Cal.

Shields, R-F-Also See Gaskets, Shielding, R-F—See Vol 3

Shields, Switch—See Vol 2

Shields, Transformer—See Vol 3

Shields, Tube—See Vol 2

Shields, Wire—See Braid, Cable & Wire Shielding—Vol 3

Shifters, Phase, Microwave—See Vol 2

Shifters, Phase, R-F

Alford Mfg. Co., Winchester, Mass.
Arra Inc., Bayshore, N.Y.
Bendix, Franklin, Ind. ..... **p 1555**
Daico Inds., Inc., Compton, Cal.
Dytronics Co., Columbus, Ohio
North Hills Elctrns., Inc., Glen Cove, N.Y.
Torotel, Inc., Grandview, Mo.
Universal Ad-Yu Elctrns., Inc., Passaic, N.J. ..... **p 579**
Weinschel Engrg. Co., Gaithersburg, Md.
Aerospace Resch. Inc., Boston, Mass.
AMBAC Inds., Garden City, N.Y.
Cardwell Condenser, Lindenhurst, N.Y.
Collins Radio Co., Dallas, Tex.
Consolidated Resistance Sls., Yonkers, N.Y.
General Microwave Corp., Farmingdale, N.Y.
GTE Sylvania Inc., Elctrn. Sys. Gp., Waltham, Mass.
Guide Inds., Inc., Sun Valley, Calif.
Herley Inds., Inc., Syosset, N.Y.
Hughes Aircraft Co, Culver City, Cal.
Hyletronics Corp., Littleton, Mass.
ITT Gremar, Inc., Woburn, Mass.
Kevlin Mfg. Co., Woburn, Mass.
Meca Elctrns., Inc., Denville, N.J.
Merrimac Resch. & Dev., Inc., West Caldwell, N.J.
Microwave Assocs., Inc., Burlington, Mass.
Microwave Development Labs., Inc., Needham Hgts., Mass.
Narda Microwave Corp., Plainview, N.Y.
Nilsen Mfg. Co., Haines City, Fla.
Premier Microwave, Port Chester, N.Y.
Prodelin, Inc., Hightstown, N.J.
Rantec Div., Calabasas, Calif.
RF Systems, Inc., Cohasset, Mass.
Special Microwave Devices Oper., Waltham, Mass.
Struthers Elctrns. Corp., Mamaroneck, N.Y.
Taylor-Winfield Corp., Warren, Ohio
Timing Sys., Inc., Marblehead, Mass.
Victor Microwave, Inc., Wakefield, Mass.
Wiltron Co., Palo Alto, Calif.

Shifters, Phase 60/400 CPS

Dytronics Co., Columbus, Ohio
Ind'l. Control Co., Farmingdale, N.Y.
Ind'l. Test Equip., Port Washington, N.Y. **p 497**
North Atlantic Inds., Plainview, N.Y.
Seg Elctrns., Richmond Hill, N.Y.
AMBAC Inds., Garden City, N.Y.
Bendix, S. Montrose, Pa.
Elctrn. Specialty, Thomaston, Conn.
Hughes Aircraft Co, Culver City, Cal.
Knopp, Inc., Oakland, Calif.
Singer-General Precision, Inc., Little Falls, N.J.
States Co., Hartford, Conn.
Theta Instr. Corp., Fairfield, N.J.
Weston-Transicoil, Worcester, Pa.

Shipping Containers—See Containers, Metal & Fiberglass, Shipping (Reusable)—Vol 3

Shock Mounts—See Mounts, Shock—Vol 3

Shock Testers—See Testers, Shock

Shorting Bars—See Bars, Shorting—Vol 3

Shredders, Paper—See Paper Shredders—Vol 3

Shrinkable Plastics & Elastomers—See Caps, Forms & Tapes, Heat Shrinkable-Also See Tubing, Heat Shrinkable—Vol 3

Shunts, Meter

Empro Mfg. Co., Inc., Indianapolis, Ind. **p 459**
General Elec. Co., Schenectady, N.Y. **p 485**
Hewlett-Packard, Palo Alto, Cal.
Hoyt Elec. Instr. Works, Belmont, Mass. **p 495**
Janco Corp., Burbank, Cal. ..... **p 1930**
Julie Research Lab., New York, N.Y. **p 503**
Rustrak Instr. Div., Manchester, N.H.
Simpson Elec. Co., Chicago, Ill.
Triplett Elec. Instr. Co., Bluffton, Ohio
Westinghouse Elec. Corp., Newark, N.J.
A & M Instrument, Inc., Great Neck, N.Y.
A.O.I.P., 75/Paris 12eme, France
Electrical Instr. Svc., Inc., Mt. Vernon, N.Y.
Elctrn. Precision Comps., Mt. Vernon, N.Y.
Esterline Angus Div., Indianapolis, Ind.
Hallmark Standards, Inc., Mt. Vernon, N.Y.
Holt Instr. Labs., Oconto, Wisc.
Precision Resistor Co., Hillside, N.J.
Ram Meter, Inc., Ferndale, Mich.
Ramm Rectifier Co., Inc., Bronx, N.Y.
Stark Elctrn. Instrs., Ltd., Ajax, Ont., Canada
Sunshine Sci. Instrs., Inc., Philadelphia, Pa.
Weston Instruments, Inc., Newark, N.J.
Yewtec Corporation, Larchmont, N.Y.

Shutters, Microwave—See Vol 2

Signal Averagers,—See Averagers, Signal

Signal Conditoners & Equipment

American Elctrn. Labs., Inc., Lansdale, Pa.
Astrosystems, Lake Success, N.Y. **p 332**
Beckman Instruments, Shiller Pk., Ill.
Bendix Environmtl. Sci., Baltimore, Md.
Bulova Watch Co., Servo Prods. Elctrns. Div., Woodside, N.Y.
Data-Control Systems, Danbury, Conn. **p 345**
DDC, Hicksville, N.Y.
Dynamics Instr. Co., Monterey Pk., Cal. **p 432**
Ectron Corp., San Diego, Cal. ..... **p 1283**
Elcor Prods. Welex Elctrns., Silver Spring, Md.
Gould, Inc., Cleveland, Ohio
Hewlett-Packard, Palo Alto, Cal.
Honeywell, Denver, Colo. ..... **p 590**
Hybrid Sys. Corp., Burlington, Mass.
Ithaco, Inc., Ithaca, N.Y. ..... **p 1286**
James Elctrns., Inc., Chicago, Ill.
Natel Engrg. Co., Canoga Pk., Cal. **p 367**
PPM, Inc., Bedford, Ohio ..... **p 535**
Rockland Sys. Corp., Blauvelt, N.Y.
Schaevitz Engrg., Pennsauken, N.J. **p 1991**
Solid State Elctrns., Sepulveda, Cal.
Sonex, Inc., Bethayres, Pa. ..... **p 955**
SRC Div., Newport Bch., Cal. **p 1993,1994**
Tektronix, Inc., Beaverton, Ore.
Teledyne Philbrick, Dedham, Mass.

Transmagnetics Inc., Farmingdale, N.Y.
Universal Ad-Yu Elctrns., Inc., Passaic, N.J. ..... p 579
Acromag, Inc., Wixom, Mich.
Aerospace Resch. Inc., Boston, Mass.
Applied Control Co., Fairfield, N.J.
A.R.F. Products, Inc., Raton, N.M.
Arco Systems Inc., Palo Alto, Cal
Astronics, Inc., Dallas, Tex.
Aydin Data Systems, Ft. Washington, Pa
Bay Labs., Inc., Cleveland, Ohio
Bell & Howell Co., Pasadena, Calif.
Bell & Howell Co., Monrovia, Calif.
Bendix Corp., Davenport, Iowa
Bio-Medical Elctrns., Inc., Rockville, Md.
Biocom, Inc., Culver City, Cal.
Bionic Instrs., Inc., Bala Cynwyd, Pa.
BLH Elctrns., Inc., Waltham, Mass.
Bristol Div, Waterbury, Conn
Columbia Resch. Labs., Woodlyn, Pa.
Conductron Corp., St. Charles, Mo.
Consolidated Ohmic Devices, Carle Pl., N.Y.
Controlotron Corp., Farmingdale, N.Y.
Defense Elctrns., Inc., Rockville, Md.
Doric Sci. Corp., San Diego, Calif.
Dynalex, Inc., Burbank, Cal.
EDC (Electro Dev.), Lynnwood, Wash.
Electronic Design Labs., Inc., Phila., Pa.
Electronic Modules, Inc., Pasadena, Cal.
Elctrns., Ltd., Marion, Iowa
Endevco, Pasadena, Calif.
Fifth Dimension, Princeton, N.J.
Foxboro Co., Foxboro, Mass.
General Atronics, Military Elctrns., Phila., Pa.
General Devices, Inc., Princeton, N.J.
General Radio Co., Concord, Mass.
Hartman Sys. Div. A-T-O, Inc., Huntington Sta., N.Y.
HB Engrg. Corp., Silver Spring, Md.
Hughes Aircraft Co, Culver City, Cal.
Hughes Aircraft Co, Fullerton, Cal.
Incor Instr., Plainview, N.Y.
InterOcean Systems, San Diego, Cal.
Jerrold Elctrns. Corp., Philadelphia, Pa.
K West, Westminster, Calif.
Lear Siegler, Inc., Santa Monica, Calif.
Lear Siegler, Anaheim, Cal.
Lockheed Aircraft Svce., Special Devices Div., Ontario, Calif.
Lynch Communication Systems, San Francisco, Calif.
Marathon Instrs. Div., Pico Rivera, Calif.
MB Elctrns/Textron Co., New Haven, Conn.
Merrimac Resch. & Dev., Inc., West Caldwell, N.J.
Micro-Strain, Inc., Spring City, Pa.
Moore Inds., Van Nuys, Cal.
Newport Labs., Inc., Santa Ana, Cal.
Non-Linear Sys., Inc., Del Mar, Cal.
Novatronics, Inc., Pompano Beach, Fla.
Philco-Ford Corp., Washington, D.C.
Prentice Elctrns. Corp., Palo Alto, Calif.
Princeton Applied Resch. Corp., Princeton, N.J.
Rawco Instrs., Inc., Ft. Worth, Tex.
Reliance Elec. Co., Cleveland, Ohio
Rochester Instr. Sys., Rochester, N.Y.
Sensotec, Inc., Columbus, Ohio
Singer - Tele-Signal, Woodbury, N.Y.
Systems Resch. Labs., Dayton, Ohio
Teledyne Taber, No. Tonawanda, N.Y.
Telmar, Inc., Columbus, Ohio
Tensitron, Inc., Harvard, Mass.
Thermo Sys., Inc., St. Paul, Minn.
Transducer Systems, Inc., Willow Grove, Pa.
Tyco Instr. Div., Waltham, Mass.
Tylan Corp., Torrance, Calif.
Unholtz-Dickie Corp., Hamden, Conn.
Varian Data Machines, Palo Alto, Cal.
Viatran Corp., Buffalo, N.Y.
West Coast Resch. Corp., Los Angeles, Calif.

Signal Tracers—See Testers, Signal Tracing

Silica, Fused—See Vol 3

Silicon Semiconductors—See Diodes; Transistors—Vol 2

Silicone Insulators & Insulation—See Insulating Compounds, Silicone—Vol 3

Silicone Rubber—See Rubber, Silicone—Vol 3

Silk Screen Processing Services—See Services, Silk Screening—Vol 3

Simulators, Line

Computer Devices, Commack, N.Y.
Seg Elctrns., Richmond Hill, N.Y.
Austin Elctrns., Roselle, N.J.
Burtek, Inc., Tulsa, Okla.
Hartman Sys. Div. A-T-O, Inc., Huntington Sta., N.Y.
Hughes Aircraft Co, Culver City, Cal.
Lockheed Aircraft Svce., Special Devices Div., Ontario, Calif.

Simulators, Motion

Andersen Labs. Inc., Bloomfield, Conn.
Icon Corp., Cambridge, Mass. .... p 1333
Metric Sys., Ft. Walton Beach, Fla.p 359
AAI Corp., Baltimore, Md.
Aeroflex Labs., Plainview, N.Y.
Analog General Corp., Oceanside, N.Y.
Artronix, Inc., St. Louis, Mo.
Austin Elctrns., Roselle, N.J.
Carco Elctrns., Menlo Park, Calif.
Conductron Corp., St. Charles, Mo.
Genisco Tech. Corp., Instr. Div., Compton, Cal.
Goerz Optical Co., Inc., Pittsburgh, Pa.
Goodyear Aerospace Corp., Akron, Ohio
Hartman Sys. Div. A-T-O, Inc., Huntington Sta., N.Y.
Hughes Aircraft Co, Culver City, Cal.
Hughes Aircraft Co., Ind'l. Prods. Div., Oceanside, Cal.
Hughes Aircraft Co., Ind'l. Prods. Div./Ind'l. Auto, Oceanside, Cal.
Lockheed Aircraft Svce., Special Devices Div., Ontario, Calif.
MB Elctrns/Textron Co., New Haven, Conn.
McFadden Elctrns. Co., South Gate, Calif.
Milman Engrg. Co., Inc., Santa Monica, Calif.
Minnetech Labs., Inc., Minneapolis, Minn.
Opto-Metric Tools, Rockleigh, N.J.
Optomechanisms, Inc., Plainview, N.Y.
Oriel Optics Corp., Stamford, Conn.
Superior Elec., Bristol, Conn.

Simulators, Radar

American Elctrn. Labs., Inc., Lansdale, Pa.
Applied Microwave Lab., Andover, Mass.
Computer Devices, Commack, N.Y.
Elgenco, Inc., Santa Monica, Cal.
Frequency Engrg. Labs., Farmingdale, N.J.
Metric Sys., Ft. Walton Beach, Fla.p 359
Vega Precision Labs., Vienna, Va.
AAI Corp., Baltimore, Md.
Aerospace Resch. Inc., Boston, Mass.
Austin Elctrns., Roselle, N.J.
Avco Corp., Cincinnati, Ohio
Conductron Corp., St. Charles, Mo.
Gap Instr. Corp., Hauppauge, N.Y.
General Atronics, Military Elctrns., Phila., Pa.
General Dynamics, San Diego, Cal.
General Electrodynamics Corp., Garland, Tex.
Goodyear Aerospace Corp., Akron, Ohio
Granite State Machine Co., Inc., Manchester, N.H.
GTE Sylvania Inc., Elctrn. Sys. Gp., Waltham, Mass.
Hartman Sys. Div. A-T-O, Inc., Huntington Sta., N.Y.
HRB-Singer, Inc., State College, Pa.
Hughes Aircraft Co, Culver City, Cal.
Itek Corp., Lexington, Mass.
ITT Avionics Div, Nutley, N.J.
Link Div., Binghamton, N.Y.
Lockheed Aircraft Svce., Special Devices Div., Ontario, Calif.
Maxson Elctrns. Div., Great River, N.Y.
Miller Associates, Mercersburg, Pa.
Nano Fast, Inc., Chicago, Ill.
Rantec Div., Calabasas, Calif.
Raytheon Co., Lexington, Mass.
RCA Govt. & Comm. Sys., Moorestown, N.J.
Reflectone, Inc., Stamford, Conn.
Sage Labs. Inc., Natick, Mass.
Sperry Marine Sys., Charlottesville, Va.
Sperry Microwave Elctrns., Clearwater, Fla.
Trak Microwave, Tampa, Fla.

Simulators, Solar—See Solar Simulators

Simulators & Trainers

Astrosystems, Lake Success, N.Y.
Bowmar Instr. Corp., Ft. Wayne, Ind.
Metric Sys., Ft. Walton Beach, Fla.p 359
AAI Corp., Baltimore, Md.
A C Electronics Co., Santa Monica, Cal.
Analog General Corp., Oceanside, N.Y.
Austin Elctrns., Roselle, N.J.
Betzelt GMBH, Trogerstr. 32, W. Germany
Burtek, Inc., Tulsa, Okla.
Carco Elctrns., Menlo Park, Calif.
Conductron Corp., St. Charles, Mo.
Digiac Corp., Plainview, N.Y.
Gap Instr. Corp., Hauppauge, N.Y.
General Dynamics, San Diego, Cal.
Goodyear Aerospace Corp., Akron, Ohio
GTE Sylvania Inc., Elctrn. Sys. Gp., Waltham, Mass.
Hartman Sys. Div. A-T-O, Inc., Huntington Sta., N.Y.
Honeywell, Aerospace & Def., Minneapolis, Minn.
Hughes Aircraft Co, Culver City, Cal.
ITT Avionics Div, Nutley, N.J.
Larson Aero Dev., Concord, Calif.
Lear Siegler, Inc., Santa Monica, Calif.
Link Div., Binghamton, N.Y.
Lockheed Aircraft Svce., Special Devices Div., Ontario, Calif.
LTV Electrosystems, Dallas, Tex.
Maxson Elctrns. Div., Great River, N.Y.
Photomechanisms Div., Inc., Huntington Sta., N.Y.
Reflectone, Inc., Stamford, Conn.
Sperry Marine Sys., Charlottesville, Va.
Universal Resch. Labs., Elk Grove Village, Ill
Visual Educom, Michigan City, Ind.

Sinks, Heat—See Transister & Diode Heat Dissipators; Tube Heat Dissipators-Also See Heat Sinks, Soldering—Vol 2

Sleeves—See Tubing—Vol 3

Slide Rules (Circuitry Computing)—See Vol 3

Slides, Cabinet & Chassis—See Vol 3

Sliding Loads, Microwave

Alford Mfg. Co., Winchester, Mass.
Hewlett-Packard, Palo Alto, Cal.
Waveline, Inc., W. Caldwell, N.J.
Aircom, Inc., Union, N.H.
Airtec, Inc., Roselle, N.J.
CES Elctrns., Brooklyn, N.Y.
Coax Devices Inc., Chelsea, Mass.
Herley Inds., Inc., Syosset, N.Y.
Maury Microwave Corp., Cucamonga, Calif.
Meca Elctrns., Inc., Denville, N.J.
Microlab/FXR, Livingston, N.J.
Microwave Labs. America, Brooklyn, N.Y.
Omega Labs., Inc., Rowley, Mass.
RF Systems, Inc., Cohasset, Mass.
Systron-Donner Microwave Div., Van Nuys, Cal.

Slip & Shaker Tables—See Vibration Test Systems

Slip-Rings & Assemblies—See Vol 2

Slotted Lines, Microwave

Alford Mfg. Co., Winchester, Mass.
Hewlett-Packard, Palo Alto, Cal.
Weinschel Engrg. Co., Gaithersburg, Md.
Aircom, Inc., Union, N.H.
Astrolab Inc., Linden, N J
General Microwave Corp., Farmingdale, N.Y.
General Radio Co., Concord, Mass.
Guide Inds., Inc., Sun Valley, Calif.
Herley Inds., Inc., Syosset, N.Y.
Hughes Aircraft Co, Culver City, Cal.
Maury Microwave Corp., Cucamonga, Calif.
MCS Corp., Monrovia, Calif.
Microlab/FXR, Livingston, N.J.
Narda Microwave Corp., Plainview, N.Y.
Omega Labs., Inc., Rowley, Mass.
OMNI Spectra, Farmington, Mich.
Phelps Dodge Comm., North Haven, Conn.
PRD Elctrns., Inc., Westbury, N.Y.
Premier Microwave, Port Chester, N.Y.
RF Systems, Inc., Cohasset, Mass.
Rohde & Schwarz Sls., Passaic, N.J.
Systron-Donner Microwave Div., Van Nuys, Cal.
TRG Prods., E. Boston, Mass.
Wiltron Co., Palo Alto, Calif.

Smith Chart Impedance Plotters, Automatic

Alford Mfg. Co., Winchester, Mass. p 598
Hewlett-Packard, Palo Alto, Cal.
Wiltron Co., Palo Alto, Calif.

Smoke Indicators—See Fire Detection & Fighting Equipment—Vol 2

Snips—See Wire Cutters

Socket Adapters—See Vol 3

Sockets, Breadboard—See Vol 2

Sockets, Capacitor—See Vol 3

Sockets, Crystal

Amphenol Ind'L Div., Chicago, Ill.
Augat Inc., Attleboro, Mass. ..... p 1536
Barnes Corp., Lansdowne, Pa.
Berg Elctrns., Inc., New Cumberland, Pa.
Connector Corp., Chicago, Ill. .... p 2613
EBY, Hugh H. Co., Phila., Pa. ..... p 2620
Elco, Willow Grove, Pa.
Elctrn. Molding Corp., Woonsocket, R.I.
Johnson E. F. Co., Waseca, Minn.
Millen, James Mfg., Malden, Mass. p 1999
Sealectro Corp., Mamaroneck, N.Y.
Showa Musen Kogyo Co., Ltd., Shinagawa-Ku Tokyo 141, Japan
Smith, Herman H., Inc., Bklyn., N.Y.
Accurate Elctrns. Corp., Elyria, Ohio
Chemelec Prods., Inc., Cherry Hill, N.J.
Cinch Mfg. Co., Elk Grove Village, Ill.
Deutsch Relay Div., East Northport, NY
DonMar Prods., Inc., Denver, Colo.
Eby Sls. Co., Jamaica, N.Y.
Industrial Elctrn. Hardware, New York, N.Y.
Javex Elctrns., Cherry Valley, Calif.
Methode Elctrns., Inc., Chicago, Ill.
Permonite Mfg. Co., Chicago, Ill.
Philmore Mfg. Co., Richmond Hill, N.Y.
Robinson-Nugent, New Albany, Ind.
Stettner-Trush Inc., Cazenovia, N.Y.
Waldom Elctrns., Inc., Chicago, Ill.

Sockets, Diode—See Vol 2

Sockets, Integrated Circuit—See Vol 2

Sockets, Lamp & Lamp Assemblies—See Vol 2

Socket, Miniature & Subminiature—See Sockets, Diode; IC; Transistor—Vol 2

Sockets, Relay—See Vol 2

Sockets, SCR—See Vol 2

Sockets, Test—See Vol 3

Sockets, Transistor—See Vol 2

Sockets, Transmitting & Industrial Tube—See Vol 2

Sockets, Tube—See Vol 2

Sockets, Vibrator—See Vol 2

Solar Cells—See Cells, Photovoltaic—Vol 2

Solar Simulators
Advanced Kinetics, Costa Mesa, Calif.
Aerospace Controls Corp., Gardena, Cal.
Avco Elctrns., Tulsa, Okla.
Computer Meas., Gardena, Cal.
Cooke Vacuum Prods., S. Norwalk, Conn.
Eimac, San Carlos, Calif.
Electro-Optical Systems, Pasadena, Cal.
Goodyear Aerospace Corp., Akron, Ohio
Hughes Aircraft Co, Culver City, Cal.
Ionics, Inc., Watertown, Mass
Pennwalt Corp., Phila., Pa.
Research, Inc., Minneapolis, Minn.
Schoeffel Instr. Corp., Westwood, N.J.
Strong Elec. Corp., Toledo, Ohio
Varian Assocs., Palo Alto, Cal.
Webber Mfg. Co., Inc., Indianapolis, Ind.

Solder (All Types)—See Vol 3

Solder Pots—See Vol 3

Solder Preforms (Including Rings)-Also See Preforms,Precious Metal—See Vol 3

Soldering Accessories—See Vol 3

Soldering Equip., Hot Gas
GTE Sylvania Inc., Danvers, Mass.
Henes Mfg. Co., Phoenix, Ariz.
Janel, Inc., Stirling, N.J.
Laurier Assocs., Westford, Mass.
MacDonald & Co., Glendale, Calif.
Wentworth Labs, Inc., Broadfield, Conn.

Soldering Equip., Induction Heating
Cycle-Dyne, Inc., Jamaica, N.Y.
Janel, Inc., Stirling, N.J.
MacDonald & Co., Glendale, Calif.
Miller, L.C. Co., Monterey Park, Calif.
Reeve Elctrns., Inc., Chicago, Ill.
Scientific Elec., Inc., Garfield, N.J.
Seven Assocs., Sunnyvale, Calif.
Taylor-Winfield Corp., Warren, Ohio
Techni-Tool, Inc., Philadelphia, Pa.

Soldering Equip., Printed Circuit
Circon Corp., Goleta, Cal. ..... p 2937
Multicore Sls. Corp., Westbury, N.Y.
Wall Mfg. Co., Kinston, N.C. ..... p 2945
Weller, Easton, Pa. ..... p 2946
Air-Vac Engrg. Co., Milford, Conn.
American Elec. Heater, Detroit, Mich.
Anchor Alloys, Inc., Brooklyn, N.Y.
Atlantic Instrs. Corp., Watertown, Mass.
Caig Labs., Inc., Westbury, N.Y.
Dee Elec. Co., Chicago, Ill.
Electrovert, Inc., Mt. Vernon, N.Y.
Enterprise Development Corp., Indianapolis, Ind.
Etchomatic, Inc., Waltham, Mass.
Hollis Engrg., Inc., Nashua, N.H.
Hughes Aircraft Co., Vacuum Tube Prods. Div/Welding Equip., Oceanside, Calif.
Janel, Inc., Stirling, N.J.
MacDonald & Co., Glendale, Calif.
Mechanical Technology, Inc., Latham, N.Y.
Newman, M.M. Corp., Marblehead, Mass.
Scientific Inds., Inc., Mineola, N.Y.
Selectrons, Ltd., New York, N.Y.
Superior Flux & Mfg., Cleveland, Ohio
Techni-Tool, Inc., Philadelphia, Pa.
Tech. Devices Co., Culver City, Calif.
UNGAR, Compton, Calif.
Unitek Corp., Monrovia, Calif.
Wenesco Inc., Chicago, Ill.
Zeva Elec. Corp., Hanover, N.J.

Soldering Equip., Reflow
Circon Corp., Goleta, Cal.
Atlantic Instrs. Corp., Watertown, Mass.
Ewald Instrs. Corp., Kent, Conn.
Hollis Engrg., Inc., Nashua, N.H.
Hughes Aircraft Co., Ind'l. Prods. Div., Oceanside, Cal.
Hughes Aircraft Co., Vacuum Tube Prods. Div/Welding Equip., Oceanside, Calif.
Janel, Inc., Stirling, N.J.
Lear Siegler, Inc., Santa Monica, Calif.
Lear Siegler, Anaheim, Cal.
MacDonald & Co., Glendale, Calif.
Reeve Elctrns., Inc., Chicago, Ill.
Unitek Corp., Monrovia, Calif.
Wentworth Labs, Inc., Broadfield, Conn.

Soldering Equip., Resistance
Wall Mfg. Co., Kinston, N.C. ..... p 2945
American Elec. Heater, Detroit, Mich.
Americon Corp., Waltham, Mass.
Communications Tech. Corp., Los Angeles, Cal.
Contact, Inc., Hudson, N.H.
Ewald Instrs. Corp., Kent, Conn.
Hughes Aircraft Co., Ind'l. Prods. Div., Oceanside, Cal.
Hughes Aircraft Co., Vacuum Tube Prods. Div/Welding Equip., Oceanside, Calif.
Ideal Industries, Inc., Sycamore, Ill.
Janel, Inc., Stirling, N.J.
Luma Electric Equipment Co., Toledo, Ohio
MacDonald & Co., Glendale, Calif.
Taylor-Winfield Corp., Warren, Ohio
Techni-Tool, Inc., Philadelphia, Pa.
Unitek Corp., Monrovia, Calif.
Virginia Elctrns. Co., Inc., Falls Church, Va.
Walters, W.A., Inc., Chicago, Ill.
Zephyr Mfg. Co., Inglewood, Calif.

Soldering Equip., Temperature Controlled—See Vol 3

Soldering Equip., Ultrasonic
Engelhard Minerals & Chem., Murray Hill, N.J.
Aperco Co., East Meadow, N.Y.
Branson Sonic Power, Danbury, Conn
Delta Sonics, Hawthorne, Cal
Janel, Inc., Stirling, N.J.
Laser Technology, Inc., N. Hollywood, Calif.
Sonobond Corp., West Chester, Pa.

Soldering Flux—See Flux, Brazing & Soldering—Vol 3

Soldering Guns—See Vol 3

Soldering Irons—See Vol 3

Solenoid Drivers, Solid-State—See Vol 2

Solenoids, Linear—See Vol 2

Solenoids, Rotary—See Vol 2

Solvents—See Cleaners & Solvents—Vol 3

Sonic Analyzers—See Analyzers, Sonic & Subsonic

Sorters—See Machines, Sorting

Sound Level Indicators—See Meters, Audio Level

Sound Recording Equip.—See Microphones; Recorders; etc.

Sources, Light, Isotope Excited
American Atomics Corp., Tucson, Ariz.
Canrad Precision Inds., Inc., Pelham, N.Y.
ILC, Inc., Sunnyvale, Calif.
SSR Instrs. Co., Santa Monica, Cal.

Sources, Light, Radioactive
American Atomics Corp., Tucson, Ariz.
Canrad Precision Inds., Inc., Pelham, N.Y.
Fiber Photics, Inc., Santa Cruz, Cal.
Gencom Div., Plainview, N.Y.
Hughes Aircraft Co, Culver City, Cal.
Schoeffel Instr. Corp., Westwood, N.J.
3M Co., St. Paul, Minn.

Sources, Light, Stroboscopic—See Lights, Stroboscopic Source—Vol 2

Sources, Radioactive
General Elec. Co., Schenectady, N.Y.
American Atomics Corp., Tucson, Ariz.
Beckman Instrs., (AISSD), Fullerton, Cal.
Canrad Precision Inds., Inc., Pelham, N.Y.
Eberline Instr. Corp., Santa Fe, N.M.
Hughes Aircraft Co, Culver City, Cal.
Landsverk Electrometer Co., Glendale, Cal.
Nuclear-Chicago, Des Plaines, Ill.
Nuclear Equip. Chem. Corp., Farmingdale, N.Y.
Nuclear Meas. Corp., Indianapolis, Ind.
Nuclear Prods. Co., El Monte, Calif.
Nuclear Supply Co., Washington, D.C.
Packard Instrument Co., Inc., Downers Grove, Ill.
Sanders Nuclear Corp, Nashua, N H
Soltec Corp., No. Hollywood, Cal.
3M Co., St. Paul, Minn.

Spacers—See Vol 3

Spaghetti—See Tubing, Spaghetti—Vol 3

Spark Gap Capacitors—See Capacitors, Overvoltage Protected—Vol 3

Spark Gaps—See Vol 2

Speaker Cones & Parts
Atlas Sound Div., Parsippany, N.J.
Bossert Mfg. Corp., Utica, N.Y.
Cleveland Elctrns., Inc., Cleveland, Ohio
Era Acoustics, Moonachie, N.J.
Hawley Prods., Hitco Co., Sub. Armco, St. Charles, Ill.
Jensen Mfg. Div., Chicago, Ill.
Magitran Co., Moonachie, N.J.
Precision Paper Tube Co., Wheeling, Ill.
Resinite Corp. Div., Wheeling , Ill
Shigoto Inds., Ltd., New York, N.Y.
Stevens Prods., Inc., E. Orange, N.J.
Waldom Elctrns., Inc., Chicago, Ill.
Welsh, W.H. Co., Inc., Chicago, Ill.

Speaker Drivers—See Drivers, Speaker

Speaker Enclosures—See Enclosures, Speaker

Speaker Horns—See Horns, Speaker

Speaker Systems (Industrial)
CTS Corp, Elkhart, Ind.
Electronic Resch. Assocs., Cedar Grove, N.J.
Sennheiser Elctrn. Corp., New York, NY p 321
Action Systems Co., Meriden, Conn.
Alcor, Inc., Ithaca, N.Y.
Altec, Anaheim, Calif.
American Geloso Elctrns., Inc., New York, N.Y.
Argos Prods. Co., Inc., Genoa, Ill.
Atlas Sound Div., Parsippany, N.J.
Audio Dynamics Corp., New Milford, Conn.
Bell P/A Prods. Corp., Columbus, Ohio
Bennett Laboratories, Inc., Emeryville, Calif.
Bogen Div., Paramus, N.J.
Bose Corp., Natick, Mass.
Collins Radio Co., Dallas, Tex.
Components Specialties, Inc., Freeport, N.Y.
Du Kane Corp., St. Charles, Ill.
Eico Electronic Instrument Co., Inc., Brooklyn, N.Y.
Era Acoustics, Moonachie, N.J.
Era Acoustics Corp., Moonachie, N.J.
Ercona Corp., Bellmore, N.Y.
Executone, Inc., Long Island City, N.Y.
Fisher-Berkeley Corp., Emeryville, Calif.
Gai-Tronics Corp., Reading, Pa
Jensen Mfg. Div., Chicago, Ill.
Klipsch & Assocs., Inc., Hope, Ark.
Magitran Co., Moonachie, N.J.
Major Elctrns. Corp., Brooklyn, N.Y.
Minneapolis Speaker Co., Minneapolis, Minn.
Mobil Elctrns., Inc., Anderson, Ind.
Neptune Elctrns. Co., New York, N.Y.
Private Tele-Comms., Inc., Chicago, Ill.
Quam-Nichols Co., Chicago, Ill.
RCA Corp., Camden, N.J.
Remler Co., San Francisco, Calif.
Smith-Meeker Engrg. Co., New York, N.Y.
Tannoy (America), Ltd., Bohemia, N.Y.
University Sound, Anaheim, Cal.
Utah Elctrns., Huntington, Ind.
Wald Sound, Sun Valley, Calif.
Whittaker Corp., Los Angeles, Cal.
Wilder Engrg. Prods., Chicago, Ill.

Speakers, Ceramic
Amperex Elctrn. Corp., Hauppauge, N.Y. p 308
CTS Corp, Elkhart, Ind.
Electronic Resch. Assocs., Cedar Grove, N.J.
Allied Elctrns. Corp., Chicago, Ill.
Cleveland Elctrns., Inc., Cleveland, Ohio
Components Specialties, Inc., Freeport, N.Y.
Minneapolis Speaker Co., Minneapolis, Minn.
Shigoto Inds., Ltd., New York, N.Y.

Speakers, Column
CTS Corp, Elkhart, Ind.
Electronic Resch. Assocs., Cedar Grove, N.J.
Sennheiser Elctrn. Corp., New York, NY
Allied Elctrns. Corp., Chicago, Ill.
American Geloso Elctrns., Inc., New York, N.Y.
Argos Prods. Co., Inc., Genoa, Ill.
Atlas Sound Div., Parsippany, N.J.
Bogen Div., Paramus, N.J.
Bozak, R.T. Mfg. Co., Darien, Conn.
Cleveland Elctrns., Inc., Cleveland, Ohio
Du Kane Corp., St. Charles, Ill.
Electro-Voice, Inc., Buchanan, Mich.
Era Acoustics, Moonachie, N.J.
Executone, Inc., Long Island City, N.Y.
Jensen Mfg. Div., Chicago, Ill.
Nelson-Hershfield Elctrns., Phoenix, Ariz.
Port-O-Vox Enterprises, Corp., New York, N.Y.
RCA Corp., Camden, N.J.
University Sound, Anaheim, Cal.
Wald Sound, Sun Valley, Calif.
Wilder Engrg. Prods., Chicago, Ill.

Speakers, Dynamic, Electro
Amperex Elctrn. Corp., Hauppauge, N.Y. p 308
Electronic Resch. Assocs., Cedar Grove, N.J.
GC Elctrns., Rockford, Ill.
Sennheiser Elctrn. Corp., New York, NY p 321
Altec, Anaheim, Calif.
Ampex Corp., Redwood City, Calif.
Cleveland Elctrns., Inc., Cleveland, Ohio
Era Acoustics Corp., Moonachie, N.J.
Fisher Radio, Long Island City, N.Y.
Jensen Mfg. Div., Chicago, Ill.
Port-O-Vox Enterprises, Corp., New York, N.Y.
RCA Corp., Camden, N.J.

Speakers, Dynamic, P-M
CTS Corp, Elkhart, Ind.
Electronic Resch. Assocs., Cedar Grove, N.J.
Sennheiser Elctrn. Corp., New York, NY
Smith, Herman H., Inc., Bklyn., N.Y.
Adec, Inc., Newark, N.J.
Allied Elctrns. Corp., Chicago, Ill.
American Geloso Elctrns., Inc., New York, N.Y.
Atlas Sound Div., Parsippany, N.J.
Barker Elec. Sls., Ship Bottom, NJ
Bogen Div., Paramus, N.J.
Bozak, R.T. Mfg. Co., Darien, Conn.
Cleveland Elctrns., Inc., Cleveland, Ohio
Components Specialties, Inc., Freeport, N.Y.
Davis J.W. & Co., Dallas, Texas
Empire Scientific Corp., Garden City, N.Y.
Era Acoustics, Moonachie, N.J.
Era Acoustics Corp., Moonachie, N.J.
Ercona Corp., Bellmore, N.Y.
Fisher Radio, Long Island City, N.Y.
Hartley Prods. Corp., Hohokus, N.J.
Heath Co., Benton Harbor, Mich.
Jensen Mfg. Div., Chicago, Ill.
Klipsch & Assocs., Inc., Hope, Ark.
Lansing, James B. Sound, Los Angeles, Cal.
Magitran Co., Moonachie, N.J.
Minneapolis Speaker Co., Minneapolis, Minn.
Oaktron Inds., Monroe, Wisc.
Philmore Mfg. Co., Richmond Hill, N.Y.
Quam-Nichols Co., Chicago, Ill.
Rola Div., Cleveland, Ohio
Rystl Elctrns. Corp., N. Miami Beach, Fla.
Sampson Elctrns. Prods. Div., Chicago, Ill.
Shigoto Inds., Ltd., New York, N.Y.

Tannoy (America), Ltd., Bohemia, N.Y.
Telex Comm. Div., Minneapolis, Minn.
University Sound, Anaheim, Cal.
Utah Elctrns., Huntington, Ind.
Wald Sound, Sun Valley, Calif.
Wilder Engrg. Prods., Chicago, Ill.

Speakers, Explosion & Flame Proof

Electronic Resch. Assocs., Cedar Grove, N.J.
Adec, Inc., Newark, N.J.
Atlas Sound Div., Parsippany, N.J.
Cleveland Elctrns., Inc., Cleveland, Ohio
Executone, Inc., Long Island City, N.Y.
Femco Div., Irwin, Pa.
Jensen Mfg. Div., Chicago, Ill.
University Sound, Anaheim, Cal.

Speakers, Horn

Electronic Resch. Assocs., Cedar Grove, N.J.
American Geloso Elctrns., Inc., New York, N.Y.
Atlas Sound Div., Parsippany, N.J.
Bogen Div., Paramus, N.J.
Cleveland Elctrns., Inc., Cleveland, Ohio
Components Specialties, Inc., Freeport, N.Y.
Du Kane Corp., St. Charles, Ill.
Electro-Voice, Inc., Buchanan, Mich.
Ercona Corp., Bellmore, N.Y.
Executone, Inc., Long Island City, N.Y.
Fanon Elctrns., Hillside, N.J.
Femco Div., Irwin, Pa.
Fourjay Inds., Dayton, Ohio
Jensen Mfg. Div., Chicago, Ill.
Philmore Mfg. Co., Richmond Hill, N.Y.
Shigoto Inds., Ltd., New York, N.Y.
University Sound, Anaheim, Cal.

Speakers, Paging & Talk Back

CTS Corp, Elkhart, Ind.
Electronic Resch. Assocs., Cedar Grove, N.J.
Sennheiser Elctrn. Corp., New York, NY
American Geloso Elctrns., Inc., New York, N.Y.
Atlas Sound Div., Parsippany, N.J.
Audio Equip. Co., Inc., Pt. Washington, N.Y.
Bennett Laboratories, Inc., Emeryville, Calif.
Bogen Div., Paramus, N.J.
Cleveland Elctrns., Inc., Cleveland, Ohio
Components Specialties, Inc., Freeport, N.Y.
Du Kane Corp., St. Charles, Ill.
Electro-Voice, Inc., Buchanan, Mich.
Era Acoustics, Moonachie, N.J.
Executone, Inc., Long Island City, N.Y.
Fanon Elctrns., Hillside, N.J.
Femco Div., Irwin, Pa.
Fisher-Berkeley Corp., Emeryville, Calif.
Fourjay Inds., Dayton, Ohio
Jensen Mfg. Div., Chicago, Ill.
Knowles Elctrns., Inc., Franklin Park, Ill.
Magitran Co., Moonachie, N.J.
Minneapolis Speaker Co., Minneapolis, Minn.
Private Tele-Comms., Inc., Chicago, Ill.
Remler Co., San Francisco, Calif.
Telex Comm. Div., Minneapolis, Minn.
University Sound, Anaheim, Cal.
Utah Elctrns., Huntington, Ind.
Wald Sound, Sun Valley, Calif.
Whittaker Corp., Los Angeles, Cal.

Speakers, Pillow

GC Elctrns., Rockford, Ill.
Rye Inds., Inc., Mamaroneck, N.Y.
Trimm, Inc., Libertyville, Ill.
Bennett Laboratories, Inc., Emeryville, Calif.
Cleveland Elctrns., Inc., Cleveland, Ohio
Components Specialties, Inc., Freeport, N.Y.
Du Kane Corp., St. Charles, Ill.
Executone, Inc., Long Island City, N.Y.
Femco Div., Irwin, Pa.
Fisher-Berkeley Corp., Emeryville, Calif.
Parcoe, Inc., Cleveland, Ohio
Philmore Mfg. Co., Richmond Hill, N.Y.
Shigoto Inds., Ltd., New York, N.Y.
Telex Comm. Div., Minneapolis, Minn.

Speakers, Submergence-Proof

Electronic Resch. Assocs., Cedar Grove, N.J.
Adec, Inc., Newark, N.J.
Audio Equip. Co., Inc., Pt. Washington, N.Y.
Cleveland Elctrns., Inc., Cleveland, Ohio
Era Acoustics, Moonachie, N.J.
Jensen Mfg. Div., Chicago, Ill.
Magitran Co., Moonachie, N.J.
Shigoto Inds., Ltd., New York, N.Y.
University Sound, Anaheim, Cal.

Speakers, Weatherproof

CTS Corp, Elkhart, Ind.
Electronic Resch. Assocs., Cedar Grove, N.J.
Sennheiser Elctrn. Corp., New York, NY p 321
Adec, Inc., Newark, N.J.
Alcor, Inc., Ithaca, N.Y.
Altec, Anaheim, Calif.
Atlas Sound Div., Parsippany, N.J.
Audio Equip. Co., Inc., Pt. Washington, N.Y.
Bogen Div., Paramus, N.J.
Bozak, R.T. Mfg. Co., Darien, Conn.
Cleveland Elctrns., Inc., Cleveland, Ohio
Components Specialties, Inc., Freeport, N.Y.
Du Kane Corp., St. Charles, Ill.
Electro-Voice, Inc., Buchanan, Mich.
Era Acoustics, Moonachie, N.J.
Era Acoustics Corp., Moonachie, N.J.
Executone, Inc., Long Island City, N.Y.
Fedtro, Inc., Rockville Centre, N.Y.
Jensen Mfg. Div., Chicago, Ill.
Klipsch & Assocs., Inc., Hope, Ark.
Magitran Co., Moonachie, N.J.
Minneapolis Speaker Co., Minneapolis, Minn.
Oaktron Inds., Monroe, Wisc.
Philmore Mfg. Co., Richmond Hill, N.Y.
Quam-Nichols Co., Chicago, Ill.
RCA Corp., Camden, N.J.
Remler Co., San Francisco, Calif.
Shigoto Inds., Ltd., New York, N.Y.
Tannoy (America), Ltd., Bohemia, N.Y.
University Sound, Anaheim, Cal.
Utah Elctrns., Huntington, Ind.

Specific Gravity Indicators—See Indicators, Specific Gravity—Vol 2

Spectral Light Sources—See Vol 2

Spectrographs & Spectrometers

Aero Vac Corp., Troy, N.Y.
Avco Corp., Cincinnati, Ohio
Bausch & Lomb, Rochester, N.Y.
Beckman Instrs., Advanced Tech., Fullerton, Cal.
Beckman Instrs., (AISSD), Fullerton, Cal.
Bell & Howell Co., Pasadena, Calif.
Ealing Corp., Cambridge, Mass.
Ercona Corp., Bellmore, N.Y.
Gaertner Scientific Corp., Chicago, Ill.
GCA Technology Div., Bedford, Mass.
McPherson Instr., Acton, Mass.
Micro-Now Instr., Chicago, Ill.
Nuclear Diodes, Prairie View, Ill.
Nuclear Meas. Corp., Indianapolis, Ind.
Nuclide Corp., N. Acton, Mass.
Packard Instrument Co., Inc., Downers Grove, Ill.
Philips Elctrn. Instrs., Mt. Vernon, N.Y.
Process & Instrs. Corp., Brooklyn, N.Y.
Rank Precision Inds., W. Nyack, N.Y.
Siemens Corp., Measuring Instrs. Div., Iselin, N.J.
Systems Instrs. Resch., Inc., Atlanta, Ga.
Thomson-CSF Inc., New York, N.Y.
Vacuum Equip. Div., Newton, Mass.
Varian Aerograph, Walnut Creek, Calif.
Varian Assocs., Palo Alto, Cal.
Varian Assocs., Analytical Instr., Palo Alto, Cal.
Veeco Instrs., Inc., Plainview, N.Y.
Zeiss, Carl, Inc., New York, N.Y.

Spectrometers, Infrared

Advanced Kinetics, Costa Mesa, Calif.
Barnes Engrg. Co., Stamford, Conn.
Beckman Instrs., (AISSD), Fullerton, Cal.
Cintra Physics Int'l., Sunnyvale, Cal.
Gaertner Scientific Corp., Chicago, Ill.
Molectron Corp., Sunnyvale, Cal.
Perkin-Elmer Corp., Norwalk, Conn.
Philips Broadcast Equipment Corp., Montvale, N.J.
Philips Elctrn. Instrs., Mt. Vernon, N.Y.
Rank Precision Inds., W. Nyack, N.Y.

Spectrometers, Mass

Avco Elctrns., Tulsa, Okla.
Bell & Howell Co., Pasadena, Calif.
Bendix, Rochester, N.Y.
General Elec. Co., W. Lynn, Mass.
Nuclide Corp., N. Acton, Mass.
Perkin-Elmer Corp., Norwalk, Conn.
Process & Instrs. Corp., Brooklyn, N.Y.
Rank Precision Inds., W. Nyack, N.Y.
Varian Assocs., Palo Alto, Cal.
Varian Assocs., Analytical Instr., Palo Alto, Cal.

Spectrophotometers

Monitor Labs, Inc., San Diego, Cal.
American Instr. Co., Silver Spring, Md.
Bausch & Lomb, Rochester, N.Y.
Beckman Instrs., Advanced Tech., Fullerton, Cal.
Beckman Instrs., (AISSD), Fullerton, Cal.
Bendix, Rochester, N.Y.
Cary Instrs., Monrovia, Calif.
Cintra Physics Int'l., Sunnyvale, Cal.
Coleman Instrs., Maywood, Ill.
Corning Glass Works, Lab. Prods. Dept., Corning, N.Y.
Ealing Corp., Cambridge, Mass.
EG & G, Inc., Salem, Mass.
Fisher Sci. Co., Pittsburgh, Pa.
Gamma Sci., San Diego, Cal.
Heath Co., Benton Harbor, Mich.
Kollmorgen-Color Sys. Div., Attleboro, Mass.
Kollsman Instr. Corp., Syosset, N.Y.
McKee-Pedersen Instrs., Danville, Calif.
McPherson Instr., Acton, Mass.
Nat'l. Instr. Labs., Rockville, Md.
Olympus Corp. America, New Hyde Park, N.Y.
Perkin-Elmer Corp., Norwalk, Conn.
Philips Elctrn. Instrs., Mt. Vernon, N.Y.
Photo Resch. Corp., Burbank, Calif.
Process & Instrs. Corp., Brooklyn, N.Y.
Rank Precision Inds., W. Nyack, N.Y.
Schoeffel Instr. Corp., Westwood, N.J.
Spectra-Physics, Inc., Mountain View, Calif.
Systems Instrs. Resch., Inc., Atlanta, Ga.
Varian Assocs., Palo Alto, Cal.
VWR Scientific, San Francisco, Cal.
Zeiss, Carl, Inc., New York, N.Y.

Spectroradiometers

Barnes Engrg. Co., Stamford, Conn.
Cary Instrs., Monrovia, Calif.
Cintra Physics Int'l., Sunnyvale, Cal.
EG&G, Inc., Electro-Optics Div., Salem, Mass.
Gamma Sci., San Diego, Cal.
Hughes Aircraft Co, Culver City, Cal.
Infrared Inds., Inc., Santa Barbara, Cal.
International Light, Newburyport, Mass.
Kollmorgen-Color Sys. Div., Attleboro, Mass.

Spectrum Analyzers—See Analyzers, Spectrum

Speech Scramblers—See Scramblers, Speech

Speed Drives, Motor—See Controls, Motor Speed—Vol 2

Spiral Wrap—See Tubing, Spiral Wrap—Vol 3

Splicers, Coaxial Cable—See Vol 3

Splicers, Wire (Butt & Cap Types)—See Vol 3

Splicing Equipment, Magnetic Tape

GC Elctrns., Rockford, Ill.
Jonard Inds. Corp., Bronx, N.Y.
Ampex Corp., Redwood City, Calif.
Duotone Co., Inc., S. Miami, Fla.
Fidelitone, Inc., Chicago,, Ill
Magnecessories, Washington, D.C.
Philmore Mfg. Co., Richmond Hill, N.Y.
Recoton Corp., Long Island City, N.Y.
Roberts Div., Los Angeles, Cal.
Robins Inds. Corp., Flushing, N Y
Rystl Elctrns. Corp., N. Miami Beach, Fla.
Tall Joel, Inc., Mt. Vernon, N.Y.
Telephone Dynamics Corp., N. Bellmore, N.Y.
3M Co., St. Paul, Minn.

Splicing Equipment, Paper Tape

Jonard Inds. Corp., Bronx, N.Y.
Brady, W.H. Co., Milwaukee, Wisc.
Neumade Prods. Corp., Scarsdale, N.Y.
O E M Prods., Carlstadt, N.J.
Robins Inds. Corp., Flushing, N Y

Spoolers, Punched Tape—See Readers, Punched Tape

Spray Systems, Electrostatic Paint

Borden Chemical Co., Norristown, Pa.
Conforming Matrix Corp., Toledo, Ohio
Despatch Oven Co., Minneapolis, Minn.
De Vilbiss Co., The, Toledo, Ohio
Fischer, H.G. & Co., Franklin Park, Ill.
Ionic Electrostatic Corp., Garfield, N.J.

Springs (All Types)—See Vol 3

Springs, Compression (Helical)—See Vol 3

Springs, Flat—See Vol 3

Sputtering Equipment

Bendix, Rochester, N.Y.
Cooke Vacuum Prods., S. Norwalk, Conn.
Denton Vacuum, Inc., Cherry Hill, N.J.
Energy Sciences Inc., Burlington, Mass.
High Vacuum Equip. Corp., Hingham, Mass.
High Voltage Engrg. Corp., Burlington, Mass.
ITI Electronics, Inc., Clifton, N.J.
Lehighton Elctrns., Inc., Lehighton, Pa.
Lepel High Frequency Labs., Maspeth, N.Y.
Middlesex Gen'l. Inds., Somerville, Mass.
Vacuum Equip. Div., Newton, Mass.
Vacuum Inds., Inc., Somerville, Mass.
Varian Assocs., Palo Alto, Cal.
Varian Assocs., Vacuum Div., Palo Alto, Cal.

Stabilizers, Frequency

Austron, Inc., Austin, Tex.
Elgar Corp., San Diego, Cal. ..... p 705
Frequency Control, Inc., Austin, Tex.
Frequency Engrg. Labs., Farmingdale, N.J. ..... p 604
Hewlett-Packard, Palo Alto, Cal.
Polarad Elctrn. Instrs., Lake Success, N.Y.
Solid State Elctrns., Sepulveda, Cal.
Aerospace Resch. Inc., Boston, Mass.
Audio Instr. Co., Union City, N.J.
California Instrs. Co., San Diego, Cal.
Gulton Inds., Hawthorne, Calif.
Hughes Aircraft Co, Culver City, Cal.
Micro-Now Instr., Chicago, Ill.
Microwave/Sys., Inc., E. Syracuse, N.Y.
Relcom, Mt. View, Calif.
Sage Labs. Inc., Natick, Mass.
Varian Assocs., Palo Alto, Cal.

Stabilizers, Line Impedance

Calico Div., San Diego, Cal.
Frequency Engrg. Labs., Farmingdale, N.J.

Stabilizers, Voltage—See Regulators & Stabilizers, Voltage-Also See Transformers, Voltage Regulating—Vol 2

Stalos—See Oscillators, Microwave

Stamped Circuit Boards—See Circuit Boards, Stamped—Vol 2

Standards, Atomic Beam

Atomichron, Inc., New Hyde Park, N.Y.
Hewlett-Packard, Palo Alto, Cal.
Tracor, Inc., Austin, Tex.

Standards, Capacitance

Beckman Instrs., Cedar Grove, N.J.
Boonton Elctrns., Parsippany, N.J.
Dranetz Engrg. Labs., Plainfield, N.J.
Electro Sci. Inds., Portland, Ore.. p 455
Elctrn. Assocs., W. Long Branch, N.J.
PFC Mfg. Div., Great Neck, N.Y... p 2339
Southern Elctrns., Burbank, Cal.
Sprague Elec. Co., No. Adams, Mass.
Cryotronics, Inc., High Bridge, N.J.
General Radio Co., Concord, Mass.
Guildline Instrs., Inc., Larchmont, N.Y.
Leeds & Northrup Corp., No. Wales, Pa.
Rohde & Schwarz Sls., Passaic, N.J.

Standards, Current

Electronic Dev. Corp., Boston, Mass. p 456
General Resistance, Mt. Vernon, N.Y.
Julie Research Lab., New York, N.Y.
North Hills Elctrns., Inc., Glen Cove, N.Y.
RFL Inds., Instr. Div., Boonton, N.J. p 554
Simpson Elec. Co., Chicago, Ill.
A & M Instrument, Inc., Great Neck, N.Y.
Electrical Instr. Svc., Inc., Mt. Vernon, N.Y.
Glentronics, Glendora, Cal.
Guildline Instrs., Inc., Larchmont, N.Y.
Hallmark Standards, Inc., Mt. Vernon, N.Y.
Halmar Elctrns., Inc., Columbus, Ohio
Holt Instr. Labs., Oconto, Wisc.
Knopp, Inc., Oakland, Calif.
Optimation, Inc., Sun Valley, Calif.
Stark Elctrn. Instrs., Ltd., Ajax, Ont., Canada
Weston Instruments, Inc., Newark, N.J.

Standards, Delay Line—See Vol 3

Standards, Frequency

Accutronics, Inc., Geneva, Ill.
Atec, Inc., Houston, Tex.
Atomichron, Inc., New Hyde Park, N.Y. p 469
Austron, Inc., Austin, Tex.
Bramco Controls, Piqua, Ohio
Bulova Watch Co., Freq. Control Prods., Elctrns. Div., Woodside, N.Y.
Connor-Winfield Corp., Winfield, Ill.
CTS Corp, Elkhart, Ind.
Electronic Research Co., Shawnee Mission, Kans.
Ferwalt, W.H., Inc., Lapwai, Idaho
Fork Standards, W. Chicago, Ill.
Frequency Control, Inc., Austin, Tex.
Frequency Elctrns., New Hyde Pk., N.Y. p 469,1391
Gibbs Mfg. & Resch., Janesville, Wisc. p 1396
Greenray Inds., Inc., Mechanicsburg, Pa. p 1393
Hewlett-Packard, Palo Alto, Cal.
Ind'l. Test Equip., Port Washington, N.Y.
Lorch-Adret Corp., Englewood, N.J.
Meloy Laboratories, Springfield, Va.
Ovenaire, Inc., Charlottesville, Va.
Reeves-Hoffman Div., Carlisle, Pa.
Vectron Labs., Inc., Norwalk, Conn. p 1433
A & M Instrument, Inc., Great Neck, N.Y.
Advanced Energy Conversion, Menlo Pk., Cal.
Aerospace Resch. Inc., Boston, Mass.
AMF Electical Prods., Alexandria, Va.
Beukers Labs., Inc., Hauppauge, N.Y.
Collins Radio Co., Cedar Rapids, Iowa
Collins Radio Co., Dallas, Tex.
Esterline Angus Div., Indianapolis, Ind.
Fairchild Space & Defense Sys., Syosset, N.Y.
General Radio Co., Concord, Mass.
Industrial Microwave, Scotch Plains, N.J.
ITT Mackay Marine, Clark, N.J.
Micro-Now Instr., Chicago, Ill.
Microlab/FXR, Livingston, N.J.
Muirhead, Inc., Mountainside, N.J.
NH Research, Inc., Santa Ana, Calif.
Palomar Engrs., Escondido, Cal.
Pickard & Burns Inc., Lindenhurst, N.Y.
Racal Communications, Rockville, Md.
Riverbank Labs., Geneva, Ill.
Rohde & Schwarz Sls., Passaic, N.J.
Sage Labs. Inc., Natick, Mass.
Somerset Radiation Lab., Arlington, Va.
Systems Elctrns., Cleveland, Ohio
Technical Mat'l., Mamaroneck, N.Y.
Timing Sys., Inc., Marblehead, Mass.
Tracor, Inc., Austin, Tex.

Standards, Inductance

Hewlett-Packard, Palo Alto, Cal.
North Hills Elctrns., Inc., Glen Cove, N.Y.
RFL Inds., Instr. Div., Boonton, N.J. p 554
Sprague Elec. Co., No. Adams, Mass.
General Radio Co., Concord, Mass.
Lionmount & Co., Ltd., New Southgate, London, England

Standards, Noise

Quan-Tech, Whippany, N.J. p 546
AIL, Div. Cutler-Hammer, Inc., Deer Park, N.Y.
Maury Microwave Corp., Cucamonga, Calif.

Standards, Phase

Austron, Inc., Austin, Tex.
Dytronics Co., Columbus, Ohio .... p 441
Ind'l. Test Equip., Port Washington, N.Y. p 497
Universal Ad-Yu Elctrns., Inc., Passaic, N.J. p 579,2752
Rantec Div., Calabasas, Calif.
Theta Instr. Corp., Fairfield, N.J.

Standards, Q

Hewlett-Packard, Palo Alto, Cal.

Standards, Resistance

Beckman Instrs., Cedar Grove, N.J.
Biddle, James G., Plymouth Meeting, Pa. p 419
Chronetics, Inc., Mt. Vernon, N.Y.
Electro Sci. Inds., Portland, Ore.. p 455
General Resistance, Mt. Vernon, N.Y.
Hewlett-Packard, Palo Alto, Cal.
Julie Research Lab., New York, N.Y. p 503
Penn Airborne Prods., Southampton, Pa. p 534
PPM, Inc., Bedford, Ohio
RFL Inds., Instr. Div., Boonton, N.J.
Shallcross, Selma, N.C.
Vishay Resistor Prod. Div., Malvern, Pa.
A & M Instrument, Inc., Great Neck, N.Y.
A.O.I.P., 75/Paris 12eme, France
General Radio Co., Concord, Mass.
Guildline Instrs., Inc., Larchmont, N.Y.
Hallmark Standards, Inc., Mt. Vernon, N.Y.
Keithley Instrs., Inc., Cleveland, Ohio
Leeds & Northrup Corp., No. Wales, Pa.
Miller Electro-Resch. Labs., New Berlin, Wisc.
Precision Resistor Co., Hillside, N.J.
Thermal Sys., Los Angeles, Cal.
Yewtec Corporation, Larchmont, N.Y.

Standards, Resistance Transfer

Beckman Instrs., Cedar Grove, N.J.
Chronetics, Inc., Mt. Vernon, N.Y.
Electro Sci. Inds., Portland, Ore.. p 455
General Resistance, Mt. Vernon, N.Y.
Hewlett-Packard, Palo Alto, Cal.
Julie Research Lab., New York, N.Y.
RFL Inds., Instr. Div., Boonton, N.J.
Beckman Instrs., (AISSD), Fullerton, Cal.
Guildline Instrs., Inc., Larchmont, N.Y.
Hallmark Standards, Inc., Mt. Vernon, N.Y.
Medistor Instr. Co., Seattle, Wash.

Standards, Synchro & Resolver

Astrosystems, Lake Success, N.Y. p 406
Bowmar Instr. Corp., Ft. Wayne, Ind.
North Atlantic Inds., Plainview, N.Y. p 530
Singer-General Precision, Inc., Little Falls, N.J.
Theta Instr. Corp., Fairfield, N.J.

Standards, Temperature

Dynarad, Inc., Norwood, Mass. .... p 439
Harrel, Inc., E. Norwalk, Conn.
RFL Inds., Thermocontrol Div., Boonton, N.J.
Weed Instr. Co., Elgin, Tex.
Barnes Engrg. Co., Stamford, Conn.
Guildline Instrs., Inc., Larchmont, N.Y.
H-B Instr. Co., Phila., Pa.
Hallmark Standards, Inc., Mt. Vernon, N.Y.
Hy-Cal Engrg., Santa Fe Springs, Cal.
Kahl Scientific Instr. Corp., El Cajon, Calif.
Kaye Instrs., Inc., Cambridge, Mass.
Leeds & Northrup Corp., No. Wales, Pa.
Riverbank Labs., Geneva, Ill.
Rosemount Engrg. Co., Minneapolis, Minn.
Trans-Sonics, Inc., Lexington, Mass.
Weksler Instrs. Corp., Freeport, N.Y.

Standards, Time

American Time Products, Woodside, N.Y. p 660
Atomichron, Inc., New Hyde Park, N.Y.
Austron, Inc., Austin, Tex.
Bulova Watch Elctrns. Div. Amer. Time Prods., Woodside, N.Y. p 660
Bulova Watch Co., Freq. Control Prods., Elctrns. Div., Woodside, N.Y.
Chrono-log Corp., Broomall, Pa.
Ferwalt, W.H., Inc., Lapwai, Idaho
Fork Standards, W. Chicago, Ill.
Gibbs Mfg. & Resch., Janesville, Wisc.
Hewlett-Packard, Palo Alto, Cal.
PPM, Inc., Bedford, Ohio
Reeves-Hoffman Div., Carlisle, Pa.
Aerospace Resch. Inc., Boston, Mass.
Beukers Labs., Inc., Hauppauge, N.Y.
Cognitronics Corp., Mt. Kisco, N.Y.
Phelps Dodge Comm., North Haven, Conn.
Riverbank Labs., Geneva, Ill.
Rohde & Schwarz Sls., Passaic, N.J.
Singer - Tele-Signal, Woodbury, N.Y.
Sprengnether, W.F. Instr. Co., Inc., St. Louis, Mo.
Timing Sys., Inc., Marblehead, Mass.

Standards, Voltage

Beckman Instrs., Cedar Grove, N.J.
CEA, Monrovia, Cal.
Chronetics, Inc., Mt. Vernon, N.Y.
Connor-Winfield Corp., Winfield, Ill.
Dynage, Bloomfield, Conn.
Electronic Dev. Corp., Boston, Mass. p 456,457
General Resistance, Mt. Vernon, N.Y.
Hewlett-Packard, Palo Alto, Cal.
International Rectifier, El Segundo, Cal.
Julie Research Lab., New York, N.Y. p 503
Kepco, Inc., Flushing, N.Y.
Kilovolt Corp., Hackensack, N.J.
Light Elec. Corp., Rancocas, N.J.
Lorch-Adret Corp., Englewood, N.J. p 517
North Hills Elctrns., Inc., Glen Cove, N.Y.
Power Designs, Westbury, N.Y.
Precision Standards Corp., Santa Ana, Cal. p 543
RFL Inds., Instr. Div., Boonton, N.J. p 554
Simpson Elec. Co., Chicago, Ill.
A & M Instrument, Inc., Great Neck, N.Y.
AMF Electical Prods., Alexandria, Va.
Analogic, Wakefield, Mass.
A.O.I.P., 75/Paris 12eme, France
AUL Instrs., Inc., Flushng, N.Y.
Beckman Instrs., (AISSD), Fullerton, Cal.
Cohu Elctrns., Inc., San Diego, Calif.
Computer Diode, Fair Lawn, N.J.
Delta-Tronics Corp., Tempe, Ariz.
Electrical Instr. Svc., Inc., Mt. Vernon, N.Y.
Electronic Design Labs., Inc., Phila., Pa.
Eppley Lab., Inc., Newport, R.I.
Esterline Angus Div., Indianapolis, Ind.
Filmohm Div., Long Island City, N.Y.
General Microwave Corp., Farmingdale, N.Y.
Glentronics, Glendora, Cal.
Guildline Instrs., Inc., Larchmont, N.Y.
Hallmark Standards, Inc., Mt. Vernon, N.Y.
Holt Instr. Labs., Oconto, Wisc.
Idalee Elctrns. Corp., Valley Stream, N.Y.
Instrulab, Inc., Dayton, Ohio
Medistor Instr. Co., Seattle, Wash.
Muirhead, Inc., Mountainside, N.J.
NH Research, Inc., Santa Ana, Calif.
Optimation, Inc., Sun Valley, Calif.
Stark Elctrn. Instrs., Ltd., Ajax, Ont., Canada
Weston Instruments, Inc., Newark, N.J.
Yewtec Corporation, Larchmont, N.Y.

Standards, Voltage Ratio

Chronetics, Inc., Mt. Vernon, N.Y.
Electro Sci. Inds., Portland, Ore.. p 455
General Resistance, Mt. Vernon, N.Y.
Hewlett-Packard, Palo Alto, Cal.
Julie Research Lab., New York, N.Y. p 502
North Atlantic Inds., Plainview, N.Y. p 530
RFL Inds., Instr. Div., Boonton, N.J. p 554
Weinschel Engrg. Co., Gaithersburg, Md.
A.O.I.P., 75/Paris 12eme, France
Collins, G.L. Corp., Long Beach, Calif.
Guildline Instrs., Inc., Larchmont, N.Y.
Hallmark Standards, Inc., Mt. Vernon, N.Y.
Idalee Elctrns. Corp., Valley Stream, N.Y.
Optimation, Inc., Sun Valley, Calif.

Standards, Voltage Reference

CEA, Monrovia, Cal.
Chronetics, Inc., Mt. Vernon, N.Y.
Dynage, Bloomfield, Conn.
Electronic Dev. Corp., Boston, Mass. p 456,457
General Resistance, Mt. Vernon, N.Y.
Hewlett-Packard, Palo Alto, Cal.
Hickok Elect. Instr., Cleveland, Ohio
International Rectifier, El Segundo, Cal.
Julie Research Lab., New York, N.Y. p 502
Kepco, Inc., Flushing, N.Y.
North Hills Elctrns., Inc., Glen Cove, N.Y.
Power Designs, Westbury, N.Y.
RFL Inds., Instr. Div., Boonton, N.J. p 554
A & M Instrument, Inc., Great Neck, N.Y.
Analogic, Wakefield, Mass.
A.O.I.P., 75/Paris 12eme, France
AUL Instrs., Inc., Flushng, N.Y.
Cohu Elctrns., Inc., San Diego, Calif.
Computer Diode, Fair Lawn, N.J.
Delta-Tronics Corp., Tempe, Ariz.
Electronic Design Labs., Inc., Phila., Pa.
Eppley Lab., Inc., Newport, R.I.
Grafix, Inc., Albuquerque, N.M.
Guildline Instrs., Inc., Larchmont, N.Y.
Hallmark Standards, Inc., Mt. Vernon, N.Y.
Holt Instr. Labs., Oconto, Wisc.
Instrulab, Inc., Dayton, Ohio
Leeds & Northrup Corp., No. Wales, Pa.
Medistor Instr. Co., Seattle, Wash.
Muirhead, Inc., Mountainside, N.J.
Weston Instruments, Inc., Newark, N.J.
Yewtec Corporation, Larchmont, N.Y.

Standing Wave Detectors—See Detectors, Standing Wave

Stands, Waveguide—See Vol 2

Stators, Motor & Generator—See Motor & Generator Armatures,Rotors, Stators—Vol 2

Steatite—See Insulation Parts, Ceramic—Vol 3

Stereoscopes, Magnifying—See Vol 2

Stools—See Benches, Consoles, Stools, Tables (Lab & Shop)—Vol 3

Stops, Limit—See Limit Stops, Mechanical—Vol 3

Staighteners, Tube Pin—See Pin Straighteners, Tube—Vol 2

Strain Gauges—See Gauges, Strain—Vol 2

Strain Indicators—See Indicators, Strain

Strain Reliefs, Cable & Wire—See Vol 3

Stretchers, Microwave—See Microwave Line Stretchers

Strip-Line Components, Microwave—See Vol 2

Strippers & Twisters, Wire—See Wire Strippers

Strippers, Wire—See Wire Strippers

Strippers, Wire, Chemical—See Chemicals, Wire Stripping—Vol 3

Strips, Ground

Berg Elctrns., Inc., New Cumberland, Pa.
Precision Metal Prods. Co., Stoneham, Mass.
Birnbach Co., Inc., Freeport, N.Y.
Braun, H., Tool & Instr. Co., Hawthorne, N.J.
British Insulated Callender's Cables, Ltd., London WC1B 3QN, Eng.
Chem Aero, Inc., Wilmington, Cal.
Jettron Prods., Hanover, N.J.
Molex Prods. Co., Downers Grove, Ill.
Sjoberg, C. & Son, Inc., Cranston, R.I.

Strips, Marker & Fanning—See Vol 3

Strips, Terminal—See Vol 3

Stroboscopes—See Lights, Stroboscopic Source—Vol 2

Studio Equipment—See Consoles; Cameras; Lighting Equip.; etc

Styli, Marking & Engraving-Also See Engraving & Profiling Equip.—See Vol 3

Styli, Recording & Playback

Aldshir Mfg. Co., Inc., Tuckahoe, N.Y.
Astatic Corp., Conneaut, Ohio
Audio Dynamics Corp., New Milford, Conn.
Capps & Co., Inc., Valley Stream, N.Y.
Dixie Diamond Tool, Miami, Fla.
Duotone Co., Inc., S. Miami, Fla.
EV/Game, Inc., Freeport, N.Y.
Electro-Voice, Inc., Buchanan, Mich.
Empire Scientific Corp., Garden City, N.Y.
Fidelitone, Inc., Chicago,, Ill
Keller, Hugo P., Inc., New York, N.Y.
Pickering & Co., Inc., Plainview, N.Y.
Recoton Corp., Long Island City, N.Y.
Shure Bros., Inc., Evanston, Ill.
Stanton Magnetics, Inc., Plainview, N.Y.
Walco Elctrns. Co., Clifton, N.J.

Substrates, Ceramic—See Vol 3

Substrates, Flexible—See Vol 3

Substrates, Glass—See Vol 3

Superconducting Magnets—See Magnets, Superconducting—Vol 3

Supports, Tube—See Retainers, Tube—Vol 2

Suppressors, Arc—See Vol 2

Suppressors, Harmonic

Austron, Inc., Austin, Tex.
Elgar Corp., San Diego, Cal.
Standard Condenser Corp., Chicago, Ill.
Audio Instr. Co., Union City, N.J.

Suppressors, Noise—See Vol 3

Suppressors, Transient Voltage (Rectifier Type)—See Vol 2

Surface Analyzers—See Indicators, Surface Roughness

Surge Arresters, Electrical—See Arresters, Electrical Surge—Vol 2

Switchboards—See Vol 2

Switchers, R-F

A. D. Data Sys., Inc., Rochester, N.Y.
American Elctrn. Labs., Inc., Lansdale, Pa. ..... **p 1552**
Arra Inc., Bayshore, N.Y.
Daico Inds., Inc., Compton, Cal... **p 1556**
Dow-Key, Santa Barbara, Cal. .... **p 1691**
Kilovac Corp., Santa Barbara, Cal. **p 1691**
Lorch Elctrns. Corp., Englewood, N.J. **p 609**
Sealectro Corp., Mamaroneck, N.Y.
Transco Prods., Inc., Venice, Cal.
Trompeter Elctrns., Chatsworth, Cal.
Adams-Russell Co., Waltham, Mass.
Andrew Corp., Orland Pk., Ill.
Blonder-Tongue Labs., Inc., Old Bridge, N.J.
Cole Instr., Costa Mesa, Cal.
Delta Elctrns., Alexandria, Va.
Dittmore-Freimuth Corp., Milwaukee, Wisc.
Edison Elctrns. Div., Manchester, N.H.
Elctrn. Resources Div., Los Angeles, Cal.
Fifth Dimension, Princeton, N.J.
General Dynamics, San Diego, Cal.
Hughes Aircraft Co, Fullerton, Cal.
Hyletronics Corp., Littleton, Mass.
Jerrold/Watkins Div., Toronto, 395, Ont., Can.
Kings Elctrns., Tuckahoe, N.Y.
Matrix Sys. Corp., Chatsworth, Cal.
Microwave Assocs., Inc., Burlington, Mass.
Olektron Corp., Dudley, Mass.
Relcom, Mt. View, Calif.
Struthers Elctrns. Corp., Mamaroneck, N.Y.
Technical Mat'l., Mamaroneck, N.Y.
Teledyne Microwave, Sunnyvale, Cal.
Whistler Elctrns., Inc., Northridge, Cal.

Switchers, Video

Amphenol RF Div., Danburry, Conn.
Arra Inc., Bayshore, N.Y.
Nippon Electric/NEC America, N.Y., N.Y.
T-Bar Inc., Wilton, Conn.
Trompeter Elctrns., Chatsworth, Cal.
Adams-Russell Co., Waltham, Mass.
Ampex Corp., Redwood City, Calif.
Blonder-Tongue Labs., Inc., Old Bridge, N.J.
Cohu Elctrns., Inc., San Diego, Calif.
Concord Elctrns., Los Angeles, Cal.
Consolidated Resistance Sls., Yonkers, N.Y.
Dynair Elctrns. Inc., San Diego, Calif.
Edison Elctrns. Div., Manchester, N.H.
Fifth Dimension, Princeton, N.J.
GBC Closed Circuit TV Corp., New York, N.Y.
General Dynamics, San Diego, Cal.
Lear Siegler, Inc., Santa Monica, Calif.
Matrix Sys. Corp., Chatsworth, Cal.
Nelson-Hershfield Elctrns., Phoenix, Ariz.
RCA Corp., Camden, N.J.
Rust Corp., Everett, Mass.
Technical Mat'l., Mamaroneck, N.Y.
Whistler Elctrns., Inc., Northridge, Cal.

Switches, Acceleration—See Accelerometers—Vol 2

Switches, Air Flow Actuated—See Vol 2

Switches, Antenna Changeover—See Vol 2

Switches, Barometric—See Vol 2

Switches, Cam—See Vol 2

Switches, Cam, Adjustable—See Switches, Cam—Vol 2

Switches, Canopy—See Vol 2

Switches, Centrifugal—See Vol 2

Switches, Coaxial Cable—See Vol 2

Switches, Code—See Vol 2

Switches, Commutator—See Commutators, Switching—Vol 2

Switches, Crossbar—See Vol 2

Switches, Data-Sampling—See Vol 2

Switches, Decade—See Vol 2

Switches, Electronic—See Controls—Vol 2

Switches, Float—See Vol 2

Switches, Foot-Pedal, Mat, Ribbon, etc.—See Vol 2

Switches, High Voltage—See Vol 2

Switches, Illuminated—See Vol 2

Switches, Inertia—See Accelerometers—Vol 2

Switches, Keyboard—See Vol 2

Switches, Key-Lock—See Vol 2

Switches, Knife—See Vol 2

Switches, Lever—See Vol 2

Switches, Limit—See Vol 2

Switches, Liquid Level/Pressure—See Vol 2

Switches, Lock—See Switches, Key-Lock—Vol 2

Switches, Magnetic Reed—See Vol 2

Switches, Magnetically Actuated—See Vol 2

Switches, Matrix—See Switches, Crossbar-Also See Boards, Programming—Vol 2

Switches, Mercury Displacement—See Vol 2

Switches, Mercury Wetted Contacts—See Vol 2

Switches, Microwave—See Switches, Coaxial Cable; Switches, Waveguide—Vol 2

Switches, Motor-Driven—See Vol 2

Switches, Motor-Reversing—See Vol 2

Switches, Oil Immersed—See Vol 2

Switches, Photoelestric—See Cells Photoconductive-Also See Controls, Photoelectric—Vol 2

Switches, Power—See Vol 2

Switches, Pressure—See Vol 2

Switches, Program—See Vol 2

Switches, Proximity—See Vol 2

Switches, Pushbutton (All Types)—See Vol 2

Switches, R-F—See Vol 2

Switches, Reed—See Vol 2

Switches, Rocker—See Vol 2

Switches, Rotary—See Vol 2

Switches, Rotary Chopper—See Vol 2

Switches, Slide—See Vol 2

Switches, Snap-Action (All Types)—See Vol 2

Switches, Solid State—See Vol 2

Switches, Step Type—See Vol 2

Switches, Thermally Actuated—See Vol 2

Switches, Thumbwheel—See Vol 2

Switches, Time Delay—See Vol 2

Switches, Timing—See Timers—Vol 2

Switches, Toggle—See Vol 2

Switches, Touch Actuated—See Vol 2

Switches, Transfer—See Vol 2

Switches, Trigger—See Vol 2

Switches, Ultrasonic—See Vol 2

Switches, Vacuum—See Vol 2

Switches, Waveguide—See Vol 2

Switchlights—See Switches, Illuminated—Vol 2

Synchro Error Testers—See Testers, Synchro Error

Synchro / Resolver Testers—See Testers, Synchro / Resolver

Synchro Resolvers—See Resolvers, Synchro—Vol 2

Synchro Transmitters, Solid-State—See Vol 2

Synchronizers, Klystron & BWO

Frequency Engrg. Labs., Farmingdale, N.J.
Hewlett-Packard, Palo Alto, Cal.
Polarad Elctrn. Instrs., Lake Success, N.Y.
Microwave/Sys., Inc., E. Syracuse, N.Y.
Rohde & Schwarz Sls., Passaic, N.J.
Sage Labs. Inc., Natick, Mass.

Synchros—See Vol 2

Synchroscopes

Polarad Elctrn. Instrs., Lake Success, N.Y.
Leader Instr. Corp., Long Island City, N.Y.
Servo Dev. Corp., Hicksville, N.Y.

Synthesizers, Delay Line—See Delay Line Synthesizers—Vol 3

Synthesizers, Filter—See Filter Synthesizers—Vol 2

Synthesizers, Frequency

Austron, Inc., Austin, Tex.
Damon Corp., Needham Hgts., Mass.
Data-Control Systems, Danbury, Conn.
Data Technology, Palo Alto, Cal... **p 429**
Fluke, John Mfg. Co., Inc., Seattle, Wash. ..... **p 478**
Frequency Elctrns., New Hyde Pk., N.Y.
Frequency Engrg. Labs., Farmingdale, N.J. ..... **p 604**
Hewlett-Packard, Palo Alto, Cal.

Kay Elemetrics, Pine Brook, N.J... p 506
Lorch-Adret Corp., Englewood, N.J. p 517
Monsanto Company, Electronic Instruments, W. Caldwell, N.J.
RF Communications, Rochester, N.Y. p 553
Rockland Sys. Corp., Blauvelt, N.Y. p 1527
Sierra Sys., Mountain View, Cal.
Solid State Elctrns., Sepulveda, Cal.
AMBAC Inds., Garden City, N.Y.
Anritsu Electric Co., Ltd., Tokyo, Japan
Applied Tech., Palo Alto, Cal.
Dana Labs., Inc., Irvine, Calif.
Esterline Angus Div., Indianapolis, Ind.
Frederick Electronics Corp., Frederick, Md.
General Radio Co., Concord, Mass.
GTE Sylvania Inc., Elctrn. Sys. Gp., Waltham, Mass.
HRB-Singer, Inc., State College, Pa.
Hughes Aircraft Co, Culver City, Cal.
Itek Corp., Lexington, Mass.
ITT Avionics Div, Nutley, N.J.
ITT Mackay Marine, Clark, N.J.
Lampkin Labs., Inc., Bradenton, Fla.
Micro-Power, Inc., Long Island City, N.Y.
Omni-Spectra, Inc., Scottsdale, Ariz.
Pacific Meas., Inc., Palo Alto, Calif.
Philco-Ford Corp., Washington, D.C.
Racal Communications, Rockville, Md.
RCA Govt. & Comm. Sys., Moorestown, N.J.
Rohde & Schwarz Sls., Passaic, N.J.
Sperry Microwave Elctrns., Clearwater, Fla.
Technical Mat'l., Mamaroneck, N.Y.
Teledyne Inet, Gardena, Cal.
Weston Instrs. Div., Hatboro, Pa

Synthesizers, Waveform

Exact Elctrns., Inc., Hillsboro, Ore.p 466
Wavetek, San Diego, Cal. ..... p 585
AMBAC Inds., Garden City, N.Y.
Esterline Angus Div., Indianapolis, Ind.
Hughes Aircraft Co, Culver City, Cal.
Hughes Aircraft Co, Fullerton, Cal.
Integrated Elctrns., Huntington Station, N.Y.
NH Research, Inc., Santa Ana, Calif.
Weston Instrs. Div., Hatboro, Pa

Systems, Temperature Control—See Controls, Temperature—Vol 3

Tables, Laboratory—See Benches, Consoles, Stools, Tables (Lab and Shop)—Vol 3

Tables, Rate Of Turn

BFC-Bernard Franklin Co., Phila., Pa.
Carco Elctrns., Menlo Park, Calif.
Genisco Tech. Corp., Instr. Div., Compton, Cal.
Goerz Optical Co., Inc., Pittsburgh, Pa.
Hughes Aircraft Co., Ind'l. Prods. Div., Oceanside, Cal.
Hughes Aircraft Co., Ind'l. Prods. Div./Ind'l. Auto, Oceanside, Cal.

Tables, X-Y Axis—See Simulators, Motion

Tachometers, Electrical (Non-Generating)—See Vol 2

Tachometers, Electrical (Self-Generating)—See Vol 2

Tachometers, Electronic, Indicating—See Vol 2

Tachometers, Stroboscopic—See Vol 2

Tape Decks—See Tape Transports

Tape Duplicators—See Duplicators, Magnetic Tape; Perforators,Paper Tape

Tape Editing Equipment—See Editing Equipment—Vol 3

Tape Erasers, Magnetic—See Erasers, Magnetic Tape (Bulk)

Tape Perforators—See Perforators, Paper Tape

Tape-Programmed Testers—See Test Equip., Automatic Checkout;Testers, Integrated Circuit

Tape Recording Accessories

Austron, Inc., Austin, Tex.
Calico Div., San Diego, Cal.
Data-Control Systems, Danbury, Conn.
GC Elctrns., Rockford, Ill.
Hewlett-Packard, Palo Alto, Cal.
Honeywell, Denver, Colo.
Int'l. Electro-Magnetics, Palatine, Ill. p 311
Rye Inds., Inc., Mamaroneck, N.Y.
Ampex Corp., Redwood City, Calif.
Astro-Science, S. El Monte, Cal.
Audio Devices, Inc., Glenbrook, Conn.
Auricord, Long Island City, N.Y.
Bell & Howell Co., Pasadena, Calif.
California Instrs. Co., San Diego, Cal.
Concord Elctrns., Los Angeles, Cal.
Corning Glass Works, Tech. Prods. Div., Corning, N.Y.
Duotone Co., Inc., S. Miami, Fla.
EV/Game, Inc., Freeport, N.Y.
Echo Science Corp., Pasadena, Cal.
Electronic Engrs., Inc., Chicago, Ill.
Int'l. Computer Prods., Dallas, Tex.
Laminated Shim Co., Inc., Glenbrook, Conn.
Loral Elctrn. Sys., Bronx, N.Y.
Multi Media Engrg., Inc., Rockville, Md.
Neumade Prods. Corp., Scarsdale, N.Y.
Porter, H.K. Co., Inc., Pittsburgh, Pa.
Potter Instr. Co., Melville, N.Y.
Precision Instr. Co., Palo Alto, Calif.
Raymond Engrg., Inc., Middletown, Conn.
RCA Corp., Camden, N.J.
Recoton Corp., Long Island City, N.Y.
Reeves Soundcraft, Danbury, Conn.
Roberts Div., Los Angeles, Cal.
TDK Elctrns. Corp., Long Island City, N.Y.
Telectro Sys. Corp., Corona, N.Y.
Telephone Dynamics Corp., N. Bellmore, N.Y.
Telex Comm. Div., Minneapolis, Minn.
3M Co., St. Paul, Minn.
United Resch. Lab., Corp., New York, N.Y.
Vidaire Electronics Mfg. Corp., Freeport, N.Y.
Video Resch. Corp., Rockville, Md.

Tape Recorders—See Recorders, Magnetic Tape; Data Recorders

Tape Search Equipment

American Astronics, Hollywood, Cal
Chrono-log Corp., Broomall, Pa. .. p 340
Cook Electric Co., Morton Grove, Ill.
Elctrn. Engrg. Co. Cal., Santa Ana, Cal.
Geo Space Sys., Tampa, Fla. ..... p 350
Metric Sys., Ft. Walton Beach, Fla.p 358
Remex Elctrns., Santa Ana, Cal. .. p 377
Systron-Donner Concord Instr. Div., Concord, Cal.
Ampex Corp., Redwood City, Calif.
Auricord, Long Island City, N.Y.
CGS/Datametrics, Watertown, Mass.
Collins Radio Co., Dallas, Tex.
Datatron, Inc., Santa Ana, Cal
Datum, Inc., Anaheim, Calif.
Gulton Inds., Albuquerque, N.M.
Int'l. Computer Prods., Dallas, Tex.
Kyros Corp., Madison, Wisc.
Merchant, Robert C. Co., Carmel Valley, Calif.
RCA Corp., Camden, N.J.
Taft Electrosystems, Inc., Metuchen, N. J.
Telectro Sys. Corp., Corona, N.Y.
Video Resch. Corp., Rockville, Md.
Zehntel, Inc., Berkeley, Calif.

Tape Transports, Computer

Almond Instrs. Co., Covina, Cal.... p 329
American Astronics, Hollywood, Cal
Burroughs Corp., Los Angeles, Cal. p 338
Cook Electric Co., Morton Grove, Ill.
Crown Int'l., Elkhart, Ind. ..... p 951
Datacom, Inc., Ft. Walton Bch., Fla. p 344
Datascan, Inc., Clifton, N.J..... p 428
Digital Equip. Corp., Maynard, Mass. p 348
Hewlett-Packard, Palo Alto, Cal.
Int'l. Electro-Magnetics, Palatine, Ill. p 311
Remex Elctrns., Santa Ana, Cal. .. p 377
Ampex Corp., Redwood City, Calif.
Auricord, Long Island City, N.Y.
Bell & Howell Co., Pasadena, Calif.
Borg-Warner Controls, Santa Ana, Cal.
California Computer Prods., Anaheim, Cal
Computer Mate, Inc., San Clemento, Cal
Cycle Equip. Co., Los Gatos, Calif.
Data Prods. Corp., Woodland Hills, Calif.
Data Recording Sys., Sunnyvale, Cal.
Defense Elctrns., Inc., Rockville, Md.
Digi-Data Corp., Bladensburg, Md.
Echo Science Corp., Pasadena, Cal.
Eico Electronic Instrument Co., Inc., Brooklyn, N.Y.
Four-Phase Sys, Cupertino, Cal
Int'l. Computer Prods., Dallas, Tex.
Marathon Instrs. Div., Pico Rivera, Calif.
Mohawk Data Science, King of Prussia, Pa.
Orion Prods. Co., Sunnyvale, Cal.
Peripheral Equip. Corp., Chatsworth, Cal.
Potter Instr. Co., Melville, N.Y.
Precision Instr. Co., Palo Alto, Calif.
R-Columbia Prods., Inc., Highland Park, Ill.
Raymond Engrg., Inc., Middletown, Conn.
RCA Govt. & Comm. Sys., Moorestown, N.J.
TEAC Corp. of Amer., Santa Monica, Cal
Telectro Sys. Corp., Corona, N.Y.
Texas Instruments, Inc., Houston, Tex.
V-M Corp., Benton Harbor, Mich.
Video Resch. Corp., Rockville, Md.
Viewlex, Holbrook, N.Y.
Xerox Data Sys., El Segundo, Cal

Tapes, Electrical Insulation—See Vol 3

Tapes, Films & Foils, Pressure Sensitive—See Vol 3

Tapes, Heat Shrinkable—See Caps, Forms & Tapes, Heat Shrinkable—Vol 3

Tapes, Paper, Plastic, etc. (For Punching)

Budd Co., Philadelphia, Pa.
Chemplast, Inc., Wayne, N.J.
Corkpak Co., Inc., New Rochelle, N.Y.
Friden Div., San Leandro, Calif.
Industrial Timer Div., Parsippany, N.J.
Norton Coated Abrasive & Tape Divs., Troy, N.Y.
Robins Inds. Corp., Flushing, N Y
Shamban, W.S. & Co., Los Angeles, Calif.
Tapecon, Inc., Rochester, N.Y.
Tri-Point Inds., Inc., Commack, N.Y.

Tapes, Recording, Magnetic (All Types)

Infodex, Inc., Waterbury, Conn.
RCA Elctrns. Comps., Harrison, N.J.
Rye Inds., Inc., Mamaroneck, N.Y.
Sangamo Elec. Co., Pickens, S.C.
Sangamo Elec. Co., Springfield, Ill.p 379
AGFA-Gevaert, Inc., Teterboro, N.J.
Alcor, Inc., Ithaca, N.Y.
Allied Elctrns. Corp., Chicago, Ill.
Ampex Corp., Redwood City, Calif.
Audio Devices, Inc., Glenbrook, Conn.
Audio Instr. Co., Union City, N.J.
Auricord, Long Island City, N.Y.
Barger Corp., Sunnyvale, Cal.
Bell & Howell Co., Pasadena, Calif.
Concord Elctrns., Los Angeles, Cal.
Design Elements, Columbus, Ohio
Duotone Co., Inc., S. Miami, Fla.
EV/Game, Inc., Freeport, N.Y.
Edo Western Corp., Salt Lake City, Utah
Fidelitone, Inc., Chicago,, Ill
Honeywell Information Systems, Wellesley Hills, Mass
Indofex, Inc., Waterbury, Conn.
Int'l. Computer Prods., Dallas, Tex.
Irish Magnetic Recording Tape, Plainview, N.Y.
Kennedy Co., Altadena, Calif.
Mac Panel Co., High Pt., N.C.
Memorex Corp., Santa Clara, Cal.
Multi Media Engrg., Inc., Rockville, Md.
RCA Corp., Camden, N.J.
Recoton Corp., Long Island City, N.Y.
Reeves Soundcraft, Danbury, Conn.
TDK Elctrns. Corp., Long Island City, N.Y.
TEAC Corp. of Amer., Santa Monica, Cal
Telephone Dynamics Corp., N. Bellmore, N.Y.
3M Co., St. Paul, Minn.
Visual Elctrns. Corp., New York, N.Y.
Wabash Tape Corp., Huntley, Ill.

Tape To Film Transfer Equip.—See Vol 2

Taps—See Dies & Taps—Vol 3

Teaching Machines

Elco, Willow Grove, Pa.
Avco Corp., Cincinnati, Ohio
Burtek, Inc., Tulsa, Okla.
Cognitronics Corp., Mt. Kisco, N.Y.
Computerized Elctrn. Education, Upper Darby, Pa.
Digiac Corp., Plainview, N.Y.
High Voltage Engrg. Corp., Burlington, Mass.
Larson Aero Dev., Concord, Calif.
Link Div., Binghamton, N.Y.
Mast Dev. Co., Davenport, Iowa
McElroy Elctrns. Corp., Shirley, Mass.
Merchant, Robert C. Co., Carmel Valley, Calif.
Microwave Magnetics Inc., Danvers, Mass.
Miles Reproducer Co., Inc., New York, N.Y.
Non-Linear Sys., Inc., Del Mar, Cal.
R-Columbia Prods., Inc., Highland Park, Ill.
Stark Elctrn. Instrs., Ltd., Ajax, Ont., Canada
Technical Consultants Corp., Ellington, Conn.
Viewlex, Holbrook, N.Y.
Visual Educom, Michigan City, Ind.

Technical Books—See Vol 3

Tees, Coaxial—See Vol 2

Tees, Waveguide—See Vol 2

Telegraph Keys—See Keys, Telegraph

Telemetering Indicators—See Analyzers, Telemetric Data

Telemetering Systems, Electronic—See Comm. Systems, Telemetering

Telemetering Testers & Calibrators

Airpax Elctrns., Inc., Cambridge, Md.
Austron, Inc., Austin, Tex.
Data-Control Systems, Danbury, Conn.
Dytronics Co., Columbus, Ohio
Electronic Dev. Corp., Boston, Mass. p 457
Frequency Control, Inc., Austin, Tex.
General Elec. Co., Schenectady, N.Y.
Hewlett-Packard, Palo Alto, Cal.
Nelson Ross Elctrns., Lake Success, N.Y.
Polarad Elctrn. Instrs., Lake Success, N.Y.
Powertec, Chatsworth, Cal.
Primo Co., Ltd., Tokyo, Japan
Solid State Elctrns., Sepulveda, Cal.
Sonex, Inc., Bethayres, Pa..... p 955
A & M Instrument, Inc., Great Neck, N.Y.
AMBAC Inds., Garden City, N.Y.
Anritsu Electric Co., Ltd., Tokyo, Japan
Automation Dynamics, Northvale, N.J.
Aydin Data Systems, Ft. Washington, Pa
Biocom, Inc., Culver City, Cal.
Bristol Div, Waterbury, Conn
Defense Elctrns., Inc., Rockville, Md.
Destron Co., Rolling Hills Est, Cal
Dorsett Elctrns., Tulsa, Okla.
Electrac, Inc., Anaheim, Calif.
Eon Instr., Inc., Van Nuys, Cal.
General Devices, Inc., Princeton, N.J.
Gulton Inds., Albuquerque, N.M.
Hughes Aircraft Co, Fullerton, Cal.
Interlind Elctrns., Doraville, Ga.

Lear Siegler, Inc., Santa Monica, Calif.
Loral Elctrn. Sys., Bronx, N.Y.
Micro-Tel Corp., Baltimore, Md.
Microcom Corp., Horsham, Pa.
Microdot Inc., S. Pasadena, Calif.
Monitor Sys., Inc., Ft. Washington, Pa.
PMC Designing, Cincinnati,, Ohio
Ramsay Engrg. Co., Anaheim, Calif.
Systems Resch. Labs., Dayton, Ohio
Taft Electrosystems, Inc., Metuchen, N. J.
Telectro Sys. Corp., Corona, N.Y.
Tempo Instr., Plainview, N.Y.
Testex Inc., Sunnyvale, Cal.
Video Resch. Corp., Rockville, Md.
Wiltron Co., Palo Alto, Calif.

Telemetric Data Analyzers—See Analyzers, Telemetric Data

Telemetry Preamplifiers—See Preamplifiers, Telemetry

Telephone Handsets—See Handsets

Telephone Systems—See Comm. Systems, Telephone

Telephones, Sound Powered—See Comm. Systems, Telephone

Teleprinter Error Correction Equipment—See Error Correction Equipment

Teleprinters

General Elec. Co., Schenectady, N.Y.
A C Electronics Co., Santa Monica, Cal.
American Data Sys., Canoga Pk., Cal
Clary Corp., San Gabriel, Calif.
Computronics Engrg., Los Angeles, Calif.
Data Access Sys., Inc., Dover, N.J.
Data Prods. Corp., Woodland Hills, Calif.
Di/An Controls, Inc., Boston, Mass.
Honeywell Information Systems, Wellesley Hills, Mass
Hughes Aircraft Co, Culver City, Cal.
ITT Mackay Marine, Clark, N.J.
KDI Adtrol, Inc., Broomall, Pa.
LTV Electrosystems, Dallas, Tex.
Motorola Instr. & Control, Phoenix, Ariz.
RCA Service Co., Camden, N.J.
Shepard Div., Richmond Hill, N.Y.
Teletype Corp., Skokie, Ill.
Texas Instruments, Inc., Houston, Tex.
Trepac Corp. America, Englewood, N.J.

Teletypewriter Testers—See Testers, Teletypewriter

Teletypewriters & Equipment

Bolt Beranek & Newman, Santa Ana, Calif.
(NES) Nationwide Elctrn. Sys., Itasca, Ill.
A C Electronics Co., Santa Monica, Cal.
Boehme, H.O., Inc., Plainview, N.Y.
Data Access Sys., Inc., Dover, N.J.
Di/An Controls, Inc., Boston, Mass.
Electrocom Inds., So. Bend, Indiana
Fansteel Inc., N Chicago, Ill.
Four-Phase Sys, Cupertino, Cal
Honeywell Information Systems, Wellesley Hills, Mass
Iso-Switch Corp., Costa Mesa, Cal.
ITT Mackay Marine, Clark, N.J.
McElroy Elctrns. Corp., Shirley, Mass.
RCA Service Co., Camden, N.J.
Teletype Corp., Skokie, Ill.
Texas Instruments, Inc., Houston, Tex.
Trepac Corp. America, Englewood, N.J.

Television Equipment—See Antennas; Cameras; Coils; Monitors;Recorders, Video

Television Systems, Closed-Circuit

Circon Corp., Goleta, Cal.
Cunningham, Honeoye Falls, N.Y. p 322
General Elec. Co., Schenectady, N.Y.
Nippon Electric/NEC America, N.Y., N.Y.
Norman Inds., Chicago, Ill.
Alcor, Inc., Ithaca, N.Y.
Altron Elctrns. Co., Woodlyn, Pa.
Ampex Corp., Redwood City, Calif.
ASC Sys. Corp., Chicago, Ill.
ATV Research, Dakota City, Neb.
Ava Elctrns., Upper Darby, Pa.
Bionic Instrs., Inc., Bala Cynwyd, Pa.
Blonder-Tongue Labs., Inc., Old Bridge, N.J.
Bludworth Marine Div., Linden, N.J.
Cohu Elctrns., Inc., San Diego, Calif.
Collins Radio Co., Dallas, Tex.
Colorado Video, Inc., Boulder, Colo.
Commercial Elctrns., Inc., Mountain View, Cal.
Concord Elctrns., Los Angeles, Cal.
Dalmo Victor, Belmont, Calif.
Data Disc, Video Div., Sunnyvale, Cal.
Denson Elctrns. Corp., Rockville, Conn.
Dynair Elctrns. Inc., San Diego, Calif.
Edo Western Corp., Salt Lake City, Utah
GBC Closed Circuit TV Corp., New York, N.Y.
Gencom Div., Plainview, N.Y.
General Electrodynamics Corp., Garland, Tex.
General TV Network, Ferndale, Mich.
Hamamatsu TV Co., Ltd., Hamamatsu City, Shizuoka Pref., Japan
Hughes Aircraft Co, Culver City, Cal.
Integrated Elctrns., Huntington Station, N.Y.
ITI Electronics, Inc., Clifton, N.J.
Jerrold Elctrns. Corp., Philadelphia, Pa.
Jerrold/Watkins Div., Toronto, 395, Ont., Can.
Lear Siegler, Inc., Santa Monica, Calif.
Lear Siegler, Anaheim, Cal.
Lenox Instr. Co., Philadelphia, Pa.
Link Div., Binghamton, N.Y.
Massey Dickinson Co., Inc., Saxonville, Mass.
Matsushita Comm. Ind'l. Co., Ltd., Yokohama, Japan
Multi Media Engrg., Inc., Rockville, Md.
Nelson-Hershfield Elctrns., Phoenix, Ariz.
Odetics, Inc., Anaheim, Cal.
Opto-Metric Tools, Rockleigh, N.J.
Philips Broadcast Equipment Corp., Montvale, N.J.
RCA Corp., Camden, N.J.
RCA Govt. & Comm. Sys., Moorestown, N.J.
RCA Service Co., Camden, N.J.
Rust Corp., Everett, Mass.
Shibaden Corp. Amer., Woodside, N.Y.
Shigoto Inds., Ltd., New York, N.Y.
Spencer-Kennedy Labs., Inc., Winchester, Mass.
Surface Conduction, Inc., New York, N.Y.
Systems Resch. Labs., Dayton, Ohio
Technical Mat'l., Mamaroneck, N.Y.
Telectro Sys. Corp., Corona, N.Y.
Teletronics, Inc., Orange, Calif.
Texas Instruments, Inc., Dallas, Tex.
Thomson-CSF Inc., New York, N.Y.
Ultra Audio Prods., Beverly Hills, Calif.
Unimetrics, Inc., Plainview, N.Y.
Varian Assoc., Beverly, Mass
VIKOA, Hoboken, N.J.
Visual Educom, Michigan City, Ind.
Wald Sound, Sun Valley, Calif.
Westinghouse Elec., Pittsburgh, Pa.
Winegard Co., Burlington, Iowa

Temperature Controls—See Controls, Temperature—Vol 2

Temperature Indicators—See Meters, Temperature

Temperature Sensors—See Transducers, Temperature—Vol 2

Templates, Drafting—See Drafting Equipment—Vol 3

Tempo Regulators—See Regulators, Pitch & Tempo

Tensile Testers—See Testers, Material

Terminal Blocks—See Blocks, Terminal—Vol 3

Terminal Boards—See Boards, Terminal—Vol 3

Terminal Boards, Prepunched—See Vol 3

Terminal Equipment, Digital

Data-Control Systems, Danbury, Conn.
Digital Equip. Corp., Maynard, Mass.
Digitron Corp., Norristown, Pa.
Eldorado Electrodata, Concord, Cal. p 449
Hewlett-Packard, Palo Alto, Cal.
Multitech Communications, Monterey Pk., Cal. p 324
(NES) Nationwide Elctrn. Sys., Itasca, Ill. p 365
Pinlites, Fairfield, N.J.
Tektronix, Inc., Beaverton, Ore.
A C Electronics Co., Santa Monica, Cal.
AMBAC Inds., Garden City, N.Y.
Applied Digital Data Systems, Inc., Hauppauge, N.Y.
Applied Systems Corp., Detroit, Mich
Ark-Les Switch Corp., Watertown, Mass.
Clary Corp., San Gabriel, Calif.
Codex Corp., Newton, Mass.
Collins Radio Co., Cedar Rapids, Iowa
Collins Radio Co., Dallas, Tex.
Computer Mate, Inc., San Clemento, Cal
Computer Prods. Int'l., Inc., Santa Clara, Calif.
Computer Test Corp., Cherry Hill, N.J.
Control Equip. Corp., New England, Lowell, Mass.
Demex, Inc., Kansas City, Mo.
Design Elements, Columbus, Ohio
Di/An Controls, Inc., Boston, Mass.
Electrocom Inds., So. Bend, Indiana
Essex Int'l, Inc., Sycamore, Ill.
Ferranti Ltd., Hollinwood, Lancs., England
Ford Industries, Inc., Portland, Ore.
Friden Div., San Leandro, Calif.
General Elec., Lynchburg, Va.
Gleason-Avery Co., Auburn, N.Y.
GTE Sylvania Inc., Elctrn. Sys. Gp., Waltham, Mass.
HB Engrg. Corp., Silver Spring, Md.
Honeywell Information Systems, Wellesley Hills, Mass
Hughes Aircraft Co, Culver City, Cal.
Hughes Aircraft Co, Fullerton, Cal.
Hughes Aircraft Co., Ind'l. Prods. Div., Oceanside, Cal.
Hughes Aircraft Co., Ind'l. Prods. Div. Display Sys., Oceanside, Calif.
Information Displays, Inc., Mt. Kisco, N.Y.
Instrumentation Tech. Corp., Northridge, Calif.
Interlind Elctrns., Doraville, Ga.
Iso-Switch Corp., Costa Mesa, Cal.
Lear Siegler, Inc., Santa Monica, Calif.
Lear Siegler, Anaheim, Cal.
Maxson Elctrns. Div., Great River, N.Y.
Milgo Electrn. Corp., Miami, Fla.
Philco-Ford Corp., Washington, D.C.
Potter Instr. Co., Melville, N.Y.
Prentice Elctrns. Corp., Palo Alto, Calif.
RCA Govt. & Comm. Sys., Moorestown, N.J.
Singer - Tele-Signal, Woodbury, N.Y.
TEC, Inc., Eden Prairie, Minn.
Telemodem, Inc., Queens Village, N.Y.
Teletype Corp., Skokie, Ill.
Texas Instruments, Inc., Houston, Tex.
Trepac Corp. America, Englewood, N.J.
Varian Assocs., Palo Alto, Cal.
Varian Data Machines, Palo Alto, Cal.
Viatron Computer Sys., Bedford, Mass.
Western Telematic, Inc., Arcadia, Cal.
Wyle Labs., El Segundo, Calif.
Zehntel, Inc., Berkeley, Calif.

Terminal Strips—See Strips, Terminal—Vol 3

Terminals, Feedthru—See Vol 3

Terminals, Ferrule, Cable-End—See Vol 3

Terminals, Hermetic—See Terminals (As Modified)—Vol 3

Terminals, Lug—See Vol 3

Terminals, Miniature & Subminiature—See Vol 3

Terminals, Printed Circuit Board—See Vol 3

Terminals, Push-On—See Connectors & Terminals, Push-On, Quick Disconnect—Vol 3

Terminals, Solderless—See Vol 3

Terminals, Standoff—See Vol 3

Terminals, Threaded—See Vol 3

Terminals, Turret—See Vol 3

Terminations, Antenna-Also See Dummy Loads

Bendix, Franklin, Ind. p 1555
Berg Elctrns., Inc., New Cumberland, Pa.
Bird Elctrn., Cleveland, Ohio. p 420
Electro Impulse, Inc., Red Bank, N.J. p 603
R L C Elctrns., Inc., Mt. Kisco, N.Y. p 1563
Sealectro Corp., Mamaroneck, N.Y.
Transco Prods., Inc., Venice, Cal. p 613
Waveline, Inc., W. Caldwell, N.J.
Weinschel Engrg. Co., Gaithersburg, Md. p 1571
Aircom, Inc., Union, N.H.
Airtec, Inc., Roselle, N.J.
American Pamcor, Inc., Paoli, Pa
Astrolab Inc., Linden, N J
Aviel Electronics Inc, Burbank, Calif.
Barker & Williamson, Bristol, Pa.
Collins Radio Co., Dallas, Tex.
Core-Tronics, Inc., Orange, N.J.
Custom Comps., Fairfield, N.J.
Custom Materials, Inc., Chelmsford, Mass.
Elcom Sys., Deer Pk., N.Y.
EMC Technology Inc, Philadelphia, Pa.
Engelmann Microwave, Montville, N.J.
Guide Inds., Inc., Sun Valley, Calif.
Herley Inds., Inc., Syosset, N.Y.
Hughes Aircraft Co, Culver City, Cal.
Hughes Aircraft Co, Fullerton, Cal.
Javex Elctrns., Cherry Valley, Calif.
Lieco, Inc., Lindenhurst, N.Y.
Maury Microwave Corp., Cucamonga, Calif.
Meca Elctrns., Inc., Denville, N.J.
Merrimac Resch. & Dev., Inc., West Caldwell, N.J.
MI-KRO Connector Div., Long Island City, N.Y.
Microlab/FXR, Livingston, N.J.
Microwave Filter Co., Inc., East Syracuse, N.Y.
Narda Microwave Corp., Plainview, N.Y.
Omega Labs., Inc., Rowley, Mass.
Philco-Ford Corp., Washington, D.C.
Rohde & Schwarz Sls., Passaic, N.J.
Sjoberg, C. & Son, Inc., Cranston, R.I.
Struthers Elctrns. Corp., Mamaroneck, N.Y.
Technical Mat'l., Mamaroneck, N.Y.
TRG Prods., E. Boston, Mass.

Terminations, High Voltage—See Vol 3

Terminations, Microwave—See Vol 2

Terminations, VHF, Video, Pulse

Bird Elctrn., Cleveland, Ohio. p 420
Electro Impulse, Inc., Red Bank, N.J. p 603
Hewlett-Packard, Palo Alto, Cal.
Texscan Corp., Indianapolis, Ind.
Trompeter Elctrns., Chatsworth, Cal.
American Pamcor, Inc., Paoli, Pa
Astrolab Inc., Linden, N J
Ava Elctrns., Upper Darby, Pa.
Barth Elctrns., Inc., Cleveland, Ohio
Blonder-Tongue Labs., Inc., Old Bridge, N.J.
Collins Radio Co., Dallas, Tex.
Dynographic Elctrns. Corp., Hicksville, N.Y.
Elcom Sys., Deer Pk., N.Y.
Engelmann Microwave, Montville, N.J.

Fairlane Electronics, Inc., Long Valley, N.J.
General Radio Co., Concord, Mass.
Herley Inds., Inc., Syosset, N.Y.
Hughes Aircraft Co, Culver City, Cal.
Hughes Aircraft Co, Fullerton, Cal.
Jerrold Elctrns. Corp., Philadelphia, Pa.
Jerrold/Watkins Div., Toronto, 395, Ont., Can.
Lundey Assocs., Inc., Waltham, Mass.
Meca Elctrns., Inc., Denville, N.J.
Microlab/FXR, Livingston, N.J.
Nanosecond Systems, Inc., Fairfield, Conn.
Narda Microwave Corp., Plainview, N.Y.
OMNI Spectra, Farmington, Mich.
Philco-Ford Corp., Washington, D.C.
Radiation Devices Co., Baltimore, Md.
Rohde & Schwarz Sls., Passaic, N.J.
Telonic Inds., Inc., Laguna Beach, Calif.

Test Equipment, Color Tv

Hickok Elect. Instr., Cleveland, Ohio
Kay Elemetrics, Pine Brook, N.J... p 506
Marconi Instrs., Englewood, N.J... p 520
Nelson Ross Elctrns., Lake Success, N.Y.
RCA Elctrns. Comps., Harrison, N.J.
Tektronix, Inc., Beaverton, Ore.
Vector Elctrn. Co., Inc., Sylmar, Cal.
Allied Elctrns. Corp., Chicago, Ill.
American Elctrn. Controls Co., Barrington, N.J.
Components Specialties, Inc., Freeport, N.Y.
Denson Elctrns. Corp., Rockville, Conn.
Dynascan Corp., Chicago, Ill.
Eico Electronic Instrument Co., Inc., Brooklyn, N.Y.
GTE Sylvania Inc., Elctrn. Comps. Grp., Waltham, Mass.
Heath Co., Benton Harbor, Mich.
International Scanatron Sys., Wyandanch, N.Y.
Jackson Elec. Instr. Co., Mineola, N.Y.
Joliet Control Corp., Joliet, Ill.
Kollmorgen-Color Sys. Div., Attleboro, Mass.
Leader Instr. Corp., Long Island City, N.Y.
Mercury Elctrns. Corp., Mineola, N.Y.
Nuclear Resch. Corp., Southampton, Pa.
Photo Resch. Corp., Burbank, Calif.
Radio Resch. Co., Rockaway, N.J.
RCA Corp., Camden, N.J.
RIL Elctrns., Inc., Southampton, Pa.
Rohde & Schwarz Sls., Passaic, N.J.
Scientronics, Barrington, N.J.
Seco Elctrns. Corp., Hopkins, Minn.
Stark Elctrn. Instrs., Ltd., Ajax, Ont., Canada
Tel-Instr. Elctrns. Corp., Carlstadt, N.J.
Telectro Sys. Corp., Corona, N.Y.
Telonic Inds., Inc., Laguna Beach, Calif.
Viz Mfg. Co., Philadelphia, Pa.

Test Equipment, Component Substituting

A. D. Data Sys., Inc., Rochester, N.Y.
Daico Inds., Inc., Compton, Cal.
Polarad Elctrn. Instrs., Lake Success, N.Y.
Alden Elctrn. & Impulse Record. Equip., Westboro, Mass.
AMBAC Inds., Garden City, N.Y.
De Soto Elec. Prods., De Soto, Mo.
Hughes Aircraft Co, Culver City, Cal.
Jackson Elec. Instr. Co., Mineola, N.Y.
Kollsman Instr. Corp., Syosset, N.Y.
Maurer, J.A., Inc., Woodside, N.Y.
Micro-Technical Inds., Laguna Beach, Cal.
Morey Corp, Downers Grove, Ill.
Rohde & Schwarz Sls., Passaic, N.J.
Singer-General Precision, Inc., Little Falls, N.J.
Systron-Donner Microwave Div., Van Nuys, Cal.
Vytell Corp., Arlington Hgts., Ill.
Zehntel, Inc., Berkeley, Calif.

Test Equipment, Environmental—See Specific Type Of Equipment

Test Equipment, Mechanical Impedance

Data-Control Systems, Danbury, Conn.
Dranetz Engrg. Labs., Plainfield, N.J.p 433
Universal Ad-Yu Elctrns., Inc., Passaic, N.J. ..... p 2752
Endevco, Pasadena, Calif.
MB Elctrns/Textron Co., New Haven, Conn.
Spectral Dynamics Corp. San Diego, San Diego, Cal.
Weston Instrs. Div., Hatboro, Pa

Test Lead Probes—See Probes, Test Lead

Test Leads & Adapters

Circon Corp., Goleta, Cal. ..... p 2937
Daburn Elctrns. & Cable Corp., Bronx, N.Y.
E-Z Hook, Test Prods., Arcadia, Cal. p 2621-2623
Electro Sci. Inds., Portland, Ore.
GC Elctrns., Rockford, Ill.
Hewlett-Packard, Palo Alto, Cal.
Hickok Elect. Instr., Cleveland, Ohio
National Tel-Tronics Corp., Great Neck, N.Y. ..... p 2650
Pomona Elctrns. Co., Inc., Pomona, Cal. p
Simpson Elec. Co., Chicago, Ill.
Smith, Herman H., Inc., Bklyn., N.Y.
Vector Elctrn. Co., Inc., Sylmar, Cal.
Accurate Elctrns. Corp., Elyria, Ohio
Air-O-Tronics Prods., Morrisville, N.Y.
Aircraft & Elctrn. Spec., Plainfield, Ind.
Amatom Elctrn. Hardware, New Rochelle, N.Y.
Anchor Specialty Mfg., Teterboro, N.J.
Argent Inds., Inc., Dayton, Ohio
Birnbach Co., Inc., Freeport, N.Y.
Bruno-New York Inds. Corp., New York, N.Y.
California Avionics Labs., Inc., Palo Alto, Calif.
Cam-Lok Div., Cincinnati, Ohio
Collins Radio Co., Dallas, Tex.
Components Specialties, Inc., Freeport, N.Y.
Conductron Corp., St. Charles, Mo.
Cooke Engrg. Co., Alexandria, Va.
De Soto Elec. Prods., De Soto, Mo.
Desco Mfg. Co., Glendale, Calif.
DonMar Prods., Inc., Denver, Colo.
Eico Electronic Instrument Co., Inc., Brooklyn, N.Y.
Excel Specialty Corp., Chicago, Ill.
Helitronics Corp., Newark, N.J.
Keystone Elctrns. Corp., New York, N.Y.
Lingenfelter Applied Tech., Gaithersburg, Md.
Lynn Elctrns. Corp., Philadelphia, Pa.
Morey Corp, Downers Grove, Ill.
Network Inds., Inc., Bayonne, N.J.
Paraplegics Mfg., Bensenville, Ill.
Philmore Mfg. Co., Richmond Hill, N.Y.
Projects Unlimited, Inc., Dayton, Ohio
Pylon Co., Inc., Attleboro, Mass.
Seven Assocs., Sunnyvale, Calif.
Shigoto Inds., Ltd., New York, N.Y.
States Co., Hartford, Conn.
Sunshine Sci. Instrs., Inc., Philadelphia, Pa.
Textool Prods., Inc., Irving, Tex.
Vytell Corp., Arlington Hgts., Ill.

Test Sets—See Testers

Test Sets, Multipurpose

A. D. Data Sys., Inc., Rochester, N.Y.
Alford Mfg. Co., Winchester, Mass.
American Elctrn. Labs., Inc., Lansdale, Pa.
Associated Resch., Chicago, Ill. .. p 404
Astrosystems, Lake Success, N.Y. p 407
Calico Div., San Diego, Cal.
Dranetz Engrg. Labs., Plainfield, N.J.
Electro Sci. Inds., Portland, Ore.. .. p 454
General Resistance, Mt. Vernon, N.Y.
Hewlett-Packard, Palo Alto, Cal.
Hickok Elect. Instr., Cleveland, Ohio
Hipotronics, Inc., Brewster, N.Y. .. p 490
Hughes Aircraft Co., Frequency Control Devices, Newport Bch., Cal. ..... p 496
Hughes Aircraft Co., Los Angeles, Cal. p 496
Nelson Ross Elctrns., Lake Success, N.Y.
Power Designs, Westbury, N.Y.
Simpson Elec. Co., Chicago, Ill.
Texscan Corp., Indianapolis, Ind.
Wavetek, San Diego, Cal.
Adar Assocs., Cambridge, Mass.
American Data Sys., Canoga Pk., Cal
Anritsu Electric Co., Ltd., Tokyo, Japan
Artronix, Inc., St. Louis, Mo.
AUL Instrs., Inc., Flushng, N.Y.
Austin Elctrns., Roselle, N.J.
BLH Elctrns., Inc., Waltham, Mass.
Components Specialties, Inc., Freeport, N.Y.
Dataprobe, Inc., So. Hackensack, N.J.
De Soto Elec. Prods., De Soto, Mo.
Desman Elctrns., Rochester, N.Y.
Guildline Instrs., Inc., Larchmont, N.Y.
Hughes Aircraft Co, Culver City, Cal.
Hughes Aircraft Co, Fullerton, Cal.
Instrument Data Products, Camarillo, Cal.
Instrument Labs. Corp., Chicago, Ill.
ITI Electronics, Inc., Clifton, N.J.
Levell Electronics Ltd., High Barnet, Herts,, England
Nano Fast, Inc., Chicago, Ill.
Peschel Instrs., Cape Coral, Fla.
Rantec Div., Calabasas, Calif.
RCA Govt. & Comm. Sys., Moorestown, N.J.
Rohde & Schwarz Sls., Passaic, N.J.
Servo Corp. America, Hicksville, N.Y.
Singer-General Precision, Inc., Little Falls, N.J.
Sunshine Sci. Instrs., Inc., Philadelphia, Pa.
Telesciences, Moorestown, N.J.
Test Equip. Corp., Dallas, Tex.
Wiltron Co., Palo Alto, Calif.
Zehntel, Inc., Berkeley, Calif.

Testers, Accelerometer—See Calibrators, Accelerometer

Testers, Battery

Christie Elec., Los Angeles, Cal.
CML-Macarr, Inc., Edison, N.J. ..... p 667
Component Resch., Santa Monica, Cal.
Dixson Inc., Grand Junction, Colo.
Hickok Elect. Instr., Cleveland, Ohio
Hoyt Elec. Instr. Works, Belmont, Mass.
Marathon Battery Co., Cold Spring, N.Y.
Schauer Mfg. Corp., Cincinnati, Ohio
Servo-Tek Prods. Co., Hawthorne, N.J.
Simpson Elec. Co., Chicago, Ill.
Western Reserve Elctrns., Twinsburg, Ohio ..... p 581
Aerotronic Assocs., Inc., Contoocook, N.H.
Anchor Specialty Mfg., Teterboro, N.J.
Austin Elctrns., Roselle, N.J.
Components Specialties, Inc., Freeport, N.Y.
Eico Electronic Instrument Co., Inc., Brooklyn, N.Y.
Electronic Meas. Corp., New York, N.Y.
Exide Power Sys. Div., Philadelphia, Pa.
Ferranti Ltd., Hollinwood, Lancs., England
Gulton Inds., Hawthorne, Calif.
Kahl Scientific Instr. Corp., El Cajon, Calif.
Neptune Elctrns. Co., New York, N.Y.
N.Y. Testing Labs., Inc., Westbury, N.Y.
Power Applications, Inc., Bayside, N.Y.
Proto Tool Co, Los Angeles, Calif.
Q.V.S., Inc., East Orange, N.J.
Ram Meter, Inc., Ferndale, Mich.
Rodale Mfg. Co., Inc., Emmaus, Pa.
Snap-On Tools Corp., Kenosha, Wisc.
Stark Elctrn. Instrs., Ltd., Ajax, Ont., Canada
Sun Electric Corp., Chicago, Ill.
Triple-A Specialty Co., Chicago, Ill.
Unex Labs., Inc., Hathorne, Mass.
Viz Mfg. Co., Philadelphia, Pa.

Testers Burn-In(Aging

A. D. Data Sys., Inc., Rochester, N.Y.
Associated Testing Labs., Inc., Wayne, N.J. ..... p 388
Blue M Engrg. Co., Blue Island, Ill. p 389
Kilovolt Corp., Hackensack, N.J.
Light Elec. Corp., Rancocas, N.J.
Opad Elec. Co., Inc., New York, N.Y.
Slaughter Co., Ardmore, Okla.
Aerotronic Assocs., Inc., Contoocook, N.H.
Anchor Specialty Mfg., Teterboro, N.J.
Applied Control Co., Fairfield, N.J.
Austin Elctrns., Roselle, N.J.
CGS Units, Inc., Rochester, N.Y.
Delta Design, La Mesa, Cal
FRL, Marin Controls Co., Belmont, Cal.
Jettron Prods., Hanover, N.J.
Lecroy Resch. Sys. Corp., West Nyack, N.Y.
Lehighton Elctrns., Inc., Lehighton, Pa.
Micro Instr., Hawthorne, Cal.
Neptune Elctrns. Co., New York, N.Y.
Non-Linear Sys., Inc., Del Mar, Cal.
Ogden Technology Labs., Fullerton, Cal.
Test Equip. Corp., Dallas, Tex.
Vestal Modern Design Corp., Vestal, N.Y.
Wakefield Engrg., Inc., Wakefield, Mass.
Willard Labs. (E), Los Angeles, Cal.

Testers, Cable

A. D. Data Sys., Inc., Rochester, N.Y.
Associated Resch., Chicago, Ill. .. p 404
Beckman Instrs., Cedar Grove, N.J. p 415
Biddle, James G., Plymouth Meeting, Pa. ..... p 419
Clarke - Hess, New York, N.Y.
Data-Control Systems, Danbury, Conn.
Del Elctrns. Corp., Mt. Vernon, N.Y.
Hewlett-Packard, Palo Alto, Cal.
Hipotronics, Inc., Brewster, N.Y. .. p 490
Hughes Aircraft Co., Frequency Control Devices, Newport Bch., Cal. ..... p 496
Hughes Aircraft Co., Los Angeles, Cal. p 496
Jonard Inds. Corp., Bronx, N.Y.
Kilovolt Corp., Hackensack, N.J. .. p 773
Light Elec. Corp., Rancocas, N.J.
Ross Engrg. Corp., Campbell, Cal.
Shallcross, Selma, N.C.
Slaughter Co., Ardmore, Okla. ..... p 558
Tektronix, Inc., Beaverton, Ore.
Triplett Elec. Instr. Co., Bluffton, Ohio
Universal Voltronics Corp., Mt. Kisco, N.Y.
Addison Div., Mountainside, N.J.
Ametek/Testing Equip. Sys., Lausdale, Pa.
Amprobe Instr., Lynbrook, N.Y.
Anchor Specialty Mfg., Teterboro, N.J.
Anritsu Electric Co., Ltd., Tokyo, Japan
A.O.I.P., 75/Paris 12eme, France
Applied Systems Corp., Detroit, Mich
Audio Accessories, Inc., Gilsum, N.H.
Automation Dynamics, Northvale, N.J.
Bliss Elctrn. Corp., Sussex, N.J.
Brooks Resch. & Mfg., Inc., Kansas City, Mo.
Canadian Research Institute, Don Mills, Ont., Canada
Central Engrg. Co., Minneapolis, Minn.
Century Coil Corp., Chicago, Ill.
Clinton Instr. Co., Clinton, Conn.
Cole Instr., Costa Mesa, Cal.
Communications Tech. Corp., Los Angeles, Cal.
Computer Automation, Inc., Newport Beach, Calif.
Custom Sci. Instrs., Inc., Whippany, N.J.
Desman Elctrns., Rochester, N.Y.
Digital Gen'l. Corp., Cleveland, Ohio
Dit-MCO International, Kansas City, Mo.
Everett/Charles, Inc., Pomona, Cal.
GAR Enterprises, Pasadena, Cal.
Glenair, Inc., Glendale, Calif.
Guildline Instrs., Inc., Larchmont, N.Y.
Hughes Aircraft Co, Culver City, Cal.
Ind'l. Winding Mach., River Edge, N.J.
Instrument Labs. Corp., Chicago, Ill.
Japanese Prods. Corp., New Rochelle, N.Y.
Jerrold/Watkins Div., Toronto, 395, Ont., Can.
Lab Electro-Acoustique, 92-Rueil, Malmaison, France
Lingenfelter Applied Tech., Gaithersburg, Md.
MacDonald & Co., Glendale, Calif.
Morey Corp, Downers Grove, Ill.
Neptune Elctrns. Co., New York, N.Y.
Network Inds., Inc., Bayonne, N.J.
Northeast Elctrns. Corp., Concord, N.H.
Peschel Instrs., Cape Coral, Fla.
Siemens Corp., Comps. Div., Iselin, N.J.
Stark Elctrn. Instrs., Ltd., Ajax, Ont., Canada
Sunshine Sci. Instrs., Inc., Philadelphia, Pa.
Telesciences, Moorestown, N.J.
V. J. Elctrns., Ontario, Cal.
Willard Labs. (E), Los Angeles, Cal.

Testers, Capacitor

A. D. Data Sys., Inc., Rochester, N.Y.
Beckman Instrs., Cedar Grove, N.J. p 414,415
Boonton Elctrns., Parsippany, N.J. p 423
Boonton Electronics Corp., Parsippany, N.J. ..... p 423
Dranetz Engrg. Labs., Plainfield, N.J. p 433

Electro Sci. Inds., Portland, Ore.. p 454
Freed Transformer Co., Bklyn., N.Y. p 481
Ind'l. Test Equip., Port Washington, N.Y.
Jonard Inds. Corp., Bronx, N.Y.
Kahle Engrg. Co., Union City, N.J.
Kilovolt Corp., Hackensack, N.J.
Light Elec. Corp., Rancocas, N.J.
Quan-Tech, Whippany, N.J. ..... p 547
Sennheiser Elctrn. Corp., New York, NY
Simpson Elec. Co., Chicago, Ill.
Slaughter Co., Ardmore, Okla.
Sprague Elec. Co., No. Adams, Mass. p 2474
Canadian Research Institute, Don Mills, Ont., Canada
Components Specialties, Inc., Freeport, N.Y.
Consolidated Ohmic Devices, Carle Pl., N.Y.
Davidson Elctrn. Dev. Co., Erie, Pa.
Daymarc Corp., Waltham, Mass.
Dynascan Corp., Chicago, Ill.
Eico Electronic Instrument Co., Inc., Brooklyn, N.Y.
Freudenberg, B., Inc., New York, N.Y.
GAR Enterprises, Pasadena, Cal.
General Radio Co., Concord, Mass.
Heath Co., Benton Harbor, Mich.
IPT Corp., Mountain View, Cal.
Mechanical Technology, Inc., Latham, N.Y.
Mercury Elctrns. Corp., Mineola, N.Y.
Micro Instr., Hawthorne, Cal.
Neptune Elctrns. Co., New York, N.Y.
Optimized Devices Inc., Pleasantville, N.Y.
Peschel Instrs., Cape Coral, Fla.
Stark Elctrn. Instrs., Ltd., Ajax, Ont., Canada
Teradyne, Inc., Boston, Mass.
Test Equip. Corp., Dallas, Tex.

Testers, Circuit—See Testers, Signal Tracing

Testers, Coil

Beckman Instrs., Cedar Grove, N.J. p 415
Boonton Elctrns., Parsippany, N.J.
Dranetz Engrg. Labs., Plainfield, N.J. p 433
Freed Transformer Co., Bklyn., N.Y. p 482,483
Ind'l. Test Equip., Port Washington, N.Y.
New Prod. Engrg., Wabash, Ind.
Slaughter Co., Ardmore, Okla. ..... p 558
Anchor Specialty Mfg., Teterboro, N.J.
Avtron Mfg., Inc., Cleveland, Ohio
Collins Radio Co., Dallas, Tex.
General Radio Co., Concord, Mass.
Instrument Labs. Corp., Chicago, Ill.
Kartron Inc., Huntington Beach, Calif.
Neptune Elctrns. Co., New York, N.Y.
Sunshine Sci. Instrs., Inc., Philadelphia, Pa.

Testers, Component Linearity

London Co., Cleveland, Ohio ..... p 516
Slaughter Co., Ardmore, Okla. p 558,559
Teledyne Philbrick, Dedham, Mass. p 1294
Audio Instr. Co., Union City, N.J.
Compu-Systems Co., Wakefield, Mass.
IPT Corp., Mountain View, Cal.
MSE, Inc., Westlake, Ohio
Solatron Enterprises, Inglewood, Calif.
Teledyne Semiconductor, Hawthorne, Cal.

Testers, Computer Memory

Chronetics, Inc., Mt. Vernon, N.Y.
E-H Resch. Labs., Inc., Oakland, Cal.
Adar Assocs., Cambridge, Mass.
Compu-Systems Co., Wakefield, Mass.
Computer Test Corp., Cherry Hill, N.J.
Control Logic, Natick, Mass.
Heidelex Corp., Chelmsford, Mass.
Honeywell, Aerospace & Def., Minneapolis, Minn.
Hughes Aircraft Co, Culver City, Cal.
Lorlin Inds., Inc., Danbury, Conn.
Macrodata, Chatsworth, Cal.
Optimized Devices Inc., Pleasantville, N.Y.
Pioneer Magnetics, Santa Monica, Cal.
Tau-Tron, Inc., Lowell, Mass.
Technical Consultants Corp., Ellington, Conn.
Willard Labs. (E), Los Angeles, Cal.
Xintel Corp., Chatsworth, Cal.
Zehntel, Inc., Berkeley, Calif.

Testers, Corona

Associated Resch., Chicago, Ill. .. p 404
Biddle, James G., Plymouth Meeting, Pa. ..... p 419
Hewlett-Packard, Palo Alto, Cal.
Hipotronics, Inc., Brewster, N.Y.. p 491
Kilovolt Corp., Hackensack, N.J.. p 773
Light Elec. Corp., Rancocas, N.J.
Ross Engrg. Corp., Campbell, Cal.
Addison Div., Mountainside, N.J.
Bertan Assocs., Inc., Plainview, N.Y.
Clinton Instr. Co., Clinton, Conn.
Delcon Div., Mt. View, Calif.
GAR Enterprises, Pasadena, Cal.
Neptune Elctrns. Co., New York, N.Y.
Peschel Instrs., Cape Coral, Fla.
Randam Elctrns., Inc., Cincinnati, Ohio
Sunshine Sci. Instrs., Inc., Philadelphia, Pa.
Techsonics, El Prado, N.M.

Testers, Crystal—See Analyzers, Crystal

Testers, Diode

American Elctrn. Labs., Inc., Lansdale, Pa.
Automated Meas., Oakland, Calif.
Beckman Instruments, Shiller Pk., Ill.
Boonton Elctrns., Parsippany, N.J. p 423
Boonton Electronics Corp., Parsippany, N.J. ..... p 423
E-H Resch. Labs., Inc., Oakland, Cal.
Hickok Elect. Instr., Cleveland, Ohio p 489
North Hills Elctrns., Inc., Glen Cove, N.Y.
Quan-Tech, Whippany, N.J. ..... p 546,547
Tektronix, Inc., Beaverton, Ore.
Aerotronic Assocs., Inc., Contoocook, N.H.
AIL, Div. Cutler-Hammer, Inc., Deer Park, N.Y.
AMF Electical Prods., Alexandria, Va.
Britec Ltd., London, W.C.2, England
Datalogic Sys., Inc., Merrimac, Mass.
Davidson Elctrn. Dev. Co., Erie, Pa.
Daymarc Corp., Waltham, Mass.
Dynascan Corp., Chicago, Ill.
Eico Electronic Instrument Co., Inc., Brooklyn, N.Y.
Fairchild Sys. Technology, Sunnyvale, Cal.
Heath Co., Benton Harbor, Mich.
IC Metrics, Eatontown, N.J.
Instr. Resch. Co., Lincoln, Mass.
IPT Corp., Mountain View, Cal.
Kikusui Elctrns. Corp., Kawasaki City, Kanagawa-Pref., Japan
Larson Aero Dev., Concord, Calif.
Lehighton Elctrns., Inc., Lehighton, Pa.
Loranger Mfg. Corp., Warren, Pa.
Lorlin Inds., Inc., Danbury, Conn.
Luft Instrs., Inc., Lincoln, Mass.
Optimized Devices Inc., Pleasantville, N.Y.
Peschel Instrs., Cape Coral, Fla.
Rantec Div., Calabasas, Calif.
Rohde & Schwarz Sls., Passaic, N.J.
Teledyne Semiconductor, Hawthorne, Cal.
Telvac Instr. Co., Van Nuys, Cal.
Teradyne, Inc., Boston, Mass.
Test Equip. Corp., Dallas, Tex.
Velonex, Santa Clara, Calif.

Testers, Electric Power—See Monitors, Power, A-C & D-C

Testers, Encoder

Beckman Instrs., Cedar Grove, N.J.
Frequency Control, Inc., Austin, Tex.
Norden Div., Norwalk, Conn.
Applied Control Co., Fairfield, N.J.
Singer-General Precision, Inc., Little Falls, N.J.
Teledyne Gurley, Troy, N.Y.
Theta Instr. Corp., Fairfield, N.J.
United Aircraft Corp., Norwalk, Conn.

Testers, Flutter—See Meters, Wow & Flutter

Testers, Ground Resistance—See Meters, OHM

Testers, Gyro

Advanced Energy Conversion, Menlo Pk., Cal.
Aeroflex Labs., Plainview, N.Y.
AMBAC Inds., Garden City, N.Y.
Anchor Specialty Mfg., Teterboro, N.J.
California Instrs. Co., San Diego, Cal.
Carco Elctrns., Menlo Park, Calif.
Consolidated Ohmic Devices, Carle Pl., N.Y.
Everett/Charles, Inc., Pomona, Cal.
Goerz Optical Co., Inc., Pittsburgh, Pa.
Honeywell, Aerospace & Def., Minneapolis, Minn.
Lear Siegler, Inc., Santa Monica, Calif.
NH Research, Inc., Santa Ana, Calif.
Sanders Assocs., Inc., Manchester, N.H.
Sanwa Corp. America, Edison, N.J.
Singer-General Precision, Inc., Little Falls, N.J.
Theta Instr. Corp., Fairfield, N.J.

Testers, Hi-Pot—See Testers, Insulation Breakdown

Testers, Insulation Breakdown

Associated Resch., Chicago, Ill. p 404,405
Beckman Instrs., Cedar Grove, N.J. p 414,415
Blue M Engrg. Co., Blue Island, Ill.
Cober Elctrns., Inc., Stamford, Conn.
Del Elctrns. Corp., Mt. Vernon, N.Y. p 679
Freed Transformer Co., Bklyn., N.Y. p 483
Hewlett-Packard, Palo Alto, Cal.
Hipotronics, Inc., Brewster, N.Y. p 490-493
Hughes Aircraft Co., Frequency Control Devices, Newport Bch., Cal. ..... p 496
Hughes Aircraft Co., Los Angeles, Cal. p 496
Ind'l. Test Equip., Port Washington, N.Y.
Janco Corp., Burbank, Cal.
Kahle Engrg. Co., Union City, N.J.
Kilovolt Corp., Hackensack, N.J.. p 773
Light Elec. Corp., Rancocas, N.J. p 808,809
Opad Elec. Co., Inc., New York, N.Y.
Penn Airborne Prods., Southampton, Pa.
Quan-Tech, Whippany, N.J. ..... p 547
Ross Engrg. Corp., Campbell, Cal.
Slaughter Co., Ardmore, Okla. p 558,559
Spellman High Voltage Elctrns. Corp., Bronx, N.Y. ..... p 873,877
Sticht, Herman H. Co., Inc., New York, N.Y. ..... p 563
Universal Voltronics Corp., Mt. Kisco, N.Y.
Addison Div., Mountainside, N.J.
Anchor Specialty Mfg., Teterboro, N.J.
Astronics, Inc., Dallas, Tex.
Austin Elctrns., Roselle, N.J.
Automation Dynamics, Northvale, N.J.
Avtron Mfg., Inc., Cleveland, Ohio
Barnes & Reinecke, Inc., Chicago, Ill.
Bertan Assocs., Inc., Plainview, N.Y.
Bliss Elctrn. Corp., Sussex, N.J.
Brooks Resch. & Mfg., Inc., Kansas City, Mo.
Canadian Research Institute, Don Mills, Ont., Canada
Century Coil Corp., Chicago, Ill.
Cincinnati Sub-Zero Prods., Cincinnati, Ohio
Clinton Instr. Co., Clinton, Conn.
Cole Instr., Costa Mesa, Cal.
Connolly & Co., Inc., Mt. View, Calif.
Consolidated Ohmic Devices, Carle Pl., N.Y.
Davidson Elctrn. Dev. Co., Erie, Pa.
Dit-MCO International, Kansas City, Mo.
Eastern Specialty Co., Philadelphia, Pa.
Elctrn. Brazing Co., Hackensack, N.J.
Energy Systems, Palo Alto, Cal.
Ferranti Elec., Inc., Plainview, N.Y.
GAR Enterprises, Pasadena, Cal.
Gencom Div., Plainview, N.Y.
Grand Transformers, Grand Haven, Mich.
Hallmark Standards, Inc., Mt. Vernon, N.Y.
Ind'l. Winding Mach., River Edge, N.J.
Instrument Labs. Corp., Chicago, Ill.
Instr. Resch. Co., Lincoln, Mass.
Japanese Prods. Corp., New Rochelle, N.Y.
Keithley Instrs., Inc., Cleveland, Ohio
Knopp, Inc., Oakland, Calif.
Lehighton Elctrns., Inc., Lehighton, Pa.
Micro Instr., Hawthorne, Cal.
Multi-Amp Corp., Cranford, N.J.
Ostby & Barton Co., Providence, R.I.
Peschel Instrs., Cape Coral, Fla.
Randam Elctrns., Inc., Cincinnati, Ohio
Rodale Elctrns., Inc., Garden City, N.Y.
Rohde & Schwarz Sls., Passaic, N.J.
Stark Elctrn. Instrs., Ltd., Ajax, Ont., Canada
Sunshine Sci. Instrs., Inc., Philadelphia, Pa.
Teledyne Semiconductor, Hawthorne, Cal.
Telesciences, Moorestown, N.J.
Velonex, Santa Clara, Calif.
Y.T. & T. Corp., Roslyn Hgts., N.Y.
Yewtec Corporation, Larchmont, N.Y.

Testers, Integrated Circuit (Automatic)

Austron, Inc., Austin, Tex.
Automated Meas., Oakland, Calif.
Barnes Corp., Lansdowne, Pa.
Beckman Instruments, Shiller Pk., Ill.
E-H Resch. Labs., Inc., Oakland, Cal.
Frequency Engrg. Labs., Farmingdale, N.J.
Julie Research Lab., New York, N.Y.
Precision Standards Corp., Santa Ana, Cal. ..... p 544
Quan-Tech, Whippany, N.J.
Tektronix, Inc., Beaverton, Ore.
Teledyne Philbrick, Dedham, Mass. p 1294
AAI Corp., Baltimore, Md.
Adar Assocs., Cambridge, Mass.
Bulova Watch Co., Sys. & Instrs. Div., Valley Stream, N.Y.
CGS Units, Inc., Rochester, N.Y.
Compu-Systems Co., Wakefield, Mass.
Datatron, Inc., Santa Ana, Cal
Daymarc Corp., Waltham, Mass.
Digital Gen'l. Corp., Cleveland, Ohio
Fairchild Semiconductor, Mountain View, Calif.
Fairchild Sys. Technology, Sunnyvale, Cal.
General Radio Co., Concord, Mass.
Headway Research, Inc., Garland, Tex.
Hughes Aircraft Co, Culver City, Cal.
Hughes Aircraft Co, Fullerton, Cal.
Lear Siegler, Inc., Santa Monica, Calif.
Loral Elctrn. Sys., Bronx, N.Y.
Lorlin Inds., Inc., Danbury, Conn.
Mechanical Technology, Inc., Latham, N.Y.
Micro Instr., Hawthorne, Cal.
Micro Tech. Mfg., Inc., Worcester, Mass.
Non-Linear Sys., Inc., Del Mar, Cal.
Optimized Devices Inc., Pleasantville, N.Y.
Pylon Co., Inc., Attleboro, Mass.
REDCOR Corp., Woodland Hills, Cal.
Signetics Corp., Sunnyvale, Calif.
Signetics Meas/Data, Mountain View, Cal.
Stark Elctrn. Instrs., Ltd., Ajax, Ont., Canada
Telectro Sys. Corp., Corona, N.Y.
Teledyne Semiconductor, Hawthorne, Cal.
Telesciences, Moorestown, N.J.
Teradyne, Inc., Boston, Mass.
Test Equip. Corp., Dallas, Tex.
Testex Inc., Sunnyvale, Cal.
Texas Instruments, Inc., Houston, Tex.
Westinghouse Elec. Corp., Pittsburgh, Pa.
Willard Labs. (E), Los Angeles, Cal.
Xintel Corp., Chatsworth, Cal.
Zehntel, Inc., Berkeley, Calif.

Testers, Integrated Circuit (Manual)

A. D. Data Sys., Inc., Rochester, N.Y.
Barnes Corp., Lansdowne, Pa.
Beckman Instruments, Shiller Pk., Ill.
Circon Corp., Goleta, Cal.
Precision Standards Corp., Santa Ana, Cal. ..... p 544
Program Data Co., Torrance, Cal.
Quan-Tech, Whippany, N.J. ..... p 546,547
Tektronix, Inc., Beaverton, Ore.
Teledyne Philbrick, Dedham, Mass. p 1294
Applied Control Co., Fairfield, N.J.
CGS Units, Inc., Rochester, N.Y.
Dataprobe, Inc., So. Hackensack, N.J.
Daymarc Corp., Waltham, Mass.
Emcee Elctrns., Inc., New Castle, Del.
Fairchild Sys. Technology, Sunnyvale, Cal.
Hughes Aircraft Co, Culver City, Cal.
Hughes Aircraft Co, Fullerton, Cal.
Hughes Aircraft Co., Ind'l. Prods. Div./Ind'l. Auto, Oceanside, Cal.
IC Metrics, Eatontown, N.J.
IPT Corp., Mountain View, Cal.
Lehighton Elctrns., Inc., Lehighton, Pa.
Loral Elctrn. Sys., Bronx, N.Y.

Lorlin Inds., Inc., Danbury, Conn.
Micro-Technical Inds., Laguna Beach, Cal.
Micro Tech. Mfg., Inc., Worcester, Mass.
Non-Linear Sys., Inc., Del Mar, Cal.
Optimized Devices Inc., Pleasantville, N.Y.
Ostby & Barton Co., Providence, R.I.
Pulse Monitors, Inc., Moorestown, N.J.
Pylon Co., Inc., Attleboro, Mass.
REDCOR Corp., Woodland Hills, Cal.
Signetics Corp., Sunnyvale, Calif.
Spectrum Dynamics, Inc., Ft. Lauderdale, Fla.
Stark Elctrn. Instrs., Ltd., Ajax, Ont., Canada
Telectro Sys. Corp., Corona, N.Y.
Teledyne Semiconductor, Hawthorne, Cal.
Telesciences, Moorestown, N.J.
Teradyne, Inc., Boston, Mass.
Testex Inc., Sunnyvale, Cal.
Unitron Inds. Corp., Taipei, Taiwan, Republic of China

Testers, Leakage

A. D. Data Sys., Inc., Rochester, N.Y.
Associated Resch., Chicago, Ill. p 404,405
Beckman Instrs., Cedar Grove, N.J. p 414,415
Freed Transformer Co., Bklyn., N.Y. p 483
Hewlett-Packard, Palo Alto, Cal.
Hickok Elect. Instr., Cleveland, Ohio
Hipotronics, Inc., Brewster, N.Y. p 490,491
Hughes Aircraft Co., Frequency Control Devices, Newport Bch., Cal. ..... p 496
Hughes Aircraft Co., Los Angeles, Cal. p 496
Kilovolt Corp., Hackensack, N.J.. p 773
Light Elec. Corp., Rancocas, N.J.
Penn Airborne Prods., Southampton, Pa.
Ross Engrg. Corp., Campbell, Cal.
Slaughter Co., Ardmore, Okla. p 558,559
Aeronautical Div, Bryan, Ohio
Aerotronic Assocs., Inc., Contoocook, N.H.
Automation Dynamics, Northvale, N.J.
Barnes & Reinecke, Inc., Chicago, Ill.
Bell & Howell Co., Pasadena, Calif.
Brooks Resch. & Mfg., Inc., Kansas City, Mo.
Canadian Research Institute, Don Mills, Ont., Canada
CGS/Datametrics, Watertown, Mass.
Clinton Instr. Co., Clinton, Conn.
Dantronics, St. Paul, Minn.
Davidson Elctrn. Dev. Co., Erie, Pa.
Dit-MCO International, Kansas City, Mo.
Erdco Engrg. Corp., Addison, Ill.
Everett/Charles, Inc., Pomona, Cal.
Fairchild Sys. Technology, Sunnyvale, Cal.
GAR Enterprises, Pasadena, Cal.
General Radio Co., Concord, Mass.
Hughes Aircraft Co., Ind'l. Prods. Div., Oceanside, Cal.
Hughes Aircraft Co., Ind'l. Prods. Div./Ind'l. Auto, Oceanside, Cal.
Ind'l. Winding Mach., River Edge, N.J.
Instrument Labs. Corp., Chicago, Ill.
IPT Corp., Mountain View, Cal.
Keithley Instrs., Inc., Cleveland, Ohio
Knopp, Inc., Oakland, Calif.
Magnaflux Corp., Chicago, Ill.
Micro Instr., Hawthorne, Cal.
Northeast Elctrns. Corp., Concord, N.H.
Optimized Devices Inc., Pleasantville, N.Y.
Peschel Instrs., Cape Coral, Fla.
RIL Elctrns., Inc., Southampton, Pa.
Techni-Tool, Inc., Philadelphia, Pa.
Teledyne Semiconductor, Hawthorne, Cal.
Telesciences, Moorestown, N.J.
Teradyne, Inc., Boston, Mass.
Test Equip. Corp., Dallas, Tex.
Vacuum Equip. Div., Newton, Mass.
Varian Assocs., Palo Alto, Cal.
Velonex, Santa Clara, Calif.
Willard Labs. (E), Los Angeles, Cal.
Y.T. & T. Corp., Roslyn Hgts., N.Y.
Yewtec Corporation, Larchmont, N.Y.

Testers, Life, Component

A. D. Data Sys., Inc., Rochester, N.Y.
Associated Testing Labs., Inc., Wayne, N.J. ..... p 388
Blue M Engrg. Co., Blue Island, Ill. p 389
Kilovolt Corp., Hackensack, N.J.
Light Elec. Corp., Rancocas, N.J.
Austin Elctrns., Roselle, N.J.
Barnes & Reinecke, Inc., Chicago, Ill.
Cole Instr., Costa Mesa, Cal.
Custom Sci. Instrs., Inc., Whippany, N.J.
Davidson Elctrn. Dev. Co., Erie, Pa.
Delta Design, La Mesa, Cal
FRL, Marin Controls Co., Belmont, Cal.
Micro Instr., Hawthorne, Cal.
Solatron Enterprises, Inglewood, Calif.
Teledyne Semiconductor, Hawthorne, Cal.
Test Equip. Corp., Dallas, Tex.
Vestal Modern Design Corp., Vestal, N.Y.

Testers, Logarithmic Amplifier

RHG Elctrns. Lab., Farmingdale, N.Y.
Keithley Instrs., Inc., Cleveland, Ohio

Testers, Logic Card

A. D. Data Sys., Inc., Rochester, N.Y.
Automated Meas., Oakland, Calif.
Dynamics Instr. Co., Monterey Pk., Cal.
Hewlett-Packard, Palo Alto, Cal.
Hughes Aircraft Co., Frequency Control Devices, Newport Bch., Cal. ..... p 496
Hughes Aircraft Co., Los Angeles, Cal. p 496
Multitech Data Prods., Monterey Pk., Cal.
Powertec, Chatsworth, Cal.
AAI Corp., Baltimore, Md.
Adar Assocs., Cambridge, Mass.
Applied Control Co., Fairfield, N.J.
Austin Elctrns., Roselle, N.J.
Automation Dynamics, Northvale, N.J.
Aydin Data Systems, Ft. Washington, Pa
Compu-Systems Co., Wakefield, Mass.
Computer Automation, Inc., Newport Beach, Calif.
Conductron Corp., St. Charles, Mo.
Dantronics, St. Paul, Minn.
Dataprobe, Inc., So. Hackensack, N.J.
Datatron, Inc., Santa Ana, Cal
Davidson Elctrn. Dev. Co., Erie, Pa.
Digital Gen'l. Corp., Cleveland, Ohio
Fairchild Sys. Technology, Sunnyvale, Cal.
General Radio Co., Concord, Mass.
Hughes Aircraft Co, Culver City, Cal.
Industrial Inventions, Inc., Monmouth Jct., N.J.
Lehighton Elctrns., Inc., Lehighton, Pa.
Lockheed Aircraft Svce., Special Devices Div., Ontario, Calif.
Loral Elctrn. Sys., Bronx, N.Y.
Optimized Devices Inc., Pleasantville, N.Y.
Pulse Monitors, Inc., Moorestown, N.J.
Tau-Tron, Inc., Lowell, Mass.
Teledyne Semiconductor, Hawthorne, Cal.
Telesciences, Moorestown, N.J.
Teradyne, Inc., Boston, Mass.
Testex Inc., Sunnyvale, Cal.
Texas Instruments, Inc., Houston, Tex.
Willard Labs. (E), Los Angeles, Cal.
Zehntel, Inc., Berkeley, Calif.

Testers, LSI (Automatic)

A. D. Data Sys., Inc., Rochester, N.Y.
Automated Meas., Oakland, Calif.
E-H Resch. Labs., Inc., Oakland, Cal.
AAI Corp., Baltimore, Md.
Adar Assocs., Cambridge, Mass.
Compu-Systems Co., Wakefield, Mass.
Computer Automation, Inc., Newport Beach, Calif.
Dantronics, St. Paul, Minn.
Datatron, Inc., Santa Ana, Cal
Digital Gen'l. Corp., Cleveland, Ohio
Fairchild Semiconductor, Mountain View, Calif.
Fairchild Sys. Technology, Sunnyvale, Cal.
Hughes Aircraft Co, Culver City, Cal.
IPT Corp., Mountain View, Cal.
Lorlin Inds., Inc., Danbury, Conn.
Macrodata, Chatsworth, Cal.
Non-Linear Sys., Inc., Del Mar, Cal.
Optimized Devices Inc., Pleasantville, N.Y.
Tau-Tron, Inc., Lowell, Mass.
Teledyne Semiconductor, Hawthorne, Cal.
Teradyne, Inc., Boston, Mass.
Texas Instruments, Inc., Houston, Tex.
Westinghouse Elec. Corp., Pittsburgh, Pa.
Xintel Corp., Chatsworth, Cal.

Testers, Magnetic Core

A. D. Data Sys., Inc., Rochester, N.Y.
Chronetics, Inc., Mt. Vernon, N.Y.
E-H Resch. Labs., Inc., Oakland, Cal.
Shallcross, Selma, N.C.
Computer Test Corp., Cherry Hill, N.J.
Hallmark Standards, Inc., Mt. Vernon, N.Y.
Horex Elctrns., Inc., Santa Monica, Calif.
Hughes Aircraft Co, Culver City, Cal.
Sunshine Sci. Instrs., Inc., Philadelphia, Pa.

Testers, Magnetron

Cober Elctrns., Inc., Stamford, Conn. p 600
Kilovolt Corp., Hackensack, N.J.
Light Elec. Corp., Rancocas, N.J.
E.F.E. Labs., Inc., Horsham, Pa.
Energy Systems, Palo Alto, Cal.
Faria, Thomas G. Corp., Uncasville, Conn.
Mictron Div. KMS, Inc., Sarasota, Fla.
Sage Labs. Inc., Natick, Mass.

Testers, Material

Associated Resch., Chicago, Ill. .. p 404
Beckman Instrs., Cedar Grove, N.J. p 414
Electro Impulse, Inc., Red Bank, N.J.
Kilovolt Corp., Hackensack, N.J.
Light Elec. Corp., Rancocas, N.J.
Ohio Semitronics, Columbus, Ohio
RFL Inds., Instr. Div., Boonton, N.J.
Schaevitz Engrg., Pennsauken, N.J. p 390
Acromag, Inc., Wixom, Mich.
Ametek/Testing Equip. Sys., Lausdale, Pa.
Andonian Assocs., Inc., Waltham, Mass.
Ann Arbor Div., Ann Arbor, Mich.
Atlas Electric Devices, Chicago, Ill.
Automation Inds., Danbury, Conn.
CGS/Lawrence, Southampton, Pa.
Custom Sci. Instrs., Inc., Whippany, N.J.
Delta Sonics, Hawthorne, Cal
Dillon, W.C. & Co., Van Nuys 340, Calif.
Electromatic Equip. Co., Cedarhurst, N.Y.
GCO, Inc., Ann Arbor, Mich
Honeywell, Apparatus Controls, Mpls., Minn.
Hughes Aircraft Co, Culver City, Cal.
Inspection Systems, Hawthorne, Calif
Instron Corp., Canton, Mass.
Magnaflux Corp., Chicago, Ill.
Magnetic Sys. & Instrs., Worcester, Mass.
Magnetics Sys. & Instrs., Worcester, Mass.
Mechanical Technology, Inc., Latham, N.Y.
Microwave Instrs. Co., Corona del Mar, Calif.
Pacific Scien. Co., City Commerce, Cal.
Peschel Instrs., Cape Coral, Fla.
Rohde & Schwarz Sls., Passaic, N.J.
Sunshine Sci. Instrs., Inc., Philadelphia, Pa.

Testers, Memory—See Testers, Computer Memory

Testers, Meter

Electro Sci. Inds., Portland, Ore.. p 455
Electronic Dev. Corp., Boston, Mass.
General Elec. Co., Schenectady, N.Y.
Hewlett-Packard, Palo Alto, Cal.
Hickok Elect. Instr., Cleveland, Ohio
Jonard Inds. Corp., Bronx, N.Y.
Julie Research Lab., New York, N.Y.
North Hills Elctrns., Inc., Glen Cove, N.Y.
RFL Inds., Instr. Div., Boonton, N.J.
Simpson Elec. Co., Chicago, Ill.
A & M Instrument, Inc., Great Neck, N.Y.
Abbey Elctrns. Div., Plainview, N.Y.
AUL Instrs., Inc., Flushng, N.Y.
Automation Dynamics, Northvale, N.J.
Canadian Research Institute, Don Mills, Ont., Canada
Collins, G.L. Corp., Long Beach, Calif.
Components Specialties, Inc., Freeport, N.Y.
Eastern Specialty Co., Philadelphia, Pa.
Hallmark Standards, Inc., Mt. Vernon, N.Y.
Holt Instr. Labs., Oconto, Wisc.
Idalee Elctrns. Corp., Valley Stream, N.Y.
Jewell Electrical Instrs., Manchester, N.H.
Kikusui Elctrns. Corp., Kawasaki City, Kanagawa-Pref., Japan
Knopp, Inc., Oakland, Calif.
Optimation, Inc., Sun Valley, Calif.
Stark Elctrn. Instrs., Ltd., Ajax, Ont., Canada
States Co., Hartford, Conn.
Sunshine Sci. Instrs., Inc., Philadelphia, Pa.
Weston Instruments, Inc., Newark, N.J.
Yewtec Corporation, Larchmont, N.Y.

Testers, Microphone—See Calibrators, Microphone

Testers, Microwave

Alford Mfg. Co., Winchester, Mass.
American Elctrn. Labs., Inc., Lansdale, Pa.
Cober Elctrns., Inc., Stamford, Conn. p 600
Data-Control Systems, Danbury, Conn.
Electro Impulse, Inc., Red Bank, N.J.
Frequency Engrg. Labs., Farmingdale, N.J. .....p 604,605
Hewlett-Packard, Palo Alto, Cal.
Kilovolt Corp., Hackensack, N.J.
Light Elec. Corp., Rancocas, N.J.
Polarad Elctrn. Instrs., Lake Success, N.Y.
Waveline, Inc., W. Caldwell, N.J.
Weinschel Engrg. Co., Gaithersburg, Md. ..... p 1571
AAI Corp., Baltimore, Md.
AIL, Div. Cutler-Hammer, Inc., Deer Park, N.Y.
AMBAC Inds., Garden City, N.Y.
Anritsu Electric Co., Ltd., Tokyo, Japan
AUL Instrs., Inc., Flushng, N.Y.
Carco Elctrns., Menlo Park, Calif.
Chemalloy Elctrns., Santee, Cal.
Collins Radio Co., Dallas, Tex.
General Microwave Corp., Farmingdale, N.Y.
Guide Inds., Inc., Sun Valley, Calif.
Herley Inds., Inc., Syosset, N.Y.
Hughes Aircraft Co, Culver City, Cal.
Hyletronics Corp., Littleton, Mass.
Loral Elctrn. Sys., Bronx, N.Y.
Magnaflux Corp., Chicago, Ill.
Micro-Tel Corp., Baltimore, Md.
Microlab/FXR, Livingston, N.J.
Pacific Meas., Inc., Palo Alto, Calif.
Philco-Ford Corp., Washington, D.C.
PRD Elctrns., Inc., Westbury, N.Y.
Rantec Div., Calabasas, Calif.
Sage Labs. Inc., Natick, Mass.
Scientific-Atlanta, Inc., Atlanta, Ga.
Servo Corp. America, Hicksville, N.Y.
Sperry Microwave Elctrns., Clearwater, Fla.
Struthers Elctrns. Corp., Mamaroneck, N.Y.
Western Microwave Labs., Los Gatos, Cal.
Westinghouse Elec. Corp., Pittsburgh, Pa.
Wiltron Co., Palo Alto, Calif.
Zehntel, Inc., Berkeley, Calif.
Zeta Labs., Inc., Mountain View, Calif.

Testers, Motor

Scientific Columbus, Columbus, Ohio
Slaughter Co., Ardmore, Okla.
Chatillon John & Sons, Kew Gardens, N.Y.
Delta Products, Inc., Grand Junction, Colo.
Japanese Prods. Corp., New Rochelle, N.Y.
Singer-General Precision, Inc., Little Falls, N.J.
Westberg Mfg. Co., Sonoma, Cal.
Westinghouse Elec. Corp., Pittsburgh, Pa.

Testers, Multipurpose—See Test Sets, Multipurpose

Testers, Potentiometer

Associated Resch., Chicago, Ill.
Computer Instrs., Hempstead, N.Y.
Electro Sci. Inds., Portland, Ore.. p 454
North Hills Elctrns., Inc., Glen Cove, N.Y.
Penn Airborne Prods., Southampton, Pa.
Advance Instr. Corp., Belmar, N. J.
Barber-Colman Co., Industrial Instrs. Div., Rockford, Ill.
Bristol Div, Waterbury, Conn
Freudenberg, B., Inc., New York, N.Y.
Hallmark Standards, Inc., Mt. Vernon, N.Y.
Hy-Cal Engrg., Santa Fe Springs, Cal.
Lewis Engrg. Co., Naugatuck, Conn.
Litton Inds., Mt. Vernon, N.Y.
Solatron Enterprises, Inglewood, Calif.
Taylor Instr. Process Control Div., Rochester, N.Y.
Teledyne Gurley, Troy, N.Y.
Yewtec Corporation, Larchmont, N.Y.

Testers, Power Supply

Astro-Space Labs., Huntsville, Ala
Del Elctrns. Corp., Mt. Vernon, N.Y.
Electronic Dev. Corp., Boston, Mass.
Hipotronics, Inc., Brewster, N.Y. p 491,492

Julie Research Lab., New York, N.Y.
Kepco, Inc., Flushing, N.Y. ..... p 762
Universal Voltronics Corp., Mt. Kisco, N.Y.
Automation Dynamics, Northvale, N.J.
Pacific Meas., Inc., Palo Alto, Calif.
Packer, B. L., Co., Inc., Hicksville, N.Y.
Peschel Instrs., Cape Coral, Fla.
Rodale Mfg. Co., Inc., Emmaus, Pa.
Y.T. & T. Corp., Roslyn Hgts., N.Y.

Testers, Pulse Jitter

Adar Assocs., Cambridge, Mass.
American Data Sys., Canoga Pk., Cal
Anritsu Electric Co., Ltd., Tokyo, Japan
Bertan Assocs., Inc., Plainview, N.Y.
Sage Labs. Inc., Natick, Mass.
Wiltron Co., Palo Alto, Calif.

Testers, Radar

Bird Elctrn., Cleveland, Ohio
Cober Elctrns., Inc., Stamford, Conn.
Frequency Engrg. Labs., Farmingdale, N.J.
Kilovolt Corp., Hackensack, N.J.
Light Elec. Corp., Rancocas, N.J.
Metric Sys., Ft. Walton Beach, Fla. p 359
Vega Precision Labs., Vienna, Va.
Weinschel Engrg. Co., Gaithersburg, Md.
AAI Corp., Baltimore, Md.
Aerospace Resch. Inc., Boston, Mass.
ASC Sys. Corp., Chicago, Ill.
Bedford Div., Bedford, Mass.
Chemalloy Elctrns., Santee, Cal.
E.F.E. Labs., Inc., Horsham, Pa.
Energy Systems, Palo Alto, Cal.
General Microwave Corp., Farmingdale, N.Y.
Guide Inds., Inc., Sun Valley, Calif.
Hughes Aircraft Co, Culver City, Cal.
Hughes Aircraft Co, Fullerton, Cal.
LAD Electro-Sys., Inc., Hicksville, N.Y.
Loral Elctrn. Sys., Bronx, N.Y.
Miller Associates, Mercersburg, Pa.
RCA Govt. & Comm. Sys., Moorestown, N.J.
Sage Labs. Inc., Natick, Mass.
Sperry Microwave Elctrns., Clearwater, Fla.
United Telecontrol Elctrns., Asbury Park, N.J.
Westinghouse Elec. Corp., Pittsburgh, Pa.

Testers, Ratio Voltage

Biddle, James G., Plymouth Meeting, Pa. ..... p 419
Electro Sci. Inds., Portland, Ore. p 454,455
General Resistance, Mt. Vernon, N.Y.
Hewlett-Packard, Palo Alto, Cal.
Hickok Elect. Instr., Cleveland, Ohio
Julie Research Lab., New York, N.Y. p 503
North Atlantic Inds., Plainview, N.Y. p 531
RFL Inds., Instr. Div., Boonton, N.J. p 554
Weinschel Engrg. Co., Gaithersburg, Md. ..... p 1571
A & M Instrument, Inc., Great Neck, N.Y.
B.H. Inds., Los Angeles, Cal.
California Instrs. Co., San Diego, Cal.
Collins, G.L. Corp., Long Beach, Calif.
Hallmark Standards, Inc., Mt. Vernon, N.Y.

Testers, Relay

Associated Resch., Chicago, Ill.
Barnes Corp., Lansdowne, Pa.
Couch S.H. Div., Boston, Mass.
Hathaway Comps., Denver, Colo.
Hi-G, Windsor Locks, Conn.
Jonard Inds. Corp., Bronx, N.Y.
New Prod. Engrg., Wabash, Ind.
North Hills Elctrns., Inc., Glen Cove, N.Y.
Simpson Elec. Co., Chicago, Ill.
Slaughter Co., Ardmore, Okla.
Anchor Specialty Mfg., Teterboro, N.J.
Artisan Elctrns. Corp., Parsippany, N.J.
Avtron Mfg., Inc., Cleveland, Ohio
Bliss Elctrn. Corp., Sussex, N.J.
Canadian Research Institute, Don Mills, Ont., Canada
Eastern Specialty Co., Philadelphia, Pa.
Electro-Standards Labs., Inc., Miami, Fla.
Elgin Elctrns., Waterford, Pa.
Hy-Cal Engrg., Santa Fe Springs, Cal.
Kemper Engrg. Co., Northridge, Cal.
Lab Electro-Acoustique, 92-Rueil, Malmaison, France
Multi-Amp Corp., Cranford, N.J.
Non-Linear Sys., Inc., Del Mar, Cal.
Optimized Devices Inc., Pleasantville, N.Y.
Ostby & Barton Co., Providence, R.I.
Photologic Co., Orange, Cal.
Robertson Instr., Azusa, Cal.
Sigma Instrs., Inc., Braintree, Mass.
Solatron Enterprises, Inglewood, Calif.
States Co., Hartford, Conn.
Struthers-Dunn, Inc., Bettendorf, Iowa
Sunshine Sci. Instrs., Inc., Philadelphia, Pa.
Trepac Corp. America, Englewood, N.J.
Zehntel, Inc., Berkeley, Calif.

Testers, Resistivity

A. D. Data Sys., Inc., Rochester, N.Y.
Associated Resch., Chicago, Ill. .. p 404
Automation Dev., Culver City, Cal.
Beckman Instrs., Cedar Grove, N.J. p 414
Biddle, James G., Plymouth Meeting, Pa. ..... p 419
Boonton Elctrns., Parsippany, N.J.
Hewlett-Packard, Palo Alto, Cal.
Hipotronics, Inc., Brewster, N.Y. .. p 490
North Hills Elctrns., Inc., Glen Cove, N.Y.
Penn Airborne Prods., Southampton, Pa. ..... p 534
Self-Organizing Sys., Inc., Dallas, Tex.
Shallcross, Selma, N.C. ..... p 555
Automation Dynamics, Northvale, N.J.
Ind'l. Winding Mach., River Edge, N.J.
Keithley Instrs., Inc., Cleveland, Ohio
Lehighton Elctrns., Inc., Lehighton, Pa.
Randam Elctrns., Inc., Cincinnati, Ohio
Rohde & Schwarz Sls., Passaic, N.J.
Semimetals, Inc., Westbury, N.Y.
Willard Labs. (E), Los Angeles, Cal.

Testers, Resistor

A. D. Data Sys., Inc., Rochester, N.Y.
Beckman Instrs., Cedar Grove, N.J. p 414
Boonton Elctrns., Parsippany, N.J.
Boonton Electronics Corp., Parsippany, N.J.
Electro Sci. Inds., Portland, Ore. .. p 454
Freed Transformer Co., Bklyn., N.Y. p 481
General Resistance, Mt. Vernon, N.Y.
Hewlett-Packard, Palo Alto, Cal.
Hickok Elect. Instr., Cleveland, Ohio
Ind'l. Test Equip., Port Washington, N.Y.
Julie Research Lab., New York, N.Y. p 503
North Hills Elctrns., Inc., Glen Cove, N.Y.
Penn Airborne Prods., Southampton, Pa. ..... p 534
Quan-Tech, Whippany, N.J. .....p 546,547
RFL Inds., Instr. Div., Boonton, N.J.
Shallcross, Selma, N.C.
Simpson Elec. Co., Chicago, Ill.
Slaughter Co., Ardmore, Okla.
Anchor Specialty Mfg., Teterboro, N.J.
Brunswick Instrs., New Brunswick, N.J.
California Instrs. Co., San Diego, Cal.
Canadian Research Institute, Don Mills, Ont., Canada
Davidson Elctrn. Dev. Co., Erie, Pa.
Daymarc Corp., Waltham, Mass.
Freudenberg, B., Inc., New York, N.Y.
General Radio Co., Concord, Mass.
Hallmark Standards, Inc., Mt. Vernon, N.Y.
Heath Co., Benton Harbor, Mich.
Hy-Cal Engrg., Santa Fe Springs, Cal.
IPT Corp., Mountain View, Cal.
Lehighton Elctrns., Inc., Lehighton, Pa.
Luft Instrs., Inc., Lincoln, Mass.
Mercury Elctrns. Corp., Mineola, N.Y.
Micro Instr., Hawthorne, Cal.
Optimized Devices Inc., Pleasantville, N.Y.
Peschel Instrs., Cape Coral, Fla.
Philips Elctrn. Instrs., Mt. Vernon, N.Y.
Teradyne, Inc., Boston, Mass.

Testers, Servo

Astrosystems, Lake Success, N.Y. p 406,407
Control Technology Co., L.I.C., N.Y.
Ind'l. Control Co., Farmingdale, N.Y. p 1872
Jonard Inds. Corp., Bronx, N.Y.
North Atlantic Inds., Plainview, N.Y. p 530
Advance Instr. Corp., Belmar, N. J.
Aeroflex Labs., Plainview, N.Y.
Ametek/Testing Equip. Sys., Lausdale, Pa.
Anchor Specialty Mfg., Teterboro, N.J.
Auto Control Labs., Los Angeles, Calif.
Bendix, S. Montrose, Pa.
Carbonara, Victor E. Inc., Port Washington, N.Y.
Collins Radio Co., Dallas, Tex.
Lear Siegler, Inc., Santa Monica, Calif.
Orbit Instr. Corp., Syosset, N.Y.
Sanders Assocs., Inc., Manchester, N.H.
Servo Corp. America, Hicksville, N.Y.
Singer-General Precision, Inc., Little Falls, N.J.
Theta Instr. Corp., Fairfield, N.J.
Weston Instrs. Div., Hatboro, Pa
Weston-Transicoil, Worcester, Pa.

Testers, Shock

Blue M Engrg. Co., Blue Island, Ill. p 389
Multitech Microelctrns., Monterey Pk., Cal.
Auto Control Labs., Los Angeles, Calif.
Avco Corp., Cincinnati, Ohio
Avco Elctrns., Tulsa, Okla.
Bendix, Rochester, N.Y.
Bergen Labs., Inc., Paterson, N.J.
Cincinnati Sub-Zero Prods., Cincinnati, Ohio
Hughes Aircraft Co, Culver City, Cal.
Hughes Aircraft Co, Fullerton, Cal.
IMPACT-O-GRAPH Div., Bedford, Ohio
Jan Hardware Mfg. Co., Inc., Long Island City, N.Y.
Kartron Inc., Huntington Beach, Calif.
L.A.B. Corp., Skaneateles, N.Y.
Larson Aero Dev., Concord, Calif.
Ling Elctrns., Anaheim, Calif.
Mechanical Technology, Inc., Latham, N.Y.
Mechanization Assocs., Mt. View, Calif.

Testers, Short-Turn—See Testers, Coil

Testers, Signal Tracing

Astro-Space Labs., Huntsville, Ala
Automated Meas., Oakland, Calif.
Beckman Instrs., Cedar Grove, N.J. p 415
Circon Corp., Goleta, Cal.
Data-Control Systems, Danbury, Conn.
Hewlett-Packard, Palo Alto, Cal.
Hickok Elect. Instr., Cleveland, Ohio
Hughes Aircraft Co., Frequency Control Devices, Newport Bch., Cal. ..... p 496
Hughes Aircraft Co., Los Angeles, Cal. p 496
Program Data Co., Torrance, Cal.
Simpson Elec. Co., Chicago, Ill.
Systron-Donner Corp., Concord, Cal. p 565
Systron-Donner Alpha Div., Oakland, Cal. ..... p 565
Systron-Donner Concord Instr. Div., Concord, Cal. ..... p 565
Systron-Donner Kruse Elctrns. Sub., Mountain View, Cal. ..... p 565
Tektronix, Inc., Beaverton, Ore.
Teledyne Philbrick, Dedham, Mass. p 1294
Automation Dynamics, Northvale, N.J.
Barnes & Reinecke, Inc., Chicago, Ill.
Bliss Elctrn. Corp., Sussex, N.J.
Bright Star Inds., Inc., Clifton, N.J.
Brooks Resch. & Mfg., Inc., Kansas City, Mo.
Canadian Research Institute, Don Mills, Ont., Canada
Collins Radio Co., Dallas, Tex.
Components Specialties, Inc., Freeport, N.Y.
Compu-Systems Co., Wakefield, Mass.
Computer Automation, Inc., Newport Beach, Calif.
Dataprobe, Inc., So. Hackensack, N.J.
Desco Mfg. Co., Glendale, Calif.
Dit-MCO International, Kansas City, Mo.
Dynascan Corp., Chicago, Ill.
Eico Electronic Instrument Co., Inc., Brooklyn, N.Y.
Electronic Meas. Corp., New York, N.Y.
Everett/Charles, Inc., Pomona, Cal.
Heath Co., Benton Harbor, Mich.
Hughes Aircraft Co., Ind'l. Prods. Div., Oceanside, Cal.
Hughes Aircraft Co., Ind'l. Prods. Div./Ind'l. Auto, Oceanside, Cal.
Hunter Tools, El Monte, Calif
Ideal Industries, Inc., Sycamore, Ill.
IE Mfg. Co., Chicago, Ill.
Industrial Inventions, Inc., Monmouth Jct., N.J.
IPT Corp., Mountain View, Cal.
Leader Instr. Corp., Long Island City, N.Y.
Northeast Elctrns. Corp., Concord, N.H.
Ostby & Barton Co., Providence, R.I.
Precision Electronics, Inc., Franklin Park, Ill.
Stark Elctrn. Instrs., Ltd., Ajax, Ont., Canada
Telesciences, Moorestown, N.J.
Ultra Audio Prods., Beverly Hills, Calif.
Willard Labs. (E), Los Angeles, Cal.
Workman Elctrn. Prods., Inc., Sarasota, Fla.

Testers, Solderability—See Machines, Solderability Testing

Testers, Spark

Hipotronics, Inc., Brewster, N.Y.
Slaughter Co., Ardmore, Okla.
Addison Div., Mountainside, N.J.
Clinton Instr. Co., Clinton, Conn.
Ind'l. Winding Mach., River Edge, N.J.

Testers, Synchro Error

Astrosystems, Lake Success, N.Y. p 406-408
North Atlantic Inds., Plainview, N.Y. p 530
Advance Instr. Corp., Belmar, N. J.
Bendix, S. Montrose, Pa.
Clifton Div., Clifton Hgts., Pa.
Computer Conversions Corp., East Northport, N.Y.
Farrand Controls, Inc., Valhalla, N.Y.
Muirhead, Inc., Mountainside, N.J.
Singer-General Precision, Inc., Little Falls, N.J.
Teledyne Gurley, Troy, N.Y.
Theta Instr. Corp., Fairfield, N.J.

Testers, Synchro(Resolver

Astrosystems, Lake Success, N.Y. p 406-408
Control Technology Co., L.I.C., N.Y.
North Atlantic Inds., Plainview, N.Y. p 530
Carbonara, Victor E. Inc., Port Washington, N.Y.
Clifton Div., Clifton Hgts., Pa.
Computer Conversions Corp., East Northport, N.Y.
Muirhead, Inc., Mountainside, N.J.
Projects Unlimited, Inc., Dayton, Ohio
Singer-General Precision, Inc., Little Falls, N.J.
Teledyne Gurley, Troy, N.Y.
Theta Instr. Corp., Fairfield, N.J.

Testers, Tachometer

Advance Instr. Corp., Belmar, N. J.

Testers, Telemetering—See Telemetering Testers & Calibrators

Testers, Telephone

Computer Automation, Inc., Newport Beach, Calif.
Elgin Elctrns., Waterford, Pa.
Wiltron Co., Palo Alto, Calif.
Y.T. & T. Corp., Roslyn Hgts., N.Y.
Zehntel, Inc., Berkeley, Calif.

Testers, Teletypewriter

Dynamics Instr. Co., Monterey Pk., Cal.
American Data Sys., Canoga Pk., Cal
Dataprobe, Inc., So. Hackensack, N.J.
Diamond Repeater Co., Madison, N.J.
Digitech Data Inds., Inc., Ridgefield, Conn.
Lab Electro-Acoustique, 92-Rueil, Malmaison, France
Singer - Tele-Signal, Woodbury, N.Y.
Telemodem, Inc., Queens Village, N.Y.
Y.T. & T. Corp., Roslyn Hgts., N.Y.

Testers, Tensile—See Testers, Material

Testers, Torque

Jonard Inds. Corp., Bronx, N.Y.
Matrix Corp., Beech Grove, Ind.
Ametek/Testing Equip. Sys., Lausdale, Pa.
Anchor Specialty Mfg., Teterboro, N.J.
Applied Control Co., Fairfield, N.J.
Bendix, Utica, N.Y.
BLH Elctrns., Inc., Waltham, Mass.
Bowmar/Ali, Inc., Acton, Mass.
Chatillon John & Sons, Kew Gardens, N.Y.
Cole-Parmer Instr. Co., Chicago, Ill.
Dillon, W.C. & Co., Van Nuys 340, Calif.
Falcon Div., Wilmington, Mass.
General Thermodynamics Corp., Wilmington, Mass.
Himmelstein, S. & Co., Elk Grove Village, Ill.
Instron Corp., Canton, Mass.
Kahn & Co., Inc., Wethersfield, Conn.
Magtrol, Inc., Buffalo, N.Y.
McFadden Elctrns. Co., South Gate, Calif.
Owatonna Tool Co., Owatonna, Minn.
Power Instrs., Skokie, Ill.
Snap-On Tools Corp., Kenosha, Wisc.
Sunshine Sci. Instrs., Inc., Philadelphia, Pa.
Techni-Tool, Inc., Philadelphia, Pa.
Tyco Instr. Div., Waltham, Mass.
Vibrac Corp., Chelmsford, Mass.
Waters Mfg., Inc., Wayland, Mass.
West Coast Resch. Corp., Los Angeles, Calif.

Testers, Tracking & Erosion Resistance (Insulation)

Beckman Instrs., Cedar Grove, N.J. p 415
Hallmark Standards, Inc., Mt. Vernon, N.Y.

Testers, Transistor

American Elctrn. Labs., Inc., Lansdale, Pa.
Automated Meas., Oakland, Calif.
Barnes Corp., Lansdowne, Pa.
Hewlett-Packard, Palo Alto, Cal.
Hickok Elect. Instr., Cleveland, Ohio p 489
Precision Standards Corp., Santa Ana, Cal. ..... p 544
Quan-Tech, Whippany, N.J. .....p 546,547
RCA Elctrns. Comps., Harrison, N.J. p 550,551
Syracuse Elctrns. Corp., Syracuse, N.Y.
Systron-Donner Concord Instr. Div., Concord, Cal.
Tektronix, Inc., Beaverton, Ore.
Triplett Elec. Instr. Co., Bluffton, Ohio
Abbey Elctrns. Div., Plainview, N.Y.
Beckman Instrs., (AISSD), Fullerton, Cal.
Britec Ltd., London, W.C.2, England
Bulova Watch Co., Sys. & Instrs. Div., Valley Stream, N.Y.
Components Specialties, Inc., Freeport, N.Y.
Custom Sci. Instrs., Inc., Whippany, N.J.
Dantronics, St. Paul, Minn.
Daymarc Corp., Waltham, Mass.
Desco Mfg. Co., Glendale, Calif.
Dynascan Corp., Chicago, Ill.
Eico Electronic Instrument Co., Inc., Brooklyn, N.Y.
Electronic Meas. Corp., New York, N.Y.
Fairchild Semiconductor, Mountain View, Calif.
Fairchild Sys. Technology, Sunnyvale, Cal.
Gencom Div., Plainview, N.Y.
General Microwave Corp., Farmingdale, N.Y.
Gralex Inds., Inc., Farmingdale, N.Y.
Heath Co., Benton Harbor, Mich.
Hy-Cal Engrg., Santa Fe Springs, Cal.
IC Metrics, Eatontown, N.J.
IPT Corp., Mountain View, Cal.
Leader Instr. Corp., Long Island City, N.Y.
Lecroy Resch. Sys. Corp., West Nyack, N.Y.
Levell Electronics Ltd., High Barnet, Herts,, England
Loranger Mfg. Corp., Warren, Pa.
Lorlin Inds., Inc., Danbury, Conn.
MacDonald & Co., Glendale, Calif.
Mechanization Assocs., Mt. View, Calif.
Micro Tech. Mfg., Inc., Worcester, Mass.
Optimized Devices Inc., Pleasantville, N.Y.
Philco-Ford Corp., Washington, D.C.
Rohde & Schwarz Sls., Passaic, N.J.
Spectra Sonics, Ogden, Utah
Stark Elctrn. Instrs., Ltd., Ajax, Ont., Canada
Teledyne Semiconductor, Hawthorne, Cal.
Telvac Instr. Co., Van Nuys, Cal.
Teradyne, Inc., Boston, Mass.
Test Equip. Corp., Dallas, Tex.
Velonex, Santa Clara, Calif.
Wakefield Engrg., Inc., Wakefield, Mass.
Workman Elctrn. Prods., Inc., Sarasota, Fla.

Testers, Transmission & Delay

Data-Control Systems, Danbury, Conn.
Hewlett-Packard, Palo Alto, Cal.
Marconi Instrs., Englewood, N.J... p 521
Anritsu Electric Co., Ltd., Tokyo, Japan
Bowmar/Ali, Inc., Acton, Mass.
Edison Elctrns. Div., Manchester, N.H.
Microwave Div, Nashua, N.H.
Northeast Elctrns. Corp., Concord, N.H.
Phelps Dodge Comm., North Haven, Conn.
Philco-Ford Corp., Washington, D.C.
Railway Comm., Raytown, Mo.
Sage Labs. Inc., Natick, Mass.
Siemens Corp., Comps. Div., Iselin, N.J.
Singer - Tele-Signal, Woodbury, N.Y.
Wandel & Goltermann, E. Hanover, N.J.
Waveforms, No. Hollywood, Cal.
Wiltron Co., Palo Alto, Calif.
Zehntel, Inc., Berkeley, Calif.

Testers, Tube

Cober Elctrns., Inc., Stamford, Conn. p 600
Hickok Elect. Instr., Cleveland, Ohio p 489
Allied Elctrns. Corp., Chicago, Ill.
American Elctrn. Controls Co., Barrington, N.J.
Dynascan Corp., Chicago, Ill.
Eico Electronic Instrument Co., Inc., Brooklyn, N.Y.
Electronic Meas. Corp., New York, N.Y.
Fedtro, Inc., Rockville Centre, N.Y.
Gencom Div., Plainview, N.Y.
GTE Sylvania Inc., Seneca Falls, N.Y.
Heath Co., Benton Harbor, Mich.
Jackson Elec. Instr. Co., Mineola, N.Y.
Joliet Control Corp., Joliet, Ill.
LAD Electro-Sys., Inc., Hicksville, N.Y.
Lattin Radio Labs., Owensboro, Ky.
Mercury Elctrns. Corp., Mineola, N.Y.
RIL Elctrns., Inc., Southampton, Pa.
Scientronics, Barrington, N.J.
Seco Elctrns. Corp., Hopkins, Minn.
Stark Elctrn. Instrs., Ltd., Ajax, Ont., Canada
Viz Mfg. Co., Philadelphia, Pa.
Weltronic Co., Southfield, Mich.

Testers, Universal

Frequency Engrg. Labs., Farmingdale, N.J. ..... p 605
Hewlett-Packard, Palo Alto, Cal.
Julie Research Lab., New York, N.Y.
Simpson Elec. Co., Chicago, Ill.
Adar Assocs., Cambridge, Mass.
Ametek/Testing Equip. Sys., Lausdale, Pa.
Anchor Specialty Mfg., Teterboro, N.J.
Applied Systems Corp., Detroit, Mich
Automation Dynamics, Northvale, N.J.
Chatillon John & Sons, Kew Gardens, N.Y.
Dataprobe, Inc., So. Hackensack, N.J.
De Soto Elec. Prods., De Soto, Mo.
Dillon, W.C. & Co., Van Nuys 340, Calif.
Electronic Meas. Corp., New York, N.Y.
Instron Corp., Canton, Mass.
Instrument Data Products, Camarillo, Cal.
RCA Govt. & Comm. Sys., Moorestown, N.J.
Telesciences, Moorestown, N.J.
Wakefield Engrg., Inc., Wakefield, Mass.

Testers, Vibration—See Vibration Test Systems

Testers, Voltage Breakdown

Associated Resch., Chicago, Ill. .. p 404
Beckman Instrs., Cedar Grove, N.J. p 415
Cober Elctrns., Inc., Stamford, Conn.
Del Elctrns. Corp., Mt. Vernon, N.Y.
General Elec. Co., Schenectady, N.Y.
Hipotronics, Inc., Brewster, N.Y. p 490-493
Hughes Aircraft Co., Frequency Control Devices, Newport Bch., Cal. ..... p 496
Hughes Aircraft Co., Los Angeles, Cal. p 496
ITT Jennings, Div. Int'l. Telephone & Telegraph Corp., San Jose, Cal. p 501
ITT Jennings, Dunellen,, N.J. ..... p 501
Kahle Engrg. Co., Union City, N.J.
Kilovolt Corp., Hackensack, N.J... p 773
Light Elec. Corp., Rancocas, N.J.
Slaughter Co., Ardmore, Okla. p 558,559
Tektronix, Inc., Beaverton, Ore.
Vector Elctrn. Co., Inc., Sylmar, Cal.
Addison Div., Mountainside, N.J.
Automation Dynamics, Northvale, N.J.
Avtron Mfg., Inc., Cleveland, Ohio
Bertan Assocs., Inc., Plainview, N.Y.
Canadian Research Institute, Don Mills, Ont., Canada
Clinton Instr. Co., Clinton, Conn.
Cole Instr., Costa Mesa, Cal.
Electrical Instr. Svc., Inc., Mt. Vernon, N.Y.
Freudenberg, B., Inc., New York, N.Y.
Instrument Labs. Corp., Chicago, Ill.
Instr. Resch. Co., Lincoln, Mass.
IPT Corp., Mountain View, Cal.
Japanese Prods. Corp., New Rochelle, N.Y.
Kikusui Elctrns. Corp., Kawasaki City, Kanagawa-Pref., Japan
Lehighton Elctrns., Inc., Lehighton, Pa.
Micro Instr., Hawthorne, Cal.
Microdot Inc., S. Pasadena, Calif.
Peschel Instrs., Cape Coral, Fla.
Randam Elctrns., Inc., Cincinnati, Ohio
Sunshine Sci. Instrs., Inc., Philadelphia, Pa.
Teledyne Semiconductor, Hawthorne, Cal.
Telesciences, Moorestown, N.J.
Teradyne, Inc., Boston, Mass.
Velonex, Santa Clara, Calif.

Testing, Environmental—See Services, Environmental Testing—Vol 3

Thermistors—See Vol 2

Thermo Compression Bonding Equipment

Sprague Elec. Co., No. Adams, Mass.
Automatic Die Cutting Mach. Co., New York, N.Y.
Hughes Aircraft Co, Culver City, Cal.
Hughes Aircraft Co, Fullerton, Cal.
Hughes Aircraft Co., Vacuum Tube Prods. Div/Welding Equip., Oceanside, Calif.
Joy Mfg. Co., New Phila., Ohio
Micro Tech. Mfg., Inc., Worcester, Mass.
Unitek Corp., Monrovia, Calif.

Thermocouple Reference Junctions—See Vol 2

Thermocouples, Elements & Accessories—See Vol 2

Thermocouples, Vacuum-Also See Thermocouples, Elements & Accessories—See Vol 2

Thermocouple Devices & Materials—See Cooling/Heating Modules, Thermoelectric—Vol 2

Thermoelectric Generators—See Generators, Thermoelectric—Vol 2

Thermometers, Medical, Electronic

Bailey Instrs., Inc., Saddle Brook, N.J.
Electronic Design Labs., Inc., Phila., Pa.
High Temperature Instr., W. Conshohocken, Pa.
Omega Engrg., Inc., Stamford, Conn.
Relco Prods., Denver, Colo.
United Elec. Controls Co., Watertown, Mass.

Thermometers, Resistance—See Vol 2

Thermopiles—See Vol 2

Thermostats-Also See Switches, Thermally Actuated; Controls, Temperature—See Vol 2

Thin-Film Memory Systems, Planar—See Memory Systems

Thyratrons—See Tubes, Thyratron—Vol 2

Thyristors (Includes Silicon Controlled Rectifiers)—See Vol 2

Ties, Wire & Cable—See Wire & Cable Ties—Vol 3

Timer Switches—See Switches, Time Delay—Vol 2

Timers, Coin Operated—See Vol 2

Timers, Counting—See Vol 2

Timers, Cycle—See Vol 2

Timers, Electrolytic Cell—See Vol 2

Timers, Impulse—See Vol 2

Timers, Interval—See Vol 2

Timers, Programmed—See Vol 2

Timers, Reset—See Vol 2

Timers, Sequence—See Vol 2

Timers, Solid State—See Vol 2

Timers, Thermal—See Vol 2

Timers, Welding (Electronic)

(NES) Nationwide Elctrn. Sys., Itasca, Ill.
Precision Timer, Westbrook, Conn.
Syracuse Elctrns. Corp., Syracuse, N.Y. p 1348
Triac Elctrn. Sys., N.Y., N.Y.
Aemco Div., Mankato, Minn.
Agastat Div., Elizabeth, N.J.
Air-O-Tronics Prods., Morrisville, N.Y.
Artisan Elctrns. Corp., Parsippany, N.J.
Coil Co. of Amer., Northvale, N.J.
Ewald Instrs. Corp., Kent, Conn.
Hughes Aircraft Co., Vacuum Tube Prods. Div/Welding Equip., Oceanside, Calif.
Price & Rutzebeck, Hayward, Calif.
Raymond Controls Corp., Middletown, Conn.
Robotron Corp., Detroit, Mich.
Square D Co., Park Ridge, Ill.
Taylor-Winfield Corp., Warren, Ohio
Tempo Instr., Plainview, N.Y.
Unitek Corp., Monrovia, Calif.
Weltronic Co., Southfield, Mich.

Timing Switches—See Timers —Vol 2

Tinsel—See Wire, Tinsel—Vol 3

Tonometers

Biotronics, Inc., Redding, Cal.

Tool Kits & Sets—See Vol 3

Tools, Alignment & Tuning—See Vol 3

Tools, Crimping—See Vol 3

Tools, Hand Or Mechanical—See Cutters; Screwdrivers; Wrenches; etc.—Vol 3

Tools, Heat Sealing

Berg Elctrns., Inc., New Cumberland, Pa.
Automatic Die Cutting Mach. Co., New York, N.Y.
Cam-Lok Div., Cincinnati, Ohio
Harwil Co., Santa Monica, Calif.
MacDonald & Co., Glendale, Calif.
Techni-Tool, Inc., Philadelphia, Pa.

Tools, Microelectronic Handling—See Vol 3

Tools, Parts-Handling, Vacuum Operated—See Vol 3

Tools, Relay Servicing—See Vol 3

Tools, Resistance Soldering—See Soldering Equip., Resistance—Vol 3

Tools, Soldering—See Specific Types—Vol 3

Tools, Swaging—See Vol 3

Toroids—See Coils, Toroidal—Vol 3

Torque Indicators—See Indicators, Torque

Torque Meters—See Indicators, Torque

Torque Testers—See Testers, Torque

Torquers, Gyro—See Motors, Gyro—Vol 2

Totalizers, Digital

Anadex Instrs., Inc., Van Nuys, Calif. p 391-393
Atec, Inc., Houston, Tex. ..... p 410
Automation Dev., Culver City, Cal.
Digital Equip. Corp., Maynard, Mass.
Dytro Corp., Hicksville, N.Y.
Eagle-Signal Div., Davenport, Iowa
Eldorado Electrodata, Concord, Cal. p 449
Electro-Numerics, Santa Clara, Cal.
Geo Space Sys., Tampa, Fla. ..... p 350
Haydon, A. W. Co., Waterbury, Conn.
Hecon Corp., New Shrewsbury, N.J. p 1332
Hewlett-Packard, Palo Alto, Cal.
Hickok Elect. Instr., Cleveland, Ohio
Kessler-Ellis Prods., Atlantic Highlands, N.J. ..... p 1336
Monitor Labs, Inc., San Diego, Cal. p 364
Monsanto Company, Electronic Instruments, W. Caldwell, N.J. .... p 528
(NES) Nationwide Elctrn. Sys., Itasca, Ill.
Norden Div., Norwalk, Conn.
Parabam, Inc., Compton, Cal. ..... p 371
Pennwood Numechron, Pittsburgh, Pa. p 372
Pinlites, Fairfield, N.J.
PPM, Inc., Bedford, Ohio ..... p 535
Precision Timer, Westbrook, Conn.
Presin Co., Inc., Shelton, Conn.
Systron-Donner Concord Instr. Div., Concord, Cal.
Tektronix, Inc., Beaverton, Ore.
Veeder-Root, Hartford, Conn..... p 1352
Acoustronics, Inc., Huntington, N.Y.
Acromag, Inc., Wixom, Mich.
Allis, Louis Co., Milwaukee, Wisc.
Applied Control Co., Fairfield, N.J.
Bristol Div, Waterbury, Conn
Burroughs Corp., Plainfield, N.J.
CGS/Datametrics, Watertown, Mass.
Collins Radio Co., Dallas, Tex.
Controlcraft Corp., West Chicago, Ill.
Datum, Inc., Anaheim, Calif.
Davidson Elctrn. Dev. Co., Erie, Pa.
Digital Displays, Mendham, N.J.
Dynapar Corp., Gurnee, Ill.
Elctrns., Ltd., Marion, Iowa
ENM Co., Chicago, Ill.
Ferranti Elec., Inc., Plainview, N.Y.
Fischer & Porter Co., Warminster, Pa.
Flow Technology, Inc., Tempe, Ariz.
Foxboro Co., Foxboro, Mass.
Industrial Timer Div., Parsippany, N.J.
Innovatek Enterprise, Millerton, N.Y.
Instrumentation Tech. Corp., Northridge, Calif.
Intercontinental Elctrns., E. Rochester, N.Y.
Jersey Tech. Conslts., Morristown, N.J.
Keltron Corp., Waltham, Mass.
Kingmann-White, Inc., Placentia, Calif.
McNab, Inc., New York, N.Y.
Moore Inds., Van Nuys, Cal.
Neutronic Corp., Bridgeton, Mo.
Rowan Controller, Westminister, Md.
Struthers-Dunn, Inc., Bettendorf, Iowa
Theta Instr. Corp., Fairfield, N.J.
Toledo Scale, Toledo, Ohio
United Aircraft Corp., Norwalk, Conn.
Weston-Transicoil, Worcester, Pa.
Zehntel, Inc., Berkeley, Calif.

Tote Boxes—See Boxes, Component / Subassembly Handling—Vol 3

Tower Erection & Maintenance Services—See Services, Tower Erection & Maintenance

Towers, Antenna—See Antenna Towers

Tracers, Curve, Tube & Transistor

American Elctrn. Labs., Inc., Lansdale, Pa.
Systron-Donner Concord Instr. Div., Concord, Cal.
Tektronix, Inc., Beaverton, Ore.
Datalogic Sys., Inc., Merrimac, Mass.
Spectra Sonics, Ogden, Utah

Tracers, Signal—See Testers, Signal Tracing

Tracers, Voltage Curve

Tektronix, Inc., Beaverton, Ore.

Tracking Systems

Control Technology Co., L.I.C., N.Y.
Geo Space Sys., Tampa, Fla. ..... p 608
Ind'l. Control Co., Farmingdale, N.Y.
Metric Sys., Ft. Walton Beach, Fla.p 358
Parabam, Inc., Compton, Cal. ..... p 371
Vega Precision Labs., Vienna, Va.
Aeroflex Labs., Plainview, N.Y.
Alden Elctrn. & Impulse Record. Equip., Westboro, Mass.
ASC Sys. Corp., Chicago, Ill.
Barnes Engrg. Co., Stamford, Conn.
Beukers Labs., Inc., Hauppauge, N.Y.
Electrac, Inc., Anaheim, Calif.
EMR Div., Princeton, N.J.
GTE Sylvania Inc., Elctrn. Sys. Gp., Waltham, Mass.
Honeywell, Aerospace & Def., Minneapolis, Minn.
Hughes Aircraft Co, Culver City, Cal.
Hughes Aircraft Co, Fullerton, Cal.
ITT Aerospace, San Fernando, Cal.
Kollsman Instr. Corp., Syosset, N.Y.
Lear Siegler, Inc., Santa Monica, Calif.
Measurement Sys., Inc., Norwalk, Conn.
Motorola, Scottsdale, Ariz.
Optron Corp., Woodbridge, Conn.
Philco-Ford Corp., Washington, D.C.
Philips Broadcast Equipment Corp., Montvale, N.J.
Photo-Sonics, Inc., Burbank, Calif.
Radiation Sys., Inc., McLean, Va.
Rantec Div., Calabasas, Calif.
RCA Govt. & Comm. Sys., Moorestown, N.J.
Schoeffel Instr. Corp., Westwood, N.J.
Servo Corp. America, Hicksville, N.Y.
Spectral Dynamics Corp. San Diego, San Diego, Cal.
Straza Inds., El Cajon, Calif.
Westinghouse Elec. Corp., Pittsburgh, Pa.

Trailers, Instrumentation—See Laboratories, Mobile & Field

Trainers—See Simulators & Trainors

Transceivers, Airborne

Vega Precision Labs., Vienna, Va.
ACR Elctrns. Div., Carle Place, N.Y.
Aerocom, Miami, Fla.
Aeronautical Comm. Equip. Inc., Miami, Fla.
A.R.F. Products, Inc., Raton, N.M.
Arvin Sys., Inc., Dayton, Ohio
ASC Sys. Corp., Chicago, Ill.
Avco Corp., Cincinnati, Ohio
Brelonix, Inc., Seattle, Wash
Collins Radio Co., Cedar Rapids, Iowa
Collins Radio Co., Dallas, Tex.
Elctrn. Comm., Inc., St. Petersburg, Fla.
General Instr. Corp., Hicksville, N.Y.
GTE Sylvania Inc., Elctrn. Sys. Gp., Waltham, Mass.
Instru-Lec Corp., Mt. Vernon, N.Y.
ISC/Telephonics Div, Huntington, N.Y.
ITT Avionics Div, Nutley, N.J.
King Radio Corp., Olathe, Kans.
La Pointe Inds., Inc., Rockville, Conn.
Linear Sys., Inc., Watsonville, Calif.
Loral Elctrn. Sys., Bronx, N.Y.
Mobil Elctrns., Inc., Anderson, Ind.
Narco Avionics, Ft. Washington, Pa.
RCA Govt. & Comm. Sys., Moorestown, N.J.
Regency Elctrns., Inc., Indianapolis, Ind.
RF Communications, Inc., Rochester, N.Y.
Special Microwave Devices Oper., Waltham, Mass.
Sunair Elctrn., Inc., Ft. Lauderdale, Fla.

Transceivers, Facsimile

Nippon Electric/NEC America, N.Y., N.Y.
Alden Elctrn. & Impulse Record. Equip., Westboro, Mass.
Anritsu Electric Co., Ltd., Tokyo, Japan
Hughes Aircraft Co, Fullerton, Cal.
International Scanatron Sys., Wyandanch, N.Y.
Muirhead, Inc., Mountainside, N.J.
Philco-Ford Corp., Washington, D.C.

Transceivers, Infrared—See Vol 2

Transceivers, Single-Sideband

Delco Elctrns. Div., Kokomo, Ind.
Alden Elctrn. & Impulse Record. Equip., Westboro, Mass.
AMBAC Inds., Garden City, N.Y.
Anritsu Electric Co., Ltd., Tokyo, Japan
Arvin Sys., Inc., Dayton, Ohio
Avco Corp., Cincinnati, Ohio
Brelonix, Inc., Seattle, Wash
Collins Radio Co., Cedar Rapids, Iowa
Collins Radio Co., Dallas, Tex.
Drake, R.L., Co., Miamisburg, Ohio
Eico Electronic Instrument Co., Inc., Brooklyn, N.Y.
Elctrn. Comm., Inc., St. Petersburg, Fla.
General Dynamics, San Diego, Cal.
General Instr. Corp., Hicksville, N.Y.
General Radiotelephone Co., Burbank, Cal.
GTE Sylvania Inc., Elctrn. Sys. Gp., Waltham, Mass.
Hammarlund Mfg. Co., Red Bank, N.J.
Heath Co., Benton Harbor, Mich.
Hughes Aircraft Co, Culver City, Cal.
Hughes Aircraft Co, Fullerton, Cal.
Kahn Resch. Labs., Inc., Freeport, N.Y.
Linear Sys., Inc., Watsonville, Calif.
Lion Precision Div., Newton, Mass.
Rank Precision Inds., W. Nyack, N.Y.
Raytheon Data Systems Co., Norwood, Mass.
RCA Corp., Camden, N.J.
RCA Govt. & Comm. Sys., Moorestown, N.J.
Regency Elctrns., Inc., Indianapolis, Ind.
RF Communications, Inc., Rochester, N.Y.
Sunair Elctrn., Inc., Ft. Lauderdale, Fla.
Technical Mat'l., Mamaroneck, N.Y.
Thomson-CSF Inc., New York, N.Y.
Weitermann Elctrns., Milwaukee, Wisc.

Transcription Arms—See Phonograph Arms, Transcription

Transducers, Acceleration—See Accelerometers—Vol 2

Transducers, Displacement—See Vol 2

Transducers, Flow—See Vol 2

Transducers, Force—See Vol 2

Transducers, Impedance—See Vol 2

Transducers, Incremental Digital Position, Rotary—See Vol 2

Transducers, Magnetic Pickup—See Vol 2

Transducers, Power—See Transducers, Volt, Watt, Currents, etc.—Vol 2

Transducers, Pressure—See Vol 2

Transducers, Sonar—See Vol 2

Transducers, Sound Velocity—See Vol 2

Transducers, Strain Gauge—See Vol 2

Transducers, Temperature—See Vol 2

Transducers, Thermoelectric—See Transducers, Temperature—Vol 2

Transducers, Torque—See Vol 2

Transducers, Ultrasonic—See Vol 2

Transducers, Velocity—See Vol 2

Transducers, Vibration—See Vol 2

Transducers Volt, Watt, Current, Var, Power Factor, Frequency—See Vol 2

Transformers, Audio—See Vol 3

Transformers, Autotransformer—See Vol 3

Transformers, Bias—See Vol 3

Transformers, Bridging—See Vol 3

Transformers, Chopper—See Vol 3

Transformers, Constant Voltage—See Vol 3

Transformers, Control—See Vol 3

Transformers, Converter, D-C To D-C—See Vol 3

Transformers, Current—See Transformers, Instrument—Vol 3

Transformers, Decade—See Vol 3

Transformers, Differential—See Vol 3

Transformers, Discriminator—See Vol 3

Transformers, Donut—See Transformers, Toroidal—Vol 3

Transformers, Driver—See Vol 3

Transformers, Filament—See Vol 3

Transformers, 400 CPS—See Vol 3

Transformers, Flyback—See Vol 3

Transformers, HV—See Vol 3

Transformers, I-F—See Vol 3

Transformers, Input—See Vol 3

Transformers, Instrument—See Vol 3

Transformers, Interstage—See Vol 3

Transformers, Isolation—See Vol 3

Transformers, Line—See Vol 3

Transformers, Magnetic Amplifier—See Transformers, Saturable—Vol 3

Transformers, Matching—See Vol 3

Transformers, Matrix—See Vol 3

Transformers, Mercury Vapor—See Vol 3

Transformers, Metered—See Vol 3

Transformers, Microphone—See Vol 3

Transformers, Miniature, Subminiature & Microminiature—See Vol 3

Transformers, Mixing—See Vol 3

Transformers, Modulation—See Vol 3

Transformers, Output—See Vol 3

Transformers, Phase Conversion—See Vol 3

Transformers, Photoflash Power—See Vol 3

Transformers, Plate—See Vol 3

Transformers, Power—See Vol 3

Transformers, Printed Circuit Mounting—See Vol 3

Transformers, Pulse—See Vol 3

Transformers, Rectifier—See Vol 3

Transformers, Reference—See Vol 3

Transformers, R-F—See Vol 3

Transformers, Rotary—See Vol 3

Transformers, Saturable—See Vol 3

Transformers, Servo—See Vol 3

Transformers, Step-Down, Step-Up—See Vol 3

Transformers, Toroidal—See Vol 3

Transformers, Transistor—See Vol 3

Transformers, Ultrasonic—See Vol 3

Transformers, Variable—See Vol 3

Transformers, Vibrator—See Vol 3

Transformers, Voltage-Dividing

ADC Prods., Minneapolis, Minn.
Amperex Elctrn. Corp., Hauppauge, N.Y. p 2482
Astrosystems, Lake Success, N.Y. p 406
Bulova Watch Co., Freq. Control Prods., Elctrns. Div., Woodside, N.Y.
Coast Coil Co., Los Angeles, Calif.
Dale Elctrns., Inc., Yankton, S.D.
Del Elctrns. Corp., Mt. Vernon, N.Y.
Dranetz Engrg. Labs., Plainfield, N.J.
Electro Sci. Inds., Portland, Ore. p 2919
Ferrodyne Corp., Venice, Calif.
Freed Transformer Co., Bklyn., N.Y.
General Elec. Co., Schenectady, N.Y.
Lambda Elctrns., Melville, N.Y.
Light Elec. Corp., Rancocas, N.J.
Microtran Co., Valley Stream, N.Y.
North Atlantic Inds., Plainview, N.Y.
North Hills Elctrns., Inc., Glen Cove, N.Y. p 2967
NWL Transformers, Trenton, N.J.
Perkin-Elmer Corp., Wilton, Conn.
Pico Elctrns Inc., Mount Vernon, N.Y.
Signal Transformer, Bklyn., N.Y.
Torotel, Inc., Grandview, Mo.
Torwico Elctrns., Inc., Lakewood, N.J.
United Transformer Co. Div. of TRW Inc., New York, N.Y.
Unitron, Garland, Tex.
Zaring Inds., Inc., Carmel, Ind.
Altec, Anaheim, Calif.
American Magnetics Corp., Carterville, Ill.
American Rectifier Corp., College Point, N.Y.
Automatic Control Elctrns. Co., San Antonio, Tex.
Basler Elec. Co., Highland, Ill.
Bourns Pacific Magnetic Corp., Romoland, Calif.
Bullock Magnetics Corp., Pomona, Calif.
C.B.C. Inds., Inc., Ft. Washington, Pa.
Central Transformer Co., Chicago, Ill.
Century Coil Corp., Chicago, Ill.
Coil Co. of Amer., Northvale, N.J.
Consolidated Transformers Unltd., San Gabriel, Cal.
Coral Magnetics Co., Farmingdale, N.Y.
Dittmore-Freimuth Corp., Milwaukee, Wisc.
Dormeyer Inds., Chicago, Ill.
Edko Elctrns., Inc., Brooklyn, N.Y.
Elctrn. Coils, Springfield, Mass.
Elctrn. Transformer Corp., Paterson, N.J.
Elnetic Elctrns., Inc., Venice, Cal.
Epco Prods., Inc., Wallkill, N.Y.
Ferranti Ltd., Hollinwood, Lancs., England
Foster Transformer Co., Cincinnati, Ohio
General Radio Co., Concord, Mass.
GTE Sylvania Inc., Danvers, Mass.
Guildline Instrs., Inc., Larchmont, N.Y.
Hallmark Standards, Inc., Mt. Vernon, N.Y.
Hammond Mfg. Co., Ltd., Guelph, Ont., Can.
Hughes Aircraft Co, Culver City, Cal.
Idalee Elctrns. Corp., Valley Stream, N.Y.
Invertronics, Pine Brook, N.J.
JB Elctrn. Transformers, Inc., Chicago, Ill.
Johnson Elec. Coil Co., Elmhurst, Ill.
Magnetic Circuit Elements, Monterey, Cal.
Magnetico, Inc., E. Northport, N.Y.
Nat'l. Coil Co., Douglas, Ariz.
Nytronics, Inc., Alpha, N.J.
Oeco Corp., Portland, Ore.
Olektron Corp., Dudley, Mass.
Optimation, Inc., Sun Valley, Calif.
Polyphase Instr. Co., Bridgeport, Pa.
Precision Elctrns. Corp., Marshfield, Mass.
Prototype Transformer Corp., E. Orange, N.J.
Sartron, Inc., Newberg, Ore.
Shane Inds., Sunny Vale, Cal.
SKG Assocs., Inc., Boston, Mass.
SNC Mfg. Co., Inc., Oshkosh, Wisc.
Sterling Transformer Corp., Brooklyn, N.Y.
Transformer Design, Milwaukee, Wisc.
Transformer Mfrs., Inc., Chicago, Ill.
Transformer Tech., Inc., Chicago, Ill.
Transitron Elctrn. Corp., Wakefield, Mass.
Transrex Div., Torrance, Cal.
Tresco an Aydin Co., Phila., Pa.
Ward Leonard, Mt. Vernon, N.Y.
Welco Inds. Inc., Cincinnati, Ohio
Wintron Co., Inc., S. El Monte, Calif.

Transformers, Voltage-Regulating-Also See Regulators & Stabilizers, Voltage—See Vol 3

Transformers, Welding—See Vol 3

Transformers, Wide Band—See Vol 3

Transistor & Diode Heat Dissipators—See Vol 2

Transistor Mounting Pads—See Pads, Transistor Mounting—Vol 2

Transistor Testers—See Testers, Transistor

Transistors, Chip, Unpackaged—See Vol 2

Transistors, Dual—See Vol 2

Transistors, Field-Effect—See Vol 2

Transistors, Germanium, Photo—See Vol 2

Transistors, Germanium, Power—See Vol 2

Transistors, Germanium, R-F—See Vol 2

Transistors, Germanium, Switching—See Vol 2

Transistors, Pressure Sensitive—See Vol 2

Transistors, Silicon, Photo—See Vol 2

Transistors, Silicon, Power—See Vol 2

Transistors, Silicon, R-F—See Vol 2

Transistors, Silicon, Switching—See Vol 2

Transistors, Unijunction—See Vol 2

Transit Cases-Also See Containers, Shipping—See Vol 3

Transitions—See Couplings—Vol 3

Translators, Data

A. D. Data Sys., Inc., Rochester, N.Y. p 328
Data-Control Systems, Danbury, Conn. p 345
Dialight Corp., Brooklyn, N.Y.
Hewlett-Packard, Palo Alto, Cal.
Metric Sys., Ft. Walton Beach, Fla. p 358,360
(NES) Nationwide Elctrn. Sys., Itasca, Ill. p 365
Parabam, Inc., Compton, Cal. p 371
Sonex, Inc., Bethayres, Pa. p 955
Summit Engrg. Corp., Bozeman, Mont.
Climatronics Corp., Hauppauge, N.Y.
Control Equip. Corp., New England, Lowell, Mass.
Datatron, Inc., Santa Ana, Cal
Digi-Data Corp., Bladensburg, Md.
Eon Instr., Inc., Van Nuys, Cal.
Honeywell, Aerospace & Def., Minneapolis, Minn.
Hughes Aircraft Co, Culver City, Cal.
Hughes Aircraft Co, Fullerton, Cal.
Meteorology Research, Inc., Altadena, Calif.
Philco-Ford Corp., Washington, D.C.
Singer - Tele-Signal, Woodbury, N.Y.
Superior Elec., Bristol, Conn.
Theta Instr. Corp., Fairfield, N.J.

Translators, TV—See Transmitters, UHF; Transmitters, VHF

Transmission Line, Wire & Cable—See Cable, Transmission Line—Vol 3

Transmission Systems, Data

A. D. Data Sys., Inc., Rochester, N.Y. p 328
Bendix Environmtl. Sci., Baltimore, Md. p 336
Data-Control Systems, Danbury, Conn.
Dynamics Instr. Co., Monterey Pk., Cal.
Hi-G, Windsor Locks, Conn.
Metric Sys., Ft. Walton Beach, Fla. p 360
Multitech Data Prods., Monterey Pk., Cal. p 363
(NES) Nationwide Elctrn. Sys., Itasca, Ill.
North Elec. Co., Galion, Ohio
North Hills Elctrns., Inc., Glen Cove, N.Y.
Quindar Elctrns., Inc., Springfield, N.J. p 953
Sonex, Inc., Bethayres, Pa. p 955
Summit Engrg. Corp., Bozeman, Mont.
AMBAC Inds., Garden City, N.Y.
American Data Sys., Canoga Pk., Cal
Anritsu Electric Co., Ltd., Tokyo, Japan
Applied Systems Corp., Detroit, Mich
Austin Elctrns., Roselle, N.J.
Autocon Inds., Inc., St. Paul, Minn.
Bristol Div, Waterbury, Conn
Cardion Elctrns., Woodbury, N.Y.
Codex Corp., Newton, Mass.
Collins Radio Co., Newport Beach, Calif.
Colorado Instrs., Inc., Broomfield, Colo.
Communitype Corp., New York, N.Y.
Conductron Corp., St. Charles, Mo.
Continental Data Sys., Dayton, Ohio
Cybermatics, Inc., Ft. Lee, N.J.
Data Access Sys., Inc., Dover, N.J.
Data Prods. Corp., Woodland Hills, Calif.
Demex, Inc., Kansas City, Mo.
Diamond Repeater Co., Madison, N.J.
Digi-Data Corp., Bladensburg, Md.
Digitronics Corp., Albertson, N.Y.
Dorsett Elctrns., Tulsa, Okla.
Essex Engrg. Co., Inc., Essex, Conn.
Fairchild Space & Defense Sys., Syosset, N.Y.
Ferranti Ltd., Hollinwood, Lancs., England
Ford Industries, Inc., Portland, Ore.
Friden Div., San Leandro, Calif.
General Atronics, Military Elctrns., Phila., Pa.
General Dynamics, San Diego, Cal.
General Elec., Lynchburg, Va.
Gosh Instrs., Inc., Wethersfield, Conn.
GTE Automatic Elec., Northlake, Ill.
GTE Lenkurt Inc., San Carlos, Calif.
GTE Sylvania Inc., Elctrn. Sys. Gp., Waltham, Mass.
Harris Semiconductor, Melbourne, Fla.
Honeywell, Aerospace & Def., Minneapolis, Minn.
Honeywell, Ft. Washington, Pa.
Hughes Aircraft Co, Culver City, Cal.
Hughes Aircraft Co, Fullerton, Cal.
Int'l. Comm., Miami, Fla.
Iso-Switch Corp., Costa Mesa, Cal.
Lear Siegler, Inc., Santa Monica, Calif.
Lynch Communication Systems, San Francisco, Calif.
Meteorology Research, Inc., Altadena, Calif.
Microwave Assocs., Inc., Burlington, Mass.
Milgo Electrn. Corp., Miami, Fla.
Mohawk Data Sciences Corp., Herkimer, N.Y.
Motorola Instr. & Control, Phoenix, Ariz.
Nat'l. Midco Inds., Inc., Trenton, N.J.
Philco-Ford Corp., Washington, D.C.
Prentice Elctrns. Corp., Palo Alto, Calif.
RCA Govt. & Comm. Sys., Moorestown, N.J.
RCA Service Co., Camden, N.J.
RFL Inds., Comms. Div., Boonton, N.J.
Sanders Data Sys., Nashua, N.H.
Sanders Assocs., Inc., Data Sys. Div., Nashua, N.H.
Schneider Instr. Co., Cincinnati, Ohio
Singer - Tele-Signal, Woodbury, N.Y.
Systems Instrs. Resch., Inc., Atlanta, Ga.
Texas Instruments, Inc., Houston, Tex.

Theta Instr. Corp., Fairfield, N.J.
Trepac Corp. America, Englewood, N.J.
Viatron Computer Sys., Bedford, Mass.
Western Telematic, Inc., Arcadia, Cal.

Transmitters, Broadcast, A-M, F-M & TV

American Elctrn. Labs., Inc., Lansdale, Pa.
Nippon Electric/NEC America, N.Y., N.Y.
Aeg-Telefunken Corp., Englewood Cliffs, N.J.
Ampex Corp., Redwood City, Calif.
CCA Elctrns. Corp., Gloucester, N.J.
Collins Radio Co., Dallas, Tex.
Continental Elctrns. Mfg., Dallas, Tex.
Energy Systems, Palo Alto, Cal.
Kahn Resch. Labs., Inc., Freeport, N.Y.
Microwave Assocs., Inc., Burlington, Mass.
RCA Corp., Camden, N.J.
Rodelco, Deer Park, N.Y.
Rohde & Schwarz Sls., Passaic, N.J.
Siemens Corp., Comps. Div., Iselin, N.J.
Standard Elctrns. Corp., Freehold, N.J.
Systems Engineering, Ltd., Grouse Creek, Utah
Technical Mat'l., Mamaroneck, N.Y.
Thomson-CSF Inc., New York, N.Y.
Wilkinson Elctrns., Woodlyn, Pa.

Transmitters, Digital Data—See Transmission Systems, Data

Transmitters, Diplexer

Nippon Electric/NEC America, N.Y., N.Y.
Anritsu Electric Co., Ltd., Tokyo, Japan
Dittmore-Freimuth Corp., Milwaukee, Wisc.
Elctrn. Resources Div., Los Angeles, Cal.
Hughes Aircraft Co, Culver City, Cal.
Hughes Aircraft Co, Fullerton, Cal.
Microwave Development Labs., Inc., Needham Hgts., Mass.
Philco-Ford Corp., Washington, D.C.
Sinclair Radio Labs., Maple, Ont., Can.
Standard Elctrns. Corp., Freehold, N.J.

Transmitters, Direction Finding

American Elctrn. Labs., Inc., Lansdale, Pa.
Aerocom, Miami, Fla.
Aeronautical Comm. Equip. Inc., Miami, Fla.
Collins Radio Co., Cedar Rapids, Iowa
Collins Radio Co., Dallas, Tex.
General Instr. Corp., Hicksville, N.Y.
GTE Sylvania Inc., Elctrn. Sys. Gp., Waltham, Mass.
Hughes Aircraft Co, Culver City, Cal.
Hughes Aircraft Co, Fullerton, Cal.
King Radio Corp., Olathe, Kans.
RCA Govt. & Comm. Sys., Moorestown, N.J.

Transmitters, Duplexer

Nippon Electric/NEC America, N.Y., N.Y.
AMBAC Inds., Garden City, N.Y.
Anritsu Electric Co., Ltd., Tokyo, Japan
Astrolab Inc., Linden, N J
Cardion Communications, Woodbury, N.Y.
Continental Elctrns. Mfg., Dallas, Tex.
Dittmore-Freimuth Corp., Milwaukee, Wisc.
Hughes Aircraft Co, Culver City, Cal.
Hughes Aircraft Co, Fullerton, Cal.
Microwave Assocs., Inc., Burlington, Mass.
Microwave Development Labs., Inc., Needham Hgts., Mass.
Philco-Ford Corp., Washington, D.C.
RCA Govt. & Comm. Sys., Moorestown, N.J.
Sinclair Radio Labs., Maple, Ont., Can.
Special Microwave Devices Oper., Waltham, Mass.

Transmitters, Facsimile

Nippon Electric/NEC America, N.Y., N.Y.
Alden Elctrn. & Impulse Record. Equip., Westboro, Mass.
Anritsu Electric Co., Ltd., Tokyo, Japan
CCA Elctrns. Corp., Gloucester, N.J.
GTE Lenkurt Inc., San Carlos, Calif.
Int'l. Comm., Miami, Fla.
International Scanatron Sys., Wyandanch, N.Y.
Microwave Assocs., Inc., Burlington, Mass.
Muirhead, Inc., Mountainside, N.J.
Philco-Ford Corp., Washington, D.C.
RCA Service Co., Camden, N.J.
RF Communications, Inc., Rochester, N.Y.
Siemens Corp., Comps. Div., Iselin, N.J.
Telautograph Corp., Los Angeles, Cal.

Transmitters, Fixed Frequency

American Elctrn. Labs., Inc., Lansdale, Pa.
Johnson E. F. Co., Waseca, Minn.
Quindar Elctrns., Inc., Springfield, N.J.
RHG Elctrns. Lab., Farmingdale, N.Y.
Sierra Sys., Mountain View, Cal.
ACR Elctrns. Div., Carle Place, N.Y.
Aerocom, Miami, Fla.
Aeronautical Comm. Equip. Inc., Miami, Fla.
Aerospace Resch. Inc., Boston, Mass.
AMBAC Inds., Garden City, N.Y.
Anritsu Electric Co., Ltd., Tokyo, Japan
Autocon Inds., Inc., St. Paul, Minn.
BF Elctrns., Solana Beach, Calif.
Bogen Div., Paramus, N.J.
Brelonix, Inc., Seattle, Wash
Bristol Div, Waterbury, Conn
Cardion Communications, Woodbury, N.Y.
CCA Elctrns. Corp., Gloucester, N.J.
Collins Radio Co., Cedar Rapids, Iowa
Collins Radio Co., Dallas, Tex.
ComGeneral Corp., Dayton, Ohio
Communications Co., Inc., Coral Gables, Fla.
Continental Elctrns. Mfg., Dallas, Tex.
Dittmore-Freimuth Corp., Milwaukee, Wisc.
Dorsett Elctrns., Tulsa, Okla.
Energy Systems, Palo Alto, Cal.
Farinon Electric, San Carlos, Calif.
General Instr. Corp., Hicksville, N.Y.
GTE Lenkurt Inc., San Carlos, Calif.
Hammarlund Mfg. Co., Red Bank, N.J.
HB Engrg. Corp., Silver Spring, Md.
Heath Co., Benton Harbor, Mich.
Hughes Aircraft Co, Culver City, Cal.
Hughes Aircraft Co, Fullerton, Cal.
Instru-Lec Corp., Mt. Vernon, N.Y.
ITT Aerospace, San Fernando, Cal.
ITT Mackay Marine, Clark, N.J.
Lear Siegler, Inc., Santa Monica, Calif.
Linear Sys., Inc., Watsonville, Calif.
Microwave Assocs., Inc., Burlington, Mass.
Mobil Elctrns., Inc., Anderson, Ind.
Philco-Ford Corp., Washington, D.C.
Prodelin, Inc., Hightstown, N.J.
Racal Communications, Rockville, Md.
RCA Govt. & Comm. Sys., Moorestown, N.J.
RF Communications, Inc., Rochester, N.Y.
Robertson Instr., Azusa, Cal.
Rohde & Schwarz Sls., Passaic, N.J.
Siemens Corp., Comps. Div., Iselin, N.J.
Southern Avionics Co., Beaumont, Tex.
Special Microwave Devices Oper., Waltham, Mass.
Standard Elctrns. Corp., Freehold, N.J.
Technical Mat'l., Mamaroneck, N.Y.
Telectro Sys. Corp., Corona, N.Y.
TRI-COM, Inc., Rockville, Md.

Transmitters, Fixed Station Comm.

American Elctrn. Labs., Inc., Lansdale, Pa.
Johnson E. F. Co., Waseca, Minn.
Aerocom, Miami, Fla.
Aeronautical Comm. Equip. Inc., Miami, Fla.
Anritsu Electric Co., Ltd., Tokyo, Japan
Bogen Div., Paramus, N.J.
CCA Elctrns. Corp., Gloucester, N.J.
Collins Radio Co., Cedar Rapids, Iowa
Collins Radio Co., Dallas, Tex.
Communications Co., Inc., Coral Gables, Fla.
Continental Elctrns. Mfg., Dallas, Tex.
Energy Systems, Palo Alto, Cal.
Farinon Electric, San Carlos, Calif.
General Dynamics, San Diego, Cal.
General Elec., Lynchburg, Va.
General Instr. Corp., Hicksville, N.Y.
GTE Lenkurt Inc., San Carlos, Calif.
GTE Sylvania Inc., Elctrn. Sys. Gp., Waltham, Mass.
Heath Co., Benton Harbor, Mich.
Hermes Elctrns., Dartmouth N.S., Can.
Hughes Aircraft Co, Culver City, Cal.
Hughes Aircraft Co, Fullerton, Cal.
ITT Mackay Marine, Clark, N.J.
Linear Sys., Inc., Watsonville, Calif.
Microwave Assocs., Inc., Burlington, Mass.
Mobil Elctrns., Inc., Anderson, Ind.
Motorola, Scottsdale, Ariz.
Philco-Ford Corp., Washington, D.C.
Racal Communications, Rockville, Md.
RCA Corp., Camden, N.J.
RCA Govt. & Comm. Sys., Moorestown, N.J.
RF Communications, Inc., Rochester, N.Y.
Siemens Corp., Comps. Div., Iselin, N.J.
Standard Elctrns. Corp., Freehold, N.J.
Technical Mat'l., Mamaroneck, N.Y.

Transmitters, Infrared—See Vol 2

Transmitters, Interrogation

American Elctrn. Labs., Inc., Lansdale, Pa.
Vega Precision Labs., Vienna, Va.
AMBAC Inds., Garden City, N.Y.
CCA Elctrns. Corp., Gloucester, N.J.
Collins Radio Co., Cedar Rapids, Iowa
Collins Radio Co., Dallas, Tex.
ComGeneral Corp., Dayton, Ohio
Continental Data Sys., Dayton, Ohio
Dorsett Elctrns., Tulsa, Okla.
GTE Sylvania Inc., Elctrn. Sys. Gp., Waltham, Mass.
Hughes Aircraft Co, Culver City, Cal.
Hughes Aircraft Co, Fullerton, Cal.
ITT Avionics Div, Nutley, N.J.
RCA Govt. & Comm. Sys., Moorestown, N.J.
Scientific Communications, Garland, Tex.

Transmitters, Microwave

American Elctrn. Labs., Inc., Lansdale, Pa.
Applied Microwave Lab., Andover, Mass.
Cober Elctrns., Inc., Stamford, Conn. p 601
Electro/Data, Inc., Garland, Tex.
Greenray Inds., Inc., Mechanicsburg, Pa. p 607
Microdot Inc., City of Industry, Cal.
Microwave Cavity Labs., La Grange, Ill.
Nippon Electric/NEC America, N.Y., N.Y.
RHG Elctrns. Lab., Farmingdale, N.Y. p 612
Vega Precision Labs., Vienna, Va. p 614
Watkins Johnson Co., Palo Alto, Cal.
Aeg-Telefunken Corp., Englewood Cliffs, N.J.
Aircom, Inc., Union, N.H.
AMBAC Inds., Garden City, N.Y.
A.R.F. Products, Inc., Raton, N.M.
Bertan Assocs., Inc., Plainview, N.Y.
Cardion Communications, Woodbury, N.Y.
Central Scientific Co., Chicago, Ill.
Collins Radio Co., Dallas, Tex.
Dittmore-Freimuth Corp., Milwaukee, Wisc.
E.F.E. Labs., Inc., Horsham, Pa.
Energy Systems, Palo Alto, Cal.
Farinon Electric, San Carlos, Calif.
General Dynamics, San Diego, Cal.
General Elec., Lynchburg, Va.
GTE Lenkurt Inc., San Carlos, Calif.
GTE Sylvania Inc., Elctrn. Sys. Gp., Waltham, Mass.
Hughes Aircraft Co, Culver City, Cal.
Hughes Aircraft Co, Fullerton, Cal.
ITT Aerospace, San Fernando, Cal.
Jerrold Elctrns. Corp., Philadelphia, Pa.
Jerrold/Watkins Div., Toronto, 395, Ont., Can.
Litton Inds., San Carlos, Calif.
Microdot Inc., S. Pasadena, Calif.
Microlab/FXR, Livingston, N.J.
Microwave Assocs., Inc., Burlington, Mass.
Microwave Div, Nashua, N.H.
OKI Elctrns. America, Ft. Lauderdale, Fla.
Philco-Ford Corp., Washington, D.C.
Premier Microwave, Port Chester, N.Y.
Raytheon Data Systems Co., Norwood, Mass.
Raytheon Co., Lexington, Mass.
RCA Corp., Camden, N.J.
RCA Govt. & Comm. Sys., Moorestown, N.J.
Rodelco, Deer Park, N.Y.
Sage Labs. Inc., Natick, Mass.
Sanders Assocs., Nashua, N.H.
Scientific Communications, Garland, Tex.
Somerset Radiation Lab., Arlington, Va.
Special Microwave Devices Oper., Waltham, Mass.
Trak Microwave, Tampa, Fla.
Varian Assoc., Beverly, Mass
Westinghouse Elec. Corp., Pittsburgh, Pa.
Zeta Labs., Inc., Mountain View, Calif.

Transmitters, Multiplex

Data-Control Systems, Danbury, Conn.
Nippon Electric/NEC America, N.Y., N.Y.
Quindar Elctrns., Inc., Springfield, N.J.
Aeg-Telefunken Corp., Englewood Cliffs, N.J.
Aerospace Resch. Inc., Boston, Mass.
AMBAC Inds., Garden City, N.Y.
Autocon Inds., Inc., St. Paul, Minn.
Bristol Div, Waterbury, Conn
Cardion Communications, Woodbury, N.Y.
Collins Radio Co., Dallas, Tex.
Dittmore-Freimuth Corp., Milwaukee, Wisc.
General Dynamics, San Diego, Cal.
Honeywell Information Systems, Wellesley Hills, Mass
Hughes Aircraft Co, Culver City, Cal.
Hughes Aircraft Co, Fullerton, Cal.
OKI Elctrns. America, Ft. Lauderdale, Fla.
Philco-Ford Corp., Washington, D.C.
RCA Corp., Camden, N.J.
RCA Govt. & Comm. Sys., Moorestown, N.J.
RFL Inds., Comms. Div., Boonton, N.J.
Singer - Tele-Signal, Woodbury, N.Y.
Special Microwave Devices Oper., Waltham, Mass.

Transmitters, Pulse Code Modulation

Data-Control Systems, Danbury, Conn.
Nippon Electric/NEC America, N.Y., N.Y.
AMBAC Inds., Garden City, N.Y.
Dorsett Elctrns., Tulsa, Okla.
Femco Div., Irwin, Pa.
General Dynamics, San Diego, Cal.
RF Communications, Inc., Rochester, N.Y.
Trak Microwave, Tampa, Fla.

Transmitters, Pulse Phase Modulation

Cober Elctrns., Inc., Stamford, Conn.
Nippon Electric/NEC America, N.Y., N.Y.
Aerospace Resch. Inc., Boston, Mass.
AMBAC Inds., Garden City, N.Y.
Continental Elctrns. Mfg., Dallas, Tex.
Dorsett Elctrns., Tulsa, Okla.
General Instr. Corp., Hicksville, N.Y.
GTE Sylvania Inc., Elctrn. Sys. Gp., Waltham, Mass.
Hughes Aircraft Co, Culver City, Cal.
Hughes Aircraft Co, Fullerton, Cal.
Raytheon Data Systems Co., Norwood, Mass.
RCA Govt. & Comm. Sys., Moorestown, N.J.

Transmitters, Pulse Time Modulation

Microdot Inc., City of Industry, Cal.
Nippon Electric/NEC America, N.Y., N.Y.
Vega Precision Labs., Vienna, Va.
Aerospace Resch. Inc., Boston, Mass.
AMBAC Inds., Garden City, N.Y.
Autocon Inds., Inc., St. Paul, Minn.
Bristol Div, Waterbury, Conn
Continental Elctrns. Mfg., Dallas, Tex.
General Instr. Corp., Hicksville, N.Y.
GTE Sylvania Inc., Elctrn. Sys. Gp., Waltham, Mass.
Hughes Aircraft Co, Culver City, Cal.
Hughes Aircraft Co, Fullerton, Cal.
Moore Inds., Van Nuys, Cal.
RCA Govt. & Comm. Sys., Moorestown, N.J.
RF Communications, Inc., Rochester, N.Y.
Sperry Marine Sys., Charlottesville, Va.

Transmitters, Radar—See Radar Systems

Transmitters, Radio-Control

Solid State Elctrns., Sepulveda, Cal.
Anritsu Electric Co., Ltd., Tokyo, Japan
A.R.F. Products, Inc., Raton, N.M.
Cardion Communications, Woodbury, N.Y.
Chamberlain Mfg. Corp., Elmhurst, Ill.
Collins Radio Co., Dallas, Tex.
Dittmore-Freimuth Corp., Milwaukee; Wisc.
Dorsett Elctrns., Tulsa, Okla.
Elctrn. Comm., Inc., St. Petersburg, Fla.
Farrall Instr. Co., Grand Island, Neb.
Femco Div., Irwin, Pa.
Heath Co., Benton Harbor, Mich.
Hughes Aircraft Co, Culver City, Cal.
Hughes Aircraft Co, Fullerton, Cal.
Lear Siegler, Inc., Santa Monica, Calif.
Linear Corp., Inglewood, Calif.
Mobil Elctrns., Inc., Anderson, Ind.
Racal Communications, Rockville, Md.
Technical Mat'l., Mamaroneck, N.Y.

Transmitters, Radio Range

CCA Elctrns. Corp., Gloucester, N.J.
Collins Radio Co., Dallas, Tex.
Dittmore-Freimuth Corp., Milwaukee, Wisc.
Elctrn. Comm., Inc., St. Petersburg, Fla.
Ground Data Corp., Fla., 33308
Hughes Aircraft Co, Culver City, Cal.
Hughes Aircraft Co, Fullerton, Cal.
ITT Aerospace, San Fernando, Cal.
ITT Avionics Div, Nutley, N.J.
Microwave Assocs., Inc., Burlington, Mass.
Racal Communications, Rockville, Md.
RCA Govt. & Comm. Sys., Moorestown, N.J.

Transmitters, Railroad

Anritsu Electric Co., Ltd., Tokyo, Japan
CCA Elctrns. Corp., Gloucester, N.J.
Collins Radio Co., Dallas, Tex.
HB Engrg. Corp., Silver Spring, Md.
McElroy Elctrns. Corp., Shirley, Mass.
Microwave Assocs., Inc., Burlington, Mass.

Transmitters, Single-Sideband

American Elctrn. Labs., Inc., Lansdale, Pa.
Delco Elctrns. Div., Kokomo, Ind.
Aerocom, Miami, Fla.
Aeronautical Comm. Equip. Inc., Miami, Fla.
Anritsu Electric Co., Ltd., Tokyo, Japan
Arvin Sys., Inc., Dayton, Ohio
Brelonix, Inc., Seattle, Wash
CCA Elctrns. Corp., Gloucester, N.J.
Collins Radio Co., Cedar Rapids, Iowa
Collins Radio Co., Dallas, Tex.
Continental Elctrns. Mfg., Dallas, Tex.
Drake, R.L., Co., Miamisburg, Ohio
General Dynamics, San Diego, Cal.
General Instr. Corp., Hicksville, N.Y.
General Radiotelephone Co., Burbank, Cal.
GTE Lenkurt Inc., San Carlos, Calif.
GTE Sylvania Inc., Elctrn. Sys. Gp., Waltham, Mass.
Hammarlund Mfg. Co., Red Bank, N.J.
Heath Co., Benton Harbor, Mich.
Hermes Elctrns., Dartmouth N.S., Can.
Hughes Aircraft Co, Culver City, Cal.
Hughes Aircraft Co, Fullerton, Cal.
ITT Mackay Marine, Clark, N.J.
Kahn Resch. Labs., Inc., Freeport, N.Y.
Linear Sys., Inc., Watsonville, Calif.
Microwave Assocs., Inc., Burlington, Mass.
OKI Elctrns. America, Ft. Lauderdale, Fla.
Pearce-Simpson, Miami, Fla.
Prodelin, Inc., Hightstown, N.J.
Racal Communications, Rockville, Md.
Raytheon Data Systems Co., Norwood, Mass.
RCA Corp., Camden, N.J.
RF Communications, Inc., Rochester, N.Y.
RFL Inds., Comms. Div., Boonton, N.J.
Rohde & Schwarz Sls., Passaic, N.J.
Siemens Corp., Comps. Div., Iselin, N.J.
Technical Mat'l., Mamaroneck, N.Y.
Telectro Sys. Corp., Corona, N.Y.
Weitermann Elctrns., Milwaukee, Wisc.
Isomet Corp., Oakland, N.J.

Transmitters, Telemetry

American Elctrn. Labs., Inc., Lansdale, Pa.
Bramco Controls, Piqua, Ohio
Data-Control Systems, Danbury, Conn.
Quindar Elctrns., Inc., Springfield, N.J.
p 953
Solid State Elctrns., Sepulveda, Cal.
Vega Precision Labs., Vienna, Va. p 614
Watkins Johnson Co., Palo Alto, Cal.
AMBAC Inds., Garden City, N.Y.
Anritsu Electric Co., Ltd., Tokyo, Japan
A.R.F. Products, Inc., Raton, N.M.
Autocon Inds., Inc., St. Paul, Minn.
Beukers Labs., Inc., Hauppauge, N.Y.
BF Elctrns., Solana Beach, Calif.
Biocom, Inc., Culver City, Cal.
Bristol Div, Waterbury, Conn
Collins Radio Co., Dallas, Tex.
ComGeneral Corp., Dayton, Ohio
Conductron Corp., St. Charles, Mo.
Continental Data Sys., Dayton, Ohio
Continental Elctrns. Mfg., Dallas, Tex.
Defense Elctrns., Inc., Rockville, Md.
Dorsett Elctrns., Tulsa, Okla.
Elctrn. Comm., Inc., St. Petersburg, Fla.
Femco Div., Irwin, Pa.
Fischer & Porter Co., Warminster, Pa.
General Instr. Corp., Hicksville, N.Y.
Gosh Instrs., Inc., Wethersfield, Conn.
Honeywell, Ft. Washington, Pa.
Hughes Aircraft Co, Culver City, Cal.
Hughes Aircraft Co, Fullerton, Cal.
ITT Aerospace, San Fernando, Cal.
Lear Siegler, Inc., Santa Monica, Calif.
Mennen-Greatbatch Elctrns., Inc., Clarence, N.Y.
Microcom Corp., Horsham, Pa.
Microdot Inc., S. Pasadena, Calif.
Micromega, Los Angeles, Cal.
Microwave Assocs., Inc., Burlington, Mass.
Oklahoma Aerotronics, Hartshorne, Okla.
Philco-Ford Corp., Washington, D.C.
RF Communications, Inc., Rochester, N.Y.
RFL Inds., Comms. Div., Boonton, N.J.
Schneider Instr. Co., Cincinnati, Ohio
Special Microwave Devices Oper., Waltham, Mass.
Stoelting Co., Chicago, Ill.
Trak Microwave, Tampa, Fla.

Transmitters, Tropospheric Scatter

Cober Elctrns., Inc., Stamford, Conn.
Nippon Electric/NEC America, N.Y., N.Y.
Aerocom, Miami, Fla.
Aeronautical Comm. Equip. Inc., Miami, Fla.
CCA Elctrns. Corp., Gloucester, N.J.
Energy Systems, Palo Alto, Cal.
GTE Sylvania Inc., Elctrn. Sys. Gp., Waltham, Mass.
Hughes Aircraft Co, Culver City, Cal.
Hughes Aircraft Co, Fullerton, Cal.
Philco-Ford Corp., Washington, D.C.
RCA Govt. & Comm. Sys., Moorestown, N.J.

Transmitters, UHF

American Elctrn. Labs., Inc., Lansdale, Pa.
Cober Elctrns., Inc., Stamford, Conn.
Electro/Data, Inc., Garland, Tex.
Microdot Inc., City of Industry, Cal.
Microwave Cavity Labs., La Grange, Ill.
Nippon Electric/NEC America, N.Y., N.Y.
Sierra Sys., Mountain View, Cal.
Vega Precision Labs., Vienna, Va.
ACR Elctrns. Div., Carle Place, N.Y.
Aerospace Resch. Inc., Boston, Mass.
AMBAC Inds., Garden City, N.Y.
Ampex Corp., Redwood City, Calif.
Anritsu Electric Co., Ltd., Tokyo, Japan
Apollo Corp., Shinagawa-Ku, Tokyo, Japan
A.R.F. Products, Inc., Boulder, Colo.
Arvin Sys., Inc., Dayton, Ohio
Benco Television Assoc., Rexdale, Ont., Can.
Bertan Assocs., Inc., Plainview, N.Y.
BF Elctrns., Solana Beach, Calif.
Cardion Communications, Woodbury, N.Y.
CCA Elctrns. Corp., Gloucester, N.J.
Collins Radio Co., Cedar Rapids, Iowa
Collins Radio Co., Dallas, Tex.
ComGeneral Corp., Dayton, Ohio
Communications Co., Inc., Coral Gables, Fla.
Continental Elctrns. Mfg., Dallas, Tex.
Dorne & Margolin, Inc., Bohemia, N.Y.
Dorsett Elctrns., Tulsa, Okla.
Elctrn. Comm., Inc., St. Petersburg, Fla.
Electronics Missiles & Comms., White Haven, Pa.
Energy Systems, Palo Alto, Cal.
Farinon Electric, San Carlos, Calif.
General Dynamics, San Diego, Cal.
General Elec., Lynchburg, Va.
General Instr. Corp., Hicksville, N.Y.
Ground Data Corp., Fla., 33308
GTE Sylvania Inc., Elctrn. Sys. Gp., Waltham, Mass.
Hughes Aircraft Co, Culver City, Cal.
Hughes Aircraft Co, Fullerton, Cal.
ITT Aerospace, San Fernando, Cal.
ITT Avionics Div, Nutley, N.J.
Micro-Tel Corp., Baltimore, Md.
Microdot Inc., S. Pasadena, Calif.
Oklahoma Aerotronics, Hartshorne, Okla.
RCA Corp., Camden, N.J.
RCA Govt. & Comm. Sys., Moorestown, N.J.
Rodelco, Deer Park, N.Y.
Rohde & Schwarz Sls., Passaic, N.J.
Scientific Communications, Garland, Tex.
Somerset Radiation Lab., Arlington, Va.
Special Microwave Devices Oper., Waltham, Mass.
Standard Elctrns. Corp., Freehold, N.J.
Thomson-CSF Inc., New York, N.Y.
Trak Microwave, Tampa, Fla.
Varian Assocs., Palo Alto, Cal.
Wand Elctrns., Inc., Old Bethpage, N.Y.
Zeta Labs., Inc., Mountain View, Calif.

Transmitters, ULF

AMBAC Inds., Garden City, N.Y.
Anritsu Electric Co., Ltd., Tokyo, Japan
GTE Sylvania Inc., Elctrn. Sys. Gp., Waltham, Mass.
Hughes Aircraft Co, Culver City, Cal.
Hughes Aircraft Co, Fullerton, Cal.
Westinghouse Elec. Corp., Pittsburgh, Pa.

Transmitters, VHF

American Elctrn. Labs., Inc., Lansdale, Pa.
Cober Elctrns., Inc., Stamford, Conn.
Electro/Data, Inc., Garland, Tex.
Instrs. For Ind., Inc., Farmingdale, N.Y.
Microdot Inc., City of Industry, Cal.
Microwave Cavity Labs., La Grange, Ill.
Nippon Electric/NEC America, N.Y., N.Y.
Sierra Sys., Mountain View, Cal.
Vega Precision Labs., Vienna, Va.
ACR Elctrns. Div., Carle Place, N.Y.
Aerocom, Miami, Fla.
Aeronautical Comm. Equip. Inc., Miami, Fla.
AMBAC Inds., Garden City, N.Y.
Ampex Corp., Redwood City, Calif.
Anritsu Electric Co., Ltd., Tokyo, Japan
A.R.F. Products, Inc., Boulder, Colo.
A.R.F. Products, Inc., Raton, N.M.
Arvin Sys., Inc., Dayton, Ohio
Barker & Williamson, Bristol, Pa.
Benco Television Assoc., Rexdale, Ont., Can.
BF Elctrns., Solana Beach, Calif.
Bogen Div., Paramus, N.J.
Cardion Communications, Woodbury, N.Y.
CCA Elctrns. Corp., Gloucester, N.J.
Collins Radio Co., Cedar Rapids, Iowa
Collins Radio Co., Dallas, Tex.
ComGeneral Corp., Dayton, Ohio
Communications Co., Inc., Coral Gables, Fla.
Conductron Corp., St. Charles, Mo.
Continental Elctrns. Mfg., Dallas, Tex.
Dorne & Margolin, Inc., Bohemia, N.Y.
Dorsett Elctrns., Tulsa, Okla.
Electronics Missiles & Comms., White Haven, Pa.
Emcee Elctrns., Inc., New Castle, Del.
Energy Systems, Palo Alto, Cal.
Fargo Co., San Francisco, Calif.
Farinon Electric, San Carlos, Calif.
General Dynamics, San Diego, Cal.
General Elec., Lynchburg, Va.
General Instr. Corp., Hicksville, N.Y.
General Radiotelephone Co., Burbank, Cal.
GTE Sylvania Inc., Elctrn. Sys. Gp., Waltham, Mass.
Hammarlund Mfg. Co., Red Bank, N.J.
Heath Co., Benton Harbor, Mich.
Hughes Aircraft Co, Culver City, Cal.
Hughes Aircraft Co, Fullerton, Cal.
ITT Aerospace, San Fernando, Cal.
ITT Mackay Marine, Clark, N.J.
Lear Siegler, Inc., Santa Monica, Calif.
Micro-Tel Corp., Baltimore, Md.
Microdot Inc., S. Pasadena, Calif.
Micromega, Los Angeles, Cal.
Mobil Elctrns., Inc., Anderson, Ind.
Narco Avionics, Ft. Washington, Pa.
Oklahoma Aerotronics, Hartshorne, Okla.
Olektron Corp., Dudley, Mass.
Pearce-Simpson, Miami, Fla.
Port-O-Vox Enterprises, Corp., New York, N.Y.
RCA Corp., Camden, N.J.
RCA Govt. & Comm. Sys., Moorestown, N.J.
Regency Elctrns., Inc., Indianapolis, Ind.
RF Communications, Inc., Rochester, N.Y.
Robertson Instr., Azusa, Cal.
Rodelco, Deer Park, N.Y.
Rohde & Schwarz Sls., Passaic, N.J.
Special Microwave Devices Oper., Waltham, Mass.
Standard Elctrns. Corp., Freehold, N.J.
Standard Winding Co., Newsburgh, N.Y.
Thomson-CSF Inc., New York, N.Y.
TRI-COM, Inc., Rockville, Md.
Visual Elctrns. Corp., New York, N.Y.
Wand Elctrns., Inc., Old Bethpage, N.Y.

Transmitters, VLF

American Elctrn. Labs., Inc., Lansdale, Pa.
Cober Elctrns., Inc., Stamford, Conn.
Anritsu Electric Co., Ltd., Tokyo, Japan
Bertan Assocs., Inc., Plainview, N.Y.
Beukers Labs., Inc., Hauppauge, N.Y.
Bogue Elec. Mfg. Co., Paterson, N.J.
CCA Elctrns. Corp., Gloucester, N.J.
Collins Radio Co., Dallas, Tex.
Continental Elctrns. Mfg., Dallas, Tex.
Delta Elctrn. Control, Costa Mesa, Cal.
Energy Systems, Palo Alto, Cal.
GTE Sylvania Inc., Elctrn. Sys. Gp., Waltham, Mass.
Hughes Aircraft Co, Culver City, Cal.
Hughes Aircraft Co, Fullerton, Cal.
ITT Avionics Div, Nutley, N.J.
ITT Mackay Marine, Clark, N.J.
RCA Govt. & Comm. Sys., Moorestown, N.J.
Southern Avionics Co., Beaumont, Tex.
Standard Elctrns. Corp., Freehold, N.J.
Technical Mat'l., Mamaroneck, N.Y.
Thomson-CSF Inc., New York, N.Y.
Westinghouse Elec. Corp., Pittsburgh, Pa.

Transponders—See Vol 2

Traps, Ion—See Ion Traps

Triacs—See Thyristors—Vol 2

Triggers, SCR—See Controls, SCR—Vol 2

Trimmer Potentiometers—See Potentiometers, Trimmer—Vol 3

Tripods (For Instruments)

Hewlett-Packard, Palo Alto, Cal.
Buhl Optical Co., Pittsburgh, Pa.
Gordon Alan Entprs., N. Hollywood, Cal.
Keuffel & Esser Co., Morristown, N.J.
Multi Media Engrg., Inc., Rockville, Md.
Red Lake Labs, Inc., Santa Clara, Calif.

Tube Heat Dissipators—See Vol 2

Tube Parts—See Vol 2

Tube Pullers—See Pullers, Tube—Vol 3

Tube Testers—See Testers, Tube

Tubes, Backward Wave—See Vol 2

Tubes, Ballast—See Vol 2

Tubes, Battery Charger—See Vol 2

Tubes, Cathode-Ray, Data-Storage—See Vol 2

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UNITED TECHNICAL PUBLICATIONS

Tubes, Cathode-Ray, Instrument Use—See Vol 2

Tubes, Cathode-Ray, Multiple Gun—See Vol 2

Tubes, Cathode-Ray, Projection—See Vol 2

Tubes, Cathode-Ray, Scan Conversion—See Vol 2

Tubes, Cathode-Ray, Shaped-Beam—See Vol 2

Tubes, Cathode-Ray, Studio or Theatre—See Vol 2

Tubes, Cathode-Ray, TV Picture & Color—See Vol 2

Tubes, Ceramic (Electron)—See Vol 2

Tubes, Counting—See Vol 2

Tubes, Diode, Temperature Limited—See Vol 2

Tubes, Electrometer—See Vol 2

Tubes, Electron Multiplier—See Vol 2

Tubes, Flash—See Vol 2

Tubes, Forward Wave—See Vol 2

Tubes, Gamma Ray—See Vol 2

Tubes, Gas—See Vol 2

Tubes, Geiger-Mueller—See Vol 2

Tubes, Glow Or Discharge—See Tubes, Gas—Vol 2

Tubes, Hollow Cathode, Spectroscopic—See Vol 2

Tubes, Ignitron—See Vol 2

Tubes, Image Converter—See Vol 2

Tubes, Indicator—See Vol 2

Tubes, Industrial Power—See Vol 2

Tubes, Infrared—See Vol 2

Tubes, Ionization—See Vol 2

Tubes, Klystron—See Vol 2

Tubes, Laser—See Vol 2

Tubes, Magnetron—See Vol 2

Tubes, Microwave—See Vol 2

Tubes, Noise Source—See Vol 2

Tubes, Pencil—See Vol 2

Tubes, Photomultiplier—See Vol 2

Tubes, Pirani—See Gauges, Pirani

Tubes, Printer—See Vol 2

Tubes, Radiation Detection—See Vol 2

Tubes, Readout-(CRT, Cold-Cathode, Vacuum Flurescent, Etc.)—See Vol 2

Tubes, Receiving—See Vol 2

Tubes, Rectifying, Gas-Filled—See Vol 2

Tubes, Rectifying, Vacuum—See Vol 2

Tubes, Scintillation—See Vol 2

Tubes, Strobe—See Lights, Stroboscopic—Vol 2

Tubes, Switching—See Vol 2

Tubes, Tv Camera Pickup—See Vol 2

Tubes, Thyratron—See Vol 2

Tubes, Transmit-Receive (TR)—See Vol 2

Tubes, Transmitting—See Vol 2

Tubes, Traveling Wave Amp.—See Vol 2

Tubes, Ultraviolet—See Vol 2

Tubes, Vidicon—See Tubes, TV Camera Pickup—Vol 2

Tubes, Voltage Reference Or Regulating—See Vol 2

Tubes, X-Ray—See Vol 2

Tubing, Aluminum—See Vol 3

Tubing, Asbestos—See Vol 3

Tubing, Brass—See Vol 3

Tubing, Ceramic—See Vol 3

Tubing, Columbium—See Vol 3

Tubing, Copper—See Vol 3

Tubing, Fabric-Also See Tubing, Spaghetti—See Vol 3

Tubing, Fiber—See Vol 3

Tubing, Fluorocarbon, Flexible—See Vol 3

Tubing, Fused Quartz—See Vol 3

Tubing, Glass Fiber Insulation—See Vol 3

Tubing, Glass, Precision—See Vol 3

Tubing, Heat Shrinkable-Also See Caps, Forms & Tapes, Heat Shrinkable—See Vol 3

Tubing, Magnesium—See Vol 3

Tubing, Metal—See Tubing, Brass; Tubing, Copper, etc.—Vol 3

Tubing, Metal Alloy—See Vol 3

Tubing, Metal Hose, Flexible—See Vol 3

Tubing, Mica—See Vol 3

Tubing, Molybdenum—See Vol 3

Tubing, Monel—See Vol 3

Tubing, Mylar—See Vol 3

Tubing, Nickel—See Vol 3

Tubing, Nylon-Also See Tubing, Spaghetti—See Vol 3

Tubing, Paper—See Vol 3

Tubing, Phenolic—See Vol 3

Tubing, Plastic-Also See Tubing, Spaghetti—See Vol 3

Tubing, Platinum—See Vol 3

Tubing, Porcelain—See Vol 3

Tubing, Precious Metal—See Vol 3

Tubing, Refractory Metal—See Vol 3

Tubing, Rubber, Natural & Synthetic—See Vol 3

Tubing, Shrinkable—See Tubing, Heat Shrinkable—Vol 3

Tubing, Spaghetti—See Vol 3

Tubing, Spiral Wrap—See Vol 3

Tubing, Tantalum—See Vol 3

Tubing, TFE-Also See Tubing, Spaghetti—See Vol 3

Tubing, Titanium—See Vol 3

Tubing, Tungsten—See Vol 3

Tubing, Varnished Cambric Insulation-Also See Tubing, Spaghetti—See Vol 3

Tubing, Waveguide—See Vol 2

Tubing, Zipper—See Vol 3

Tuners, Microwave

Amphenol RF Div., Danburry, Conn.
Frequency Engrg. Labs., Farmingdale, N.J.
Hewlett-Packard, Palo Alto, Cal.
Microwave Cavity Labs., La Grange, Ill.
RHG Elctrns. Lab., Farmingdale, N.Y.
R L C Elctrns., Inc., Mt. Kisco, N.Y.
Ryka Scientific, Inc., Sunnyvale, Cal. p 1564
Watkins Johnson Co., Palo Alto, Cal.
Waveline, Inc., W. Caldwell, N.J. p 1567
Weinschel Engrg. Co., Gaithersburg, Md.
Aircom, Inc., Union, N.H.
Airtec, Inc., Roselle, N.J.
Astrolab Inc., Linden, N J
Coax Devices Inc., Chelsea, Mass.
Collins Radio Co., Dallas, Tex.
Communication Elctrns., Rockville, Md.
Dittmore-Freimuth Corp., Milwaukee, Wisc.
Elctrn. Specialty, Thomaston, Conn.
General Instr. Corp., Hicksville, N.Y.
General Microwave Corp., Farmingdale, N.Y.
General Radio Co., Concord, Mass.
Granite State Machine Co., Inc., Manchester, N.H.
Guide Inds., Inc., Sun Valley, Calif.
Herley Inds., Inc., Syosset, N.Y.
Industrial Microwave, Scotch Plains, N.J.
Maury Microwave Corp., Cucamonga, Calif.
MCS Corp., Monrovia, Calif.
Meca Elctrns., Inc., Denville, N.J.
Microlab/FXR, Livingston, N.J.
Narda Microwave Corp., Plainview, N.Y.
OMNI Spectra, Farmington, Mich.
Pabst Engineering Equipment Co., Inc., Elizabeth, N.J.
Physical Elctrn. Labs., Menlo Park, Calif.
PRD Elctrns., Inc., Westbury, N.Y.
Premier Microwave, Port Chester, N.Y.
RF Systems, Inc., Cohasset, Mass.
Scientific Communications, Garland, Tex.
Struthers Elctrns. Corp., Mamaroneck, N.Y.
Teledyne Microwave, Sunnyvale, Cal.
TRG Prods., E. Boston, Mass.
Vectronics Microwave Corp., Middlesex, N.J.

Tuners, TV & FM

Nippon Electric/NEC America, N.Y., N.Y.
Oak Mfg., Crystal Lake, Ill.
Bogen Div., Paramus, N.J.
Davis J.W. & Co., Dallas, Texas
Ercona Corp., Bellmore, N.Y.
Gavin Instrs., Somerville, N.J.
General Instr. of Can., Waterloo, Ont., Can.
General Instr. Corp., Chicopee, Mass.
Heath Co., Benton Harbor, Mich.
Kalart Victor, Plainville, Conn.
Lear Siegler, Inc., Santa Monica, Calif.
Mallory Timers, Indpls., Ind.
Rystl Elctrns. Corp., N. Miami Beach, Fla.
Sparks Communications, Inc., Brownsville, Tex.
Trutone Elctrns., Inc., Van Nuys, Calif.
Waller Corp., Crystal Lake, Ill.

Tuning Forks

Accutronics, Inc., Geneva, Ill.
Bramco Controls, Piqua, Ohio
Fork Standards, W. Chicago, Ill.
Frequency Control, Inc., Austin, Tex.
Meloy Laboratories, Springfield, Va.
Philamon, Inc., Westbury, N.Y. .... p 1424
Central Scientific Co., Chicago, Ill.
HB Engrg. Corp., Silver Spring, Md.
Meson Elctrns. Co., Inc., Rochester, N.Y.
Muirhead, Inc., Mountainside, N.J.
Riverbank Labs., Geneva, Ill.

Turntables, Recording & Transcription

Alcor, Inc., Ithaca, N.Y.
Bogen Div., Paramus, N.J.
CCA Elctrns. Corp., Gloucester, N.J.
Collins Radio Co., Dallas, Tex.
Components Specialties, Inc., Freeport, N.Y.
Elpa Mktg. Inds., New Hyde Park, N.Y.
Empire Scientific Corp., Garden City, N.Y.
Gotham Audio Corp., New York, N.Y.
Gray Resch. & Dev. Co., E. Hartford, Conn.
Ortofon Div., New Hyde Park, N.Y.
RCA Corp., Camden, N.J.
Visual Educom, Michigan City, Ind.

Tweezers, Hand & Vacuum—See Vol 3

Twisters, Wire—See Wire Twisters—Vol 3

Twists, Waveguide—See Bends & Twists, Microwave

Typewriters, Input-Output (All Types)

(NES) Nationwide Elctrn. Sys., Itasca, Ill.
Facit-Odhner, Inc., Secaucus, N.J.
Friden Div., San Leandro, Calif.
IBM Corp., New York, NY

Ultrasonic Bonding Machines—See Machines, Ultrasonic Bonding

Ultrasonic Cleaners—See Cleaners, Ultrasonic

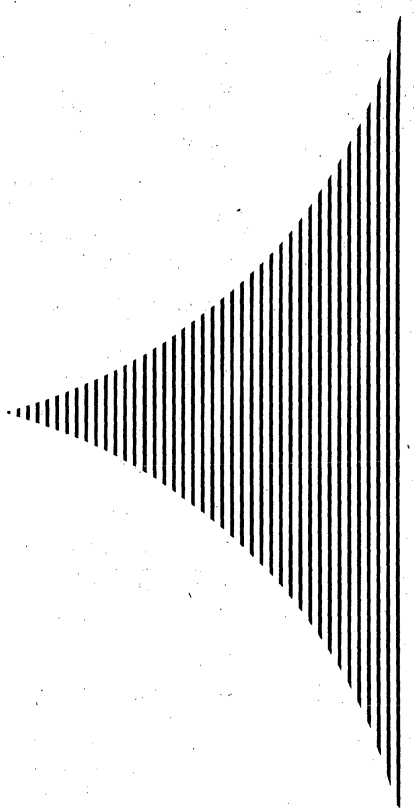
Ultrasonic Equip.—See Amplifiers; Analyzers; Controls, Indicators; Soldering Equip., etc.

Ultrasonic Guns

Advanced Patent Technology, Inc., Las Vegas, Nev.
Delta Sonics, Hawthorne, Cal
Du Kane Corp., St. Charles, Ill.
Nuclear Equip. Chem. Corp., Farmingdale, N.Y.

Ultraviolet Inspection Lighting-Also See Microscopes, Ultraviolet

American Ultraviolet Co., Chatham, N.J.
Atlantic Ultraviolet Corp., Long Island City, N.Y.
Black Light Corp. Amer., San Gabriel, Cal.
Black Light Eastern, Westbury, N.Y.
Black Light Prods., Chicago, Ill.
Dolan-Jenner Inds., Inc., Melrose, Mass.
Etchomatic, Inc., Waltham, Mass.
Gates, Geo. W. & Co., Franklin Sq., N.Y.
GTE Sylvania Inc., Danvers, Mass.
Hanovia Lamp Div., Newark, N.J.
International Light, Newburyport, Mass.
Magnaflux Corp., Chicago, Ill.
Oriel Optics Corp., Stamford, Conn.
Schoeffel Instr. Corp., Westwood, N.J.
Shannon Luminous Mat'ls., Hollywood, Cal.
Siemens Corp., Comps. Div., Iselin, N.J.
Stroblite Co., Inc., New York, N.Y.
Ultra-Violet Prods., Inc., San Gabriel, Cal.
VWR Scientific, San Francisco, Cal.
Westinghouse Elec., Bloomfield, N. J.



If you want to know

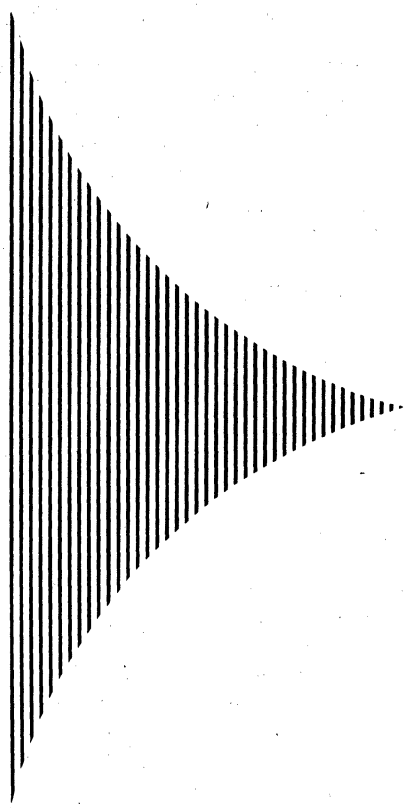
what manufacturers make what products, the **eem** green pages will solve your problem.

Product data is found

in the **eem** white pages they contain just about all the information you need to make a purchase decision.

If you're interested

in finding the address of a specific manufacturer, the **eem** yellow pages is the place to look.



Tell Them You Found It In eem

Ultraviolet Spectrophotometers—See Spectrophotometers

Underwater Communication, Detection, Navigation, etc. Equipment
American Elctrn. Labs., Inc., Lansdale, Pa.
CML-Macarr, Inc., Edison, N.J.
Data-Control Systems, Danbury, Conn.
Dranetz Engrg. Labs., Plainfield, N.J.
Electro-Mechanics Co., Austin, Tex.
Elctrn. Enterprises, Newark, N.J.
Ithaco, Inc., Ithaca, N.Y.
AMBAC Inds., Garden City, N.Y.
AMF Electical Prods., Alexandria, Va.
Arvin Sys., Inc., Dayton, Ohio
Bludworth Marine Div., Linden, N.J.
Bunker-Ramo Corp., Westlake Village, Cal
Chemalloy Elctrns., Santee, Cal.
Delta Elctrn. Control, Costa Mesa, Cal.
Dittmore-Freimuth Corp., Milwaukee, Wisc.
Echo Science Corp., Pasadena, Cal.
Edo Western Corp., Salt Lake City, Utah
Electro-Optical Systems, Pasadena, Cal.
Elctrn. Navigation Inds., Inc., Rochester, N.Y.
General Dynamics, San Diego, Cal.
General Instr. Corp., Westwood, Mass.
Goodyear Aerospace Corp., Akron, Ohio
GTE Sylvania Inc., Elctrn. Sys. Gp., Waltham, Mass.
Hermes Elctrns., Dartmouth N.S., Can.
Honeywell, Aerospace & Def., Minneapolis, Minn.
Hughes Aircraft Co, Fullerton, Cal.
Integrated Elctrns., Huntington Station, N.Y.
Int'l. Computer Prods., Dallas, Tex.
InterOcean Systems, San Diego, Cal.
Kollsman Instr. Corp., Syosset, N.Y.
Lear Siegler, Inc., Santa Monica, Calif.
Linden Labs., Inc., State College, Pa.
Massa Div., Hingham, Mass.
Nold, Walter, Co., Natick, Mass.
NUS Corp., Paramus, N.J.
Pickard & Burns Inc., Lindenhurst, N.Y.
Prodelin, Inc., Hightstown, N.J.
Raytheon Co., Lexington, Mass.
Ross Labs., Inc., Seattle, Wash.
Sanders Assocs., Ocean Sys., So. Nashua, N.H.
Scientific-Atlanta, Inc., Atlanta, Ga.
Sparton Corp., Jackson, Mich.
Sprengnether, W.F. Instr. Co., Inc., St. Louis, Mo.
Straza Inds., El Cajon, Calif.
Technical Mat'l., Mamaroneck, N.Y.
Telex Comm. Div., Minneapolis, Minn.
Topper Mfg. Co., Inc., Great Neck, N.Y.
Vitro Laboratories, Silver Spring, Md.
Westinghouse Elec. Corp., Pittsburgh, Pa.
Weston-Transicoil, Worcester, Pa.
Zero Mfg. Co., Burbank, Cal.

Urea Formaldehyde—See Plastic Raw Materials—Vol 3

Vacuum Equip., Deposition—See Depositiion Equip., Vacuum

Vacuum Fluorescent Readout Tubes—See Tubes, Readout—Vol 2

Vacuum Indicators—See Indicators, Vacuum

Vacuum Parts-Handling Tools—See Tools, Parts-Handling, Vacuum Operated—Vol 3

Vacuum-Tube Voltmeters—See Meters, Vacuum-Tube Volt

Valves, Cryogenic
Andonian Assocs., Inc., Waltham, Mass.
Atkomatic Valve Co., Indianapolis, Ind.
Automatic Switch Co., Florham Park, N.J.
Bendix Corp., Davenport, Iowa
Circle Seal Corp., Anaheim, Cal.
Consolidated Controls Corp., El Segundo, Calif.
Cooke Vacuum Prods., S. Norwalk, Conn.
Essex Cryogenics Inds., St. Louis, Mo.
Fluorocarbon Co., Anaheim, Cal.
Fox Valve Dev. Co., Inc., Hanover, N.J.
Foxboro Co., Foxboro, Mass.
Honeywell, Ft. Washington, Pa.
Hughes Aircraft Co, Culver City, Cal.
Mueller Brass Co., Port Huron, Mich.
Pennwalt Corp., Phila., Pa.
Pesco Prods., Bedford, Ohio
Task Corp., Anaheim, Calif.
United Elec. Controls Co., Watertown, Mass.
U.O.P. Instrs. Div., Greenwich, Conn.
Valcor Engrg. Corp., Kenilworth, N.J.
Wright Comps., Inc., Clifton Springs, N.Y.

Valves, Epitaxial Reactor
Applied Materials Tech., Inc., Santa Clara, Cal
Fox Valve Dev. Co., Inc., Hanover, N.J.
Valcor Engrg. Corp., Kenilworth, N.J.
Lunkenheimer Co., Cincinnati, Ohio

Valves, Nonmetallic—See Vol 3

Valves, Servo—See Vol 2

Valves, Solenoid—See Vol 2

Valves, Vacuum
Electro/Data, Inc., Garland, Tex.
Aero Vac Corp., Troy, N.Y.
Allis-Chalmers, Milwaukee, Wisc.
Aremco Prods., Inc., Briarcliff Manor, N.Y.
Automatic Switch Co., Florham Park, N.J.
Bendix, Utica, N.Y.
Bendix Corp., Davenport, Iowa
Bendix, Rochester, N.Y.
Central Scientific Co., Chicago, Ill.
Circle Seal Corp., Anaheim, Cal.
Cooke Vacuum Prods., S. Norwalk, Conn.
Denton Vacuum, Inc., Cherry Hill, N.J.
Edwards High Vacuum, Oakville, Ont., Can.
Edwards High Vacuum, Grand Island, N.Y.
Ferranti Ltd., Hollinwood, Lancs., England
Fox Valve Dev. Co., Inc., Hanover, N.J.
Granville-Phillips Co., Boulder, Colo.
High Vacuum Equip. Corp., Hingham, Mass.
High Voltage Engrg. Corp., Burlington, Mass.
Kinney Vacuum Co., Boston, Mass.
Laketown Mfg. Corp., Waconia, Minn.
Leybold-Heraeus, Monroeville, Pa.
Lunkenheimer Co., Cincinnati, Ohio
Norton Co., Newton, Mass.
Pennwalt Corp., Phila., Pa.
Skinner Elec. Valve Div., New Britain, Conn.
T-M Vacuum Prods., Riverton, N.J.
Taylor Instr. Process Control Div., Rochester, N.Y.
Torr Labs., Los Angeles, Cal.
Ultek Div., Palo Alto, Calif.
Vactronic Lab. Equip., Inc., E. Northport, N.Y.
Vacuum Equip. Div., Newton, Mass.
Vacuum Inds., Inc., Somerville, Mass.
Vacuum Resch. Mfg., San Ramon, Cal.
Valcor Engrg. Corp., Kenilworth, N.J.
Varian Assocs., Palo Alto, Cal.
Varian Assocs., Vacuum Div., Palo Alto, Cal.
Veeco Instrs., Inc., Plainview, N.Y.
Wright Comps., Inc., Clifton Springs, N.Y.

Vapor Cooling Systems, Vacuum Tube—See Vol 2

Vapor Degreasers—See Machines, Vapor-Degreasing

Varactors—See Diodes, Varactor—Vol 2

Varistors—See Resistors, Voltage Sensitive—Vol 3

Varnish—See Insulating Compounds, Varnish—Vol 3

Vehicle Guidance Systems (Industrial)—See Machines, Material Handling (Electronic Control)

Verification Systems, Tape
Data-Control Systems, Danbury, Conn.
Datacom, Inc., Ft. Walton Bch., Fla. p 344
(NES) Nationwide Elctrn. Sys., Itasca, Ill.
Remex Elctrns., Santa Ana, Cal.
Tektronix, Inc., Beaverton, Ore.
Adar Assocs., Cambridge, Mass.
Boston Digital Corp., Ashland, Mass.
Defense Elctrns., Inc., Rockville, Md.
Friden Div., San Leandro, Calif.
Gerber Sci. Instr. Co., Hartford, Conn.
Hughes Aircraft Co, Culver City, Cal.
Sanders Assocs., Inc., Data Sys. Div., Nashua, N.H.

VHF Equipment—See Generators; Receivers; etc.

Vibration Analyzers—See Analyzers, Vibration

Vibration Measurement Instruments—See Meters, Vibration

Vibration Mounts—See Mounts, Shock & Vibration—Vol 3

Vibration Test Systems-Also See Services, Environmental Test
Bafco, Inc., Warminster, Pa. ..... **p 412**
Data-Control Systems, Danbury, Conn.
Dytronics Co., Columbus, Ohio .... **p 441**
Elgenco, Inc., Santa Monica, Cal.
Tektronix, Inc., Beaverton, Ore.
Teledyne Geotech, Dallas, Tex.
Aeroflex Labs., Plainview, N.Y.
AGAC-Derritron, Inc., Alexandria, Va.
Ametek/Testing Equip. Sys., Lausdale, Pa.
Applied Systems Corp., Detroit, Mich
Audio Instr. Co., Union City, N.J.
Auto Control Labs., Los Angeles, Calif.
B & K Instrs., Inc., Cleveland, Ohio
Baganoff Assocs., Inc., St. Louis, Mo.
Barry Controls, Watertown, Mass.
Bell & Howell Co., Pasadena, Calif.
Chadwick-Helmuth Co., Inc., Monrovia, Calif.
Columbia Resch. Labs., Woodlyn, Pa.
Dynamic Data Corp., Columbus, Ohio
Endevco, Pasadena, Calif.
Epic, Inc., New York, N.Y.
General Oceanology, Inc., Cambridge, Mass.
General Radio Co., Concord, Mass.
Hughes Aircraft Co, Culver City, Cal.
Hughes Aircraft Co, Fullerton, Cal.
Indikon Co., Watertown, Mass.
IRD Mechanalysis, Inc., Columbus, Ohio
Kistler Instr. Co., Redmond, Wash.
L.A.B. Corp., Skaneateles, N.Y.
Ling Elctrns., Anaheim, Calif.
Massa Div., Hingham, Mass.
MB Elctrns/Textron Co., New Haven, Conn.
Ogden Technology Labs., Fullerton, Cal.
Optron Corp., Woodbridge, Conn.
Philips Elctrn. Instrs., Mt. Vernon, N.Y.
Signal Analysis Inds. Corp., Hauppauge, N.Y.
Spectral Dynamics Corp. San Diego, San Diego, Cal.
Sprengnether, W.F. Instr. Co., Inc., St. Louis, Mo.
Torr Labs., Los Angeles, Cal.
Unholtz-Dickie Corp., Hamden, Conn.
Wyle Labs., El Segundo, Calif.
Zonic Tech. Labs., Cincinnati, Ohio

Vibrating Capacitors—See Vol 2

Vibrators (Frequency Converting)—See Vol 2

Video Analyzers—See Analyzers, Video

Vidicon Tubes—See Tubes, TV Camera Pickup—Vol 2

Viewing Hoods, Cathode Ray Tube—See Vol 3

Vinyl Compounds—See Plastic Raw Materials—Vol 3

Viscosity Indicators—See Indicators, Viscosity—Vol 2

Visual Control Boards, Charts & Graphs—See Boards, Graphic,Visual Control

VLF Equipment—See Receivers; Transmitters; etc.

Voltage Comparators—See Comparators, Voltage

Voltage Regulators—See Regulators & Stabilizers, Voltage

Voltage Source
Astro-Space Labs., Huntsville, Ala
Behlman Div., San Diego, Cal
California Elctrn. Mfg. Co., Alamo, Calif.
Fluke, John Mfg. Co., Inc., Seattle, Wash. ..... **p 474,476**
Julie Research Lab., New York, N.Y. **p 502**
Kepco, Inc., Flushing, N.Y. ..... **p 761**
Systron-Donner Corp., Concord, Cal. **p 565**
Systron-Donner Alpha Div., Oakland, Cal. ..... **p 565**
Systron-Donner Concord Instr. Div., Concord, Cal. ..... **p 565**
Systron-Donner Kruse Elctrns. Sub., Mountain View, Cal. ..... **p 565**
Western Reserve Elctrns., Twinsburg, Ohio
Analogic, Wakefield, Mass.
AUL Instrs., Inc., Flushng, N.Y.
California Instrs. Co., San Diego, Cal.
Cohu Elctrns., Inc., San Diego, Calif.
Components Specialties, Inc., Freeport, N.Y.
Constant Voltage Co., Chicago, Ill.
Keithley Instrs., Inc., Cleveland, Ohio

Voltmeters—See Meters, Volt

Wafer Fabrication, Semiconductor—See Semiconductor Wafer Fabrication—Vol 2

Washers—See Fasteners—Vol 3

Water Coils, Tube Cooling—See Vol 2

Wave Soldering Equipment—See Soldering Equip, Printed Circuit—Vol 3

Waveform Analyzers—See Analyzers, Waveform

Waveguide-Coax Adapters—See Vol 2

Waveguides, Circular—See Vol 2

Waveguides, Flexible—See Vol 2

Waveguides, Rectangular—See Vol 2

Waveguides, Rigid—See Vol 2

Wave Traps—See Filters, Antenna; Filters, Microwave; etc.—Vol 2

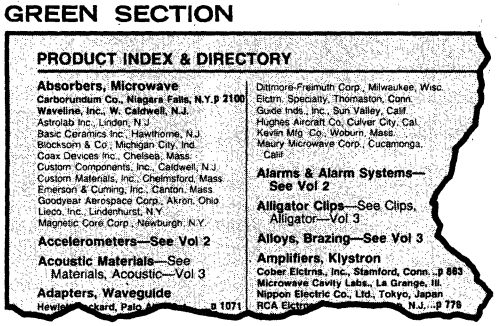
Wax—See Insulating Compounds, Wax—Vol 3

Weatherstrip, Electronic—See Vol 3

How to use eem

to find manufacturers of a specific product

GREEN SECTION


PRODUCT INDEX & DIRECTORY

Absorbers, Microwave
Carborundum Co., Niagara Falls, N.Y.p 2100
Waveline, Inc., W. Caldwell, N.J.
Astrolab Inc., Linden, N.J.
Basic Ceramics Inc., Hawthorne, N.J.
Blocksom & Co., Michigan City, Ind.
Coax Devices Inc., Chelsea, Mass.
Custom Components, Inc., Caldwell, N.J.
Custom Materials, Inc., Chelmsford, Mass.
Emerson & Cuming, Inc., Canton, Mass.
Goodyear Aerospace Corp., Akron, Ohio
Lieco, Inc., Lindenhurst, N.Y.
Magnetic Core Corp., Newburgh, N.Y.

Accelerometers—See Vol 2

Acoustic Materials—See Materials, Acoustic—Vol 3

Adapters, Waveguide
Hewlett-Packard, Palo Alto ... p 1071
Dittmore-Freimuth Corp., Milwaukee, Wisc.
Elctrn. Specialty, Thomaston, Conn.
Gude Inds., Inc., Sun Valley, Calif.
Hughes Aircraft Co, Culver City, Cal.
Kevlin Mfg. Co., Woburn, Mass.
Maury Microwave Corp., Cucamonga, Calif.

Alarms & Alarm Systems—See Vol 2

Alligator Clips—See Clips, Alligator—Vol 3

Alloys, Brazing—See Vol 3

Amplifiers, Klystron
Cober Elctrns., Inc., Stamford, Conn. ..p 863
Microwave Cavity Labs., La Grange, Ill.
Nippon Electric Co., Ltd., Tokyo, Japan
RCA Elctrn. ... N.J. ...p 778

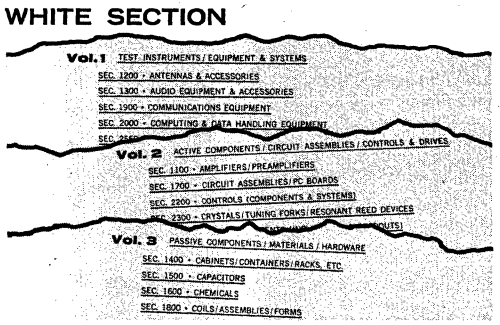
Each of the three volumes of **eem** contains a Product Index and Directory, the Green Section. This Index is a complete alphabetical listing of products. If the product you are looking for appears in the particular volume you are consulting, the green pages will provide a complete list of manufacturers who make that product. If the product is included in another volume of **eem**, the Index will provide a cross reference, directing you to the correct volume.

Boldface listings under product headings indicate that the listed manufacturer has products cataloged in **eem. Boldface** listings with page numbers indicate that this manufacturer's catalog pages include detailed data on the product indicated in the product heading.

Similar products are grouped together. For example, the many kinds of meters are listed in this manner: "Meters, Ampere," "Meters, Capacitance," "Meters, Flux" etc. To help you locate the prime product heading, there are hundreds of cross references, e.g. "Voltmeters — See Meters, Volt."

to find manufacturers' catalog information

WHITE SECTION


Vol. 1 TEST INSTRUMENTS / EQUIPMENT & SYSTEMS
SEC. 1200 • ANTENNAS & ACCESSORIES
SEC. 1300 • AUDIO EQUIPMENT & ACCESSORIES
SEC. 1900 • COMMUNICATIONS EQUIPMENT
SEC. 2000 • COMPUTING & DATA HANDLING EQUIPMENT
SEC. 2[illegible]
Vol. 2 ACTIVE COMPONENTS / CIRCUIT ASSEMBLIES / CONTROLS & DRIVES
SEC. 1100 • AMPLIFIERS/PREAMPLIFIERS
SEC. 1700 • CIRCUIT ASSEMBLIES/PC BOARDS
SEC. 2200 • CONTROLS (COMPONENTS & SYSTEMS)
SEC. 2300 • CRYSTALS/TUNING FORKS/RESONANT REED DEVICES
SEC. 2[illegible] [illegible]OUITS]
Vol. 3 PASSIVE COMPONENTS / MATERIALS / HARDWARE
SEC. 1400 • CABINETS/CONTAINERS/RACKS, ETC.
SEC. 1500 • CAPACITORS
SEC. 1600 • CHEMICALS
SEC. 1800 • COILS/ASSEMBLIES/FORMS

Catalog pages in **eem** are divided into three volumes based on very broad product groupings. These are:

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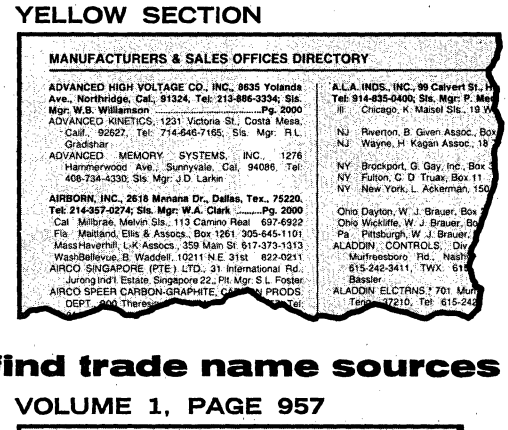
Volume 2 — Active Components / Circuit Assemblies / Controls and Drives

Volume 3 — Passive Components / Materials / Hardware

These volumes are further divided into 55 **eem** Product Sections which are assigned individually to the most appropriate volume. Within each of the 55 product sections manufacturers are arranged alphabetically, wherever possible. A complete index of all manufacturers' catalog pages is included in every volume. To locate the catalog pages of a specific manufacturer, refer to this index at the beginning of the white section in any of the three volumes. This index will provide the page numbers you require. In Volume 1, the index begins on page 302, in Volume 2 on page 1274 and in Volume 3, page 2310.

to find manufacturers' addresses, phones and sales offices

YELLOW SECTION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ADVANCED HIGH VOLTAGE CO., INC., 8635 Yolanda Ave., Northridge, Cal., 91324, Tel: 213-886-3334; Sls. Mgr. W.B. Williamson .....Pg. 2000
ADVANCED KINETICS, 1231 Victoria St., Costa Mesa, Calif., 92627, Tel: 714-646-7165; Sls. Mgr: R.L. Gradishar
ADVANCED MEMORY SYSTEMS, INC., 1276 Hammerwood Ave., Sunnyvale, Cal, 94086, Tel: 408-734-4330; Sls. Mgr: J.D. Larkin

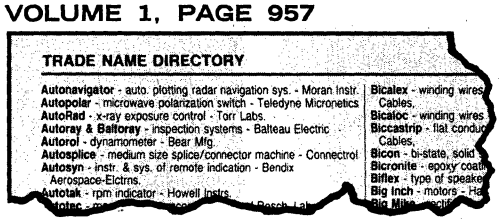
AIRBORN, INC., 2618 Manana Dr., Dallas, Tex., 75220. Tel: 214-357-0274; Sls. Mgr: W.A. Clark .....Pg. 2000
Cal. Millbrae, Melvin Sls., 113 Camino Real 697-6922
Fla. Maitland, Ellis & Assocs., Box 1261, 305-645-1101
Mass. Haverhill, L-K Assocs., 359 Main St. 617-373-1313
Wash. Bellevue, B. Waddell, 10211 N.E. 31st 822-0211
AIRCO SINGAPORE (PTE.) LTD., 31 International Rd., Jurong Ind'l. Estate, Singapore 22., Plt. Mgr: S.L. Foster
AIRCO SPEER CARBON-GRAPHITE, CA[illegible] PRODS. DEPT., 900 There[illegible] Tel:

A.L.A. INDS., INC., 99 Calvert St., H[illegible] Tel: 914-835-0400; Sls. Mgr: P. Mei[illegible]
Ill. Chicago, K. Maisel Sls., 19 W[illegible]
NJ Riverton, B. Given Assoc., Box[illegible]
NJ Wayne, H. Kagan Assoc., 18[illegible]
NY Brockport, G. Gay, Inc., Box[illegible]
NY Fulton, C. D. Truax, Box 11
NY New York, L. Ackerman, 150[illegible]
Ohio Dayton, W. J. Brauer, Box[illegible]
Ohio Wickliffe, W. J. Brauer, Bo[illegible]
Pa. Pittsburgh, W. J. Brauer, [illegible]
ALADDIN CONTROLS, Div. [illegible] Murfreesboro Rd., Nashv[illegible] 615-242-3411, TWX 615[illegible] Bassler
ALADDIN ELCTRNS.,* 701 Mur[illegible] Tenn., 37210, Tel: 615-242[illegible]

More than 6,000 manufacturers of electronic components, materials, instruments, assemblies, systems and key services are listed in the Yellow Section. An identical Yellow Section appears in each of the three volumes of **eem,** listing addresses, phone numbers and sales managers' names. TWX numbers are also included where available. **Boldface** listings indicate that detailed information on the manufacturers' products is cataloged in the White Section of **eem. Boldface** listings also indicate that local sales offices or representatives are listed for that manufacturer.

to find trade name sources

VOLUME 1, PAGE 957


TRADE NAME DIRECTORY

Autonavigator - auto. plotting radar navigation sys. - Moran Instr.
Autopolar - microwave polarization switch - Teledyne Micronetics
AutoRad - x-ray exposure control - Torr Labs.
Autoray & Baltoray - inspection systems - Balteau Electric
Autorol - dynamometer - Bear Mfg.
Autosplice - medium size splice/connector machine - Connectrol
Autosyn - instr. & sys. of remote indication - Bendix Aerospace-Elctrns.
Autotak - rpm indicator - Howell Instrs.
[illegible] - [illegible] - Rosch Lab
Bicalex - winding wires, Cables,
Bicaloc - winding wires
Biccastrip - flat conduc[illegible] Cables,
Bicon - bi-state, solid
Bicronite - epoxy coati[illegible]
Biflex - type of speake[illegible]
Big Inch - motors - Hi[illegible]
Big Mike - [illegible]

If you know only the trade name, brand name or trade mark of a product, you can locate it in **eem** by using the **Trade Name Directory.** This appears only in Volume 1, beginning on page 957 of the White Section. These pages can be identified by a vertical black band along the outside edge.

if you require additional assistance

contact the Editorial Department, United Technical Publications, Inc., 645 Stewart Ave., Garden City, N.Y. 11530, or phone (516) 248-9700.

Welding Equip. & Access.-Also See Controls, Welding; Timers,Welding

Del Elctrns. Corp., Mt. Vernon, N.Y.
International Rectifier, El Segundo, Cal.
Kahle Engrg. Co., Union City, N.J. p 947
Raytheon Co., Manchester, N.H.
Triac Elctrn. Sys., N.Y., N.Y.
American Electric & Machine Co., Upper Saddle River, N.J.
ARC Prods. Div., Chicago, Ill.
Arizona Elctrns., Inc., Benson, Ariz.
Cam-Lok Div., Cincinnati, Ohio
Communications Tech. Corp., Los Angeles, Cal.
Conrac Corp., New York, N.Y.
Electro Powerpacs Corp., Cambridge, Mass.
Eutectic Corp., Flushing, N.Y.
Ewald Instrs. Corp., Kent, Conn.
Falstrom Co., Passaic, N.J.
Flexion Corp., Santa Barbara, Cal.
Forney Inds., Inc., Fort Collins, Colo.
Freudenberg, B., Inc., New York, N.Y.
GTE Sylvania, Inc., Towanda, Pa.
Hamilton Standard, Windsor Locks, Conn.
Henes Mfg. Co., Phoenix, Ariz.
Hobart Bros. Co., Troy, Ohio
Hughes Aircraft Co., Ind'l. Prods. Div., Oceanside, Cal.
Hughes Aircraft Co., Vacuum Tube Prods. Div/Welding Equip., Oceanside, Calif.
Lenco, Inc., Jackson, Mo.
Lincoln Elec. Co., Cleveland, Ohio
Mallory Metallurgical, Indianapolis, Ind.
Maryland Lava Co., Bel Air, Md.
Microflame, Inc., Minneapolis, Minn.
Miller Elec. Mfg. Co., Appleton, Wisc.
Nat'l-Standard Co., Niles, Mich.
National-Standard Co., Strongsville, Ohio
Nelson Stud Welding Co., Lorain, Ohio
Porter, H.K. Co., Inc., Pittsburgh, Pa.
Price & Rutzebeck, Hayward, Calif.
Robotron Corp., Detroit, Mich.
Sciaky Bros., Inc., Chicago, Ill.
Scientific Elec., Inc., Garfield, N.J.
Silver, G.H. & Assocs., Newtonville, Mass.
Square D Co., Park Ridge, Ill.
Taylor-Winfield Corp., Warren, Ohio
Tekform Prods. Co., Anaheim, Cal.
Tempil Div., So. Plainfield, N.J.
Tempress Inds., Inc., Los Gatos, Calif.
Thomson Gen'l. Corp., Lynn, Mass.
Trindl Prods., Inc., Chicago, Ill.
Unibraze Corp, White Plains, N.Y.
Unitek Corp., Monrovia, Calif.
Walters, W.A., Inc., Chicago, Ill.
Westberg Mfg. Co., Sonoma, Cal.
Westinghouse Elec., Sykesville, Md.
Westinghouse Elec. Corp., Pittsburgh, Pa.

Welding Equip., Semiconductor Devices

Hughes Aircraft Co., Mos Div., Newport Beach, Cal.
International Rectifier, El Segundo, Cal.
Kahle Engrg. Co., Union City, N.J. p 947
Raytheon Co., Manchester, N.H.
Associate General Labs., Inc., Brookfield, Ill.
Communications Tech. Corp., Los Angeles, Cal.
Ewald Instrs. Corp., Kent, Conn.
Freudenberg, B., Inc., New York, N.Y.
Hadron Inc., Westbury, N.Y.
Hamilton Standard, Windsor Locks, Conn.
Hughes Aircraft Co., Vacuum Tube Prods. Div/Welding Equip., Oceanside, Calif.
Inspection Systems, Hawthorne, Calif
Korad Mat'ls. Sys. Div., Santa Monica, Cal.
Robotron Corp., Detroit, Mich.
Sonobond Corp., West Chester, Pa.
Tekform Prods. Co., Anaheim, Cal.
Tempress Inds., Inc., Los Gatos, Calif.
Thomson Gen'l. Corp., Lynn, Mass.
Unitek Corp., Monrovia, Calif.
Unitron Inds. Corp., Taipei, Taiwan, Republic of China

Welding & Refining Equip., Electron Beam

Del Elctrns. Corp., Mt. Vernon, N.Y.
Cooke Vacuum Prods., S. Norwalk, Conn.
Denton Vacuum, Inc., Cherry Hill, N.J.
Flexion Corp., Santa Barbara, Cal.
Hamilton Standard, Windsor Locks, Conn.
Norton Co., Newton, Mass.
Nuclide Corp., N. Acton, Mass.
Sciaky Bros., Inc., Chicago, Ill.
Torr Labs., Los Angeles, Cal.
Westinghouse Elec. Corp., Pittsburgh, Pa.

Whip Antennas—See Antennas, Mobile

Whiteprint Machines—See Vol 3

Wind Direction Indicators—See Indicators, Wind Direction

Wind Speed Indicators—See Indicators, Wind Speed

Windings, Transformer—See Vol 3

Windows, Infrared

Amersil, Inc., Hillside, N.J.
General Elec., Richmond Hgts., Ohio p 2811
Ohio Semitronics, Columbus, Ohio
Advanced Kinetics, Costa Mesa, Calif.
Alberox Corp., New Bedford, Mass.
Barnes Engrg. Co., Stamford, Conn.
Bausch & Lomb, Rochester, N.Y.
Ceramaseal, Inc., New Lebanon Center, N.Y.
Corning Glass Works, Tech. Prods. Div., Corning, N.Y.
Dell Optics Co., Inc., N. Bergen, N.J.
Eimac, San Carlos, Calif.
Esco Products, Oak Ridge, NJ
Exotic Materials, Inc., Costa Mesa, Cal.
GTE Sylvania, Inc., Towanda, Pa.
Harshaw Chem. Co., Cleveland, Ohio
Hughes Aircraft Co, Culver City, Cal.
Infrared Inds., Inc., Santa Barbara, Cal.
Insaco, Inc., Quakertown, Pa.
Isomet Corp., Oakland, N.J.
Jones, A.D. Optical Works, Burlington, Mass.
Kopp Glass, Inc., Pittsburgh, Pa.
Liberty Mirror Div., Brackenridge, Pa.
Moser Jewel Co., Perth Amboy, N.J.
O & S Research, Inc., Riverton, N.J.
Optical Inds., Santa Ana, Cal.
Quartz & Silice, Paris 8e, France
Republic Lens Co., Inc., Bronx, N.Y.
Santa Barbara Resch. Ctr., Goleta, Calif.
Servo Corp. America, Hicksville, N.Y.
Syncor Prods. Co., Inc., Malden, Mass.
Texas Instruments, Inc., Dallas, Tex.
Union Carbide, San Diego, Cal.

Windows, Pressure Type

American Elctrn. Labs., Inc., Lansdale, Pa.
Glass Tech., Newport Bch., Cal.
Ceramaseal, Inc., New Lebanon Center, N.Y.
Dell Optics Co., Inc., N. Bergen, N.J.
Device Seals, Inc., Sun Valley, Calif.
Eimac, San Carlos, Calif.
Electro-Optical Div., Northampton, Mass.
Electron Technology, Inc., Kearny, N.J.
Esco Products, Oak Ridge, NJ
Filmohm Div., Long Island City, N.Y.
Franklin Fibre-Lamitex, Wilmington, Del.
Granville-Phillips Co., Boulder, Colo.
Herley Inds., Inc., Syosset, N.Y.
Jones, A.D. Optical Works, Burlington, Mass.
Liberty Mirror Div., Brackenridge, Pa.
MCS Corp., Monrovia, Calif.
Microwave Assocs., Inc., Burlington, Mass.
O & S Research, Inc., Riverton, N.J.
Premier Microwave, Port Chester, N.Y.
Richland Glass Co., Inc., Richland, N.J.
Varian Assocs., Vacuum Div., Palo Alto, Cal.
Veritron West, Inc., Chatsworth, Calif.

Windows, Shieled—See Vol 3

Windows, Waveguide—See Vol 2

Wire, Antenna (All Types)—See Vol 3

Wire, Asbestos Insulated—See Vol 3

Wire, Bare, Aluminum—See Vol 3

Wire, Bare, Beryllium Copper—See Vol 3

Wire, Bare, Brass—See Vol 3

Wire, Bare, Columbium—See Vol 3

Wire, Bare, Composite Metals—See Vol 3

Wire, Bare, Copper—See Vol 3

Wire, Bare, Copper-Clad—See Vol 3

Wire, Bare, Fine, Specialties—See Vol 3

Wire, Bare, Gold & Gold-Plated—See Vol 3

Wire, Bare, Molybdenum—See Vol 3

Wire, Bare, Nickel—See Vol 3

Wire, Bare, Nickel-Chrome—See Vol 3

Wire, Bare, Nickel-Clad Copper—See Vol 3

Wire, Bare, Phosphor Bronze—See Vol 3

Wire, Bare, Platinum—See Vol 3

Wire, Bare, Silver-Plated—See Vol 3

Wire, Bare, Stainless-Steel—See Vol 3

Wire, Bare, Steel (Excluding Guy Wire)—See Vol 3

Wire, Bare, Tantalum—See Vol 3

Wire, Bare, Titanium—See Vol 3

Wire, Bare, Tungsten—See Vol 3

Wire, Bare, Zirconium—See Vol 3

Wire, Braid (Excluding Shielding)—See Vol 3

Wire, Braid (Shielding)—See Braid, Cable & Wire Shielding—Vol 3

Wire, Bridge—See Vol 3

Wire, Ceramic Insulated—See Vol 3

Wire, Enamel Insulated—See Wire, Hookup, Pushback (All Types)—Vol 3

Wire, Fiberglass Insulated—See Wire, Glass Insulated—Vol 3

Wire, Fine, Bare Or Insulated—See Wire, Bare, Fine, Specialties—Vol 3

Wire, Flat Strip—See Cable, Flat—Vol 3

Wire, Floor, Insulated—See Vol 3

Wire, Fuse—See Vol 3

Wire, Gear Measuring—See Gear Measuring Wire—Vol 3

Wire, Glass Insulated—See Vol 3

Wire, Guy—See Vol 3

Wire, Heater—See Cable, Heater—Vol 3

Wire, High Temperature—See Vol 3

Wire, High Voltage—See Vol 3

Wire, Hookup-Pushback (All Types)—See Vol 3

Wire, Irradiated—See Vol 3

Wire, Lead-In & Ground—See Vol 3

Wire, Litz—See Vol 3

Wire, Magnet—See Vol 3

Wire, Mesh—See Vol 3

Wire, Multiconductor—See Cable, Multiconductor—Vol 3

Wire, Plastic Insulated—See Wire, Hookup-Pushback—Vol 3

Wire, Potentiometer Winding—See Vol 3

Wire, Radiation-Resistant—See Vol 3

Wire, Recording—See Vol 3

Wire, Refractory Metal—See Vol 3

Wire, Resistance & Filament—See Vol 3

Wire, Resistance Thermometer—See Vol 3

Wire, Resistor Winding—See Vol 3

Wire, Ribbon—See Vol 3

Wire, Semiconductor Lead—See Vol 3

Wire, Shielded—See Vol 3

Wire, Strain Gauge—See Vol 3

Wire, TFE Insulated—See Vol 3

Wire, Test Lead—See Vol 3

Wire, Thermocouple—See Vol 3

Wire, Tinsel—See Vol 3

Wire, Transmission—See Cable, Transmission Line—Vol 3

Wire, Tungsten—See Vol 3

Wire & Cable Ties—See Vol 3

Wire Cutters, Automatic

ETC, Inc., Cleveland, Ohio
American Pamcor, Inc., Paoli, Pa
Automatic Die Cutting Mach. Co., New York, N.Y.
Eraser Co., Syracuse, N.Y.
Eubanks Engrg., Monrovia, Calif.
Janel, Inc., Stirling, N.J.
MacDonald & Co., Glendale, Calif.
Porter, H.K., Inc., Somerville, Mass.
Techni-Tool, Inc., Philadelphia, Pa.
Western Elctrn. Prods. Co., San Clemente, Cal.
Wybar Elctrns., Inc., Syracuse, N.Y.

Wire Cutters, Hand Operated—See Vol 3

Wire Cutting & Stripping Services—See Services, Wire Cutting & Stripping—Vol 3

Wire Forms—See Forms, Wire—Vol 3

Wire Markers (All Types)-Also See Strips, Marker & Fanning—See Vol 3

Wire-Marking Machines, Automatic

Ackerman Gould Co., Inc., Oceanside, N.Y.
Acromark Co., Berkeley Hts, N.J.
Artos Engrg. Co., New Berlin, Wisc.
Brady, W.H. Co., Milwaukee, Wisc.
Conrac Corp., New York, N.Y.
Formulabs Ind'l. Inks, Escondido, Cal.
Geartronics Corp., N. Billerica, Mass.
Gillies, Duncan M. Co., Inc., W. Boylston, Mass.
Ind'l. Winding Mach., River Edge, N.J.
Kingsley Mach. Co., Hollywood, Calif.
Manger Elec. Co., Inc., Stamford, Conn.
Matthews, Jas & Co., Pittsburgh, Pa.
Wharton Unitools, Moosup, Conn.

Wire-Marking Machines, Hand Operated

Aero Devices, Inc., Totowa, N.J.
Ackerman Gould Co., Inc., Oceanside, N.Y.
Acromark Co., Berkeley Hts, N.J.
Formulabs Ind'l. Inks, Escondido, Cal.
Gillies, Duncan M. Co., Inc., W. Boylston, Mass.
Kingsley Mach. Co., Hollywood, Calif.
Matthews, Jas & Co., Pittsburgh, Pa.

Wire Measuring & Cutting Machines

Durant Digital Instrs., Milwaukee, Wisc. p 1316
Birnbach Co., Inc., Freeport, N.Y.
Conrac Corp., New York, N.Y.
Eraser Co., Syracuse, N.Y.
Formulabs Ind'l. Inks, Escondido, Cal.
Foster & Allen, Inc., Chatham, N.J.
Hykon Mfg. Co., Alliance, Ohio
Laser Technology, Inc., N. Hollywood, Calif.
Manger Elec. Co., Inc., Stamford, Conn.
Olympic Instrs., Inc., Vashon, Wash.
Western Elctrn. Prods. Co., San Clemente, Cal.
Wybar Elctrns., Inc., Syracuse, N.Y.

Wire-Measuring Gauges—See Vol 3

Wire Shielding—See Vol 3

Wire Strippers, Automatic

Addison Div., Mountainside, N.J.
Artos Engrg. Co., New Berlin, Wisc.
Carpenter Mfg. Co., Inc., Manlius, N.Y.
Eraser Co., Syracuse, N.Y.
Eubanks Engrg., Monrovia, Calif.
Ewald Instrs. Corp., Kent, Conn.
Gardner-Denver Co., Quincy, Ill.
High Speed Hammer Co., Inc., Rochester, N.Y.
Hughes Aircraft Co, Culver City, Cal.
Ideal-Hellermann Can., Ltd., Ajax, Ont., Can.
Ind'l. Winding Mach., River Edge, N.J.
Janel, Inc., Stirling, N.J.
MacDonald & Co., Glendale, Calif.
Manger Elec. Co., Inc., Stamford, Conn.
Omega Engrg., Inc., Stamford, Conn.
Taylor-Winfield Corp., Warren, Ohio
Techni-Tool, Inc., Philadelphia, Pa.
Tech. Devices Co., Culver City, Calif.
Thomas & Betts Co., Elizabeth, N.J.
Thomas Instrument Co., Phoenix, N.Y.
Western Elctrn. Prods. Co., San Clemente, Cal.
Wybar Elctrns., Inc., Syracuse, N.Y.

Wire Strippers, Hand Operated—See Vol 3

Wire Strippers, Thermal—See Vol 3

Wire Stripping Chemicals—See Chemicals, Wire Stripping—Vol 3

Wire Twisters, Automatic

Jonard Inds. Corp., Bronx, N.Y.
Victor Wire & Cable, L.A., Cal.
Carpenter Mfg. Co., Inc., Manlius, N.Y.
Eraser Co., Syracuse, N.Y.
Geartronics Corp., N. Billerica, Mass.
Hanscom, H.F. Co., Inc., Providence, R.I.
Janel, Inc., Stirling, N.J.
MacDonald & Co., Glendale, Calif.
Techni-Tool, Inc., Philadelphia, Pa.
Wybar Elctrns., Inc., Syracuse, N.Y.

Wire Twisters, Hand Operated—See Vol 3

Wire Wrapping Services—See Services, Wire Wrapping—Vol 3

Wire Wrapping Tools & Accessories-Also See Machines, Wire Wrapping—See Vol 3

Wiring Panels & Boards, Computer—See Boards, Programming

Work Positioners, Circuit Board & Chassis—See Holders & Jigs—Vol 3

Work Stations, Clean, Dust Free

Agnew-Higgins, Inc., Garden Grove, Calif.
Ajusto Equip. Co., Bowling Green, Ohio
American Air Filter, Louisville, Ky.
Amsco Industrial Co., Erie, Pa.
Baker Co., Inc., Biddeford, Me.
Clean Rooms Constr., Westminster, Cal.
Controlled Environment Equip. Corp., Newton Upper Falls, Mass.
Edcraft Inds., Inc., Linden, N.J.
General Acoustics Corp., Los Angeles, Calif.
Janel, Inc., Stirling, N.J.
Matthews Resch., Inc., Alexandria, Va.
Pressteel Co., El Monte, Calif.
Ray Prods., Inc., Alhambra, Calif.
Sara Scientific Co., San Francisco, Calif.
Sturdilite Sci. Furniture Sys., Plainwell, Mich
Techni-Tool, Inc., Philadelphia, Pa.
Tenney Engrg., Inc., Union, N.J.
Torit Corp., St. Paul, Minn.
Westinghouse Elec., Grand Rapids, Mich.

Wrenches—See Vol 3

X-Ray Inspection Equipment

AMBAC Inds., Garden City, N.Y.
Automation Inds., Los Angeles, Cal.
Automation Inds., Danbury, Conn.
Balteau Electric Corp., Stamford, Conn.
Bendix Corp., Ann Arbor, Mich.
Bendix, Dayton, Ohio
Blu-Ray Inc., Essex, Conn.
Eastern Delta Corp., Fair Lawn, N.J.
E.I. DuPont DeNemours & Co., Wilmington, Del.
Ercona Corp., Bellmore, N.Y.
Gagne Assocs., Inc., Binghamton, N.Y.
General Elec. Co., W. Lynn, Mass.
High Voltage Engrg. Corp., Burlington, Mass.
Ind'l. Gauging & Control, Norwalk, Conn.
Isomet Corp., Oakland, N.J.
Kaman Nuclear, Colorado Springs, Colo.
Magnaflux Corp., Chicago, Ill.
Merix Chem. Co., Chicago, Ill.
Neumade Prods. Corp., Scarsdale, N.Y.
Nuclear Diodes, Prairie View, Ill.
Nuclear Resch. Corp., Southampton, Pa.
Philips Broadcast Equipment Corp., Montvale, N.J.
Philips Elctrn. Instrs., Mt. Vernon, N.Y.
Press-On Prods., Addison, Ill.
Testing Equip. & Supplies Corp., Natick, Mass.
Torr Labs., Los Angeles, Cal.
Varian Assocs., Palo Alto, Cal.

X-Ray Intensity Meters—See Meters, X-Ray Intensity

X-Y Axis Tables—See Simulators, Motion

Xenon Lamp Power Supplies—See Power Supplies, ARC Lamp

YIG Crystals—See Crystals, YIG

Yokes, Deflection, Oscilloscope—See Vol 3

Yokes, Deflection, Radar PPI—See Vol 3

Yokes, Deflection, Cathode-Ray Tube—See Vol 3

Yokes, Deflection, TV Camera—See Vol 3

Yokes, Rotating Coil—See Vol 3

Zener Diodes—See Diodes, Zener—Vol 2

Zipper Tubing—See Tubing, Zipper—Vol 3

Zone Boxes, Thermocouple—See Thermocouples, Elements & Acessories—Vol 2

This is the Last Page of the Product Index/Directory — Volume 1.

Next page is 1273

1971-72 eem

55 PRODUCT SECTIONS IN 3 VOLUMES

TEST INSTRUMENTS EQUIPMENT & SYSTEMS	Vol. 1
ACTIVE COMPONENTS / CIRCUIT ASSEMBLIES / CONTROLS & DRIVES	Vol. 2
PASSIVE COMPONENTS MATERIALS / HARDWARE	Vol. 3

eem — Electronic Engineers Master saves you engineering, specifying and purchasing time. Manufacturers' catalogs are grouped under easy-to-remember headings.

The 55 Product Sections categorize related electronics components, equipment, materials, instruments and systems, and fabrication services, enabling you to quickly compare and evaluate similar items.

To find a specific manufacturer's catalog pages refer to the Index of Manufacturers which precedes each Catalog Section (white pages).

These are the 55 eem Product Sections grouped in 3 volumes

Volume Number	Product Section	Page Number	Products
2	1100	1278	Amplifiers, Audio, Operational, etc.
1	1200	307	Antennas & Accessories
1	1300	308	Audio Equipment & Accessories
3	1400	2314	Cabinets, Chassis, Containers, Racks, Boxes, etc.
3	1500	2330	Capacitors (All Types)
3	1600	2478	Chemicals (Acids, Adhesives, Coatings, Lubricants, etc.)
2	1700	1296	Circuit Assemblies, Circuit Boards & Breadboarding Kits
3	1800	2481	Coils (Inductors, Chokes), Assemblies, Forms
1	1900	322	Communications Equipment (Facsimile, Telephone, Television)
1	2000	328	Computing, Data Handling Equipment & Accessories
3	2100	2510	Connectors, Electrical (Receptacles, Sockets, Terminal Boards)
2	2200	1304	Controls, Control Components & Systems
2	2300	1353	Crystals & Mechanical Tuning Devices; Oscillators
3	2350	2728	Delay Lines (All Types)
2	2400	1435	Panel Components (Including Lighting & Readouts)
3	2500	2754	Fabricated Mechanical Parts (Bearings, Cores, Magnets, etc.)
1	2550	388	Environmental Test Equipment
3	2600	2776	Fans, Blowers & Cooling Equipment
2	2700	1506	Filters
3	2800	2809	Hardware, Non-Current Carrying (Fasteners, Washers, etc.)
1	2900	391	Instruments, Measuring & Test
1	3000	587	Instruments, Graphic Recording
3	3100	2810	Insulators, Insulating Materials & Parts
2	3130	1535	Integrated Circuits & Hybrid Microcircuits
3	3150	2814	Manufacturing, Subcontracting, Custom Fabrication
3	3200	2816	Materials, Raw (Metals, Plastics, Glass, Rubber, Cloth, etc.)
1	3300		Medical Electronic Equipment
1	3400	598	Microwave, Laser & Radar (Systems & Subsystems)
2	3450	1552	Microwave, Laser & Radar (Components/Accessories)
2	3500	1572	Motors, Rotating Components & Accessories
1	3600		Nuclear & Radiation Equipment
2	3700	1636	Photoelectric Equipment & Components
2	3800	1641	Optical Equipment & Accessories
1	4000	616	Power Supplies, Converters, Inverters, Batteries, etc.
1	4100	947	Production Machinery & Automation Equipment
3	4200		Engineering Aids (Books, Drafting Equipment, Whiteprinters)
1	4300	950	Recording Equipment (Non-Audio Types)
2	4500	1645	Relays
3	4600		Research, Development, Engineering Services
3	4700	2818	Resistors, Fixed
3	4750	2902	Resistors, Variable (Potentiometers & Rheostats)
2	4800	1794	Semiconductors & Devices, Rectifiers (Non-Tube Types)
2	4900	1865	Servomechanisms & Components
1	5000	951	Studio Equipment
2	5100	1877	Switches, Circuit Breakers, Fuses, Protective Devices
1	5200	953	Telemetering Equipment
2	5300	1963	Thermal Devices, Thermistors, Thermocouples, Thermostats, etc.
3	5400	2933	Tools (Hand & Power); Soldering Supplies
2	5500	1985	Transducers & Associated Equipment
3	5600	2948	Transformers
2	5700	1995	Tubes, Tube Parts, Shields, Inserts, etc.
1	5800		Ultrasonic, Sonic, Subsonic Equipment
1	5850		Vacuum Equipment & Accessories
2	5900	2006	Vibrators, Choppers, etc.
3	6000	2994	Wire, Cable, Harnesses & Accessories

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INDEX OF MANUFACTURERS' CATALOG PAGES

note: This same index appears in all three volumes of **eem**

eem
electronic engineers master
1971-72

Mfr. Page

A

Aaron-Davis 616
Abbott Transistor Labs 618-632, 2948, 2949
Accutronics Inc. 1353-1360
ACDC Electronics Inc. 634-639
Acopian Corp. 640, 641
AD Data Systems 328
ADC Products 2510-2515
Advanced High Voltage Co. 617
Aero Devices 2994
Aerovox Corp. 2330
AirBorn, Inc. 2517
Airflyte Electronics Co. 1580
Airpax Electronics 1308, 1877
A.L.A. Industries Inc. 1645
Alco Electronic Products, Inc.
- Knobs 1440
- Lamps 1439
- Readouts 1438
- Relays 1646
- Switches 1878-1880
- Terminal Strips 1646

Alford Manufacturing Co. 598
All-Tronics, Inc. 1506-1508
Allard Instrument Corp. 1435
Allen Avionics, Inc. 1510, 2729-2731
Allen-Bradley 1511, 1535, 2331, 2822, 2823, 2908, 2909
Allen Electronics 2481
Almond Instruments Co. 329
Alpha, Div. of Loral Corp. 2995
American Aerospace Controls 1304-1307
American Astronics, Inc. 335
American Electronic Labs 1552
American Lava Corp., Sub. of 3M..2810
American Nucleonics Corp. 307
American Precision Industries, Delevan Div. 1585, 2490
American Technical Ceramics 2332, 2333
American Zettler, Inc. 1309, 1647-1653, 1882, 1883
Amersil Inc. 2816
Ametek/Lamb Electric 1572, 1573, 2776, 2777
Amglo Industries, Inc. 1641
AMP Inc., Capitron Div. 642, 643, 2338, 2518, 2519
Syscom Div. 330, 331, 1881
Amperex Electronic Corp.
- Audio Equipment & Accessories ..308
- Capacitors 2334-2337
- Resistors 2818, 2819
- Tubes 1995
- Yokes 2482

Amphenol Corp.
- Bunker-Ramo ....Back Cover, Vol. 3
- Cadre Div. 2814
- Connector Div. 2560-2590
- Controls Div...1436, 1437, 2902-2907
- Industrial Div. 2538-2557
- R.F. Div. 1884-1887, 2520-2537
- Sams Div. 2558, 2559
- Switch Div. 1888

Anadex Instruments, Inc. 391-400
Analog Digital Data Systems 328
Andersen Labs., Inc. 2728
A.P. Circuit Corp. 1509
API Instruments, Sub. of LFE Corp. 402, 403
Applied Microwave Lab. Inc. 599
Applied Research Inc. 1554
Arco Electronics, Inc., PFC Mfg. Div. 2339-2345
Arnold Engineering Co. 2754, 2755
Arnold Magnetics Corp. 644-651
ARRA Inc. (Antenna & Radome Research Assocs.) 1553
Art Wire & Stamping Co. 2815
Artronic Instrument Co. 2732
Arvee Engineering Co. 1278
Arvin Frequency Devices 1361
Arvin Magnetics 309
Ashland Electric Products 1574-1579, 2778-2781
Associated Research, Inc. 404, 405
Associated Testing Labs 388
Astro-Space Laboratories, Inc. 633
Astrodyne, Inc. 1794
Astrosystems Inc. 332-334, 406-409
Atec, Inc. 410, 411
Atomichron, Inc. 469
ATR Electronics, Inc. 652
Augat Inc. 1536
Austron Inc. 653
Automatic Coil 2483
Automatic Controls (see Cook Electric)
Automation Development Co. 1310
Autronics Corp. 1311
Avtel Corp. 654-659
AVX Aerovox 2330

Mfr. Page

B

Babcock Electronics Corp. 1654-1659
BAFCO, Inc. 412
Balco Electronics, Inc. Balco/Marstan 1296, 2346, 2347, 2820, 2821
Barnes Corp. 2591
Beau Products 2720, 2721
Beckman Instruments Inc.
- Cedar Grove Operations 414, 415
- Electronic Instruments Div. 413

Beede Electrical Instr. Co. 416, 417
Behlman Div. (see California Instruments)
Bel Fuse Inc. 2734-2738
Bell Inc., F.W. 418, 1985
Bendix Corp.
- Environmental Science Div. 336
- Microwave Devices 1555, 2597, 2756

Berg Electronics, Inc. 2592-2595
Beta Instrument Corp. 337
Betamite Electronic Devices 1660
Biddle Co., James G. 419
Bird Electronic Corp. 420, 421
Bissett-Berman Corp. 1314
Bivar, Inc. 2809
Bloc-Lite 1441
Bliley Electric Co. 1367-1372, 2733
Blue M Engineering 389
Bodine Electric Co. 1581
Bolt Beranek and Newman Inc. 587
Boonton Electronics Corp. 422, 423
Bowmar Instrument Corp. 1312, 1313, 1442, 1582
Bramco Controls Div., Ledex Inc. 1406, 1523
Brush Div., Gould Inc. 588, 589
Buchanan Electrical Products Corp. 2598, 2599
Bulova Watch Co.
- American Time Products 660, 1366, 1642
- Frequency Control Products 1362-1365, 1512
- Servo Products 1865-1867

Bunker-Ramo/Amphenol (see Amphenol)
Burroughs 338
Burton-Rogers (Hoyt) 494, 495
Bussmann Mfg. Div., McGraw-Edison 1890, 1891

Mfr. Page

C

C-Cor Electronics, Inc. 1280, 1281
C & K Components, Inc. 1892, 1893
Cabtron Corporation 2314
Caddell-Burns Mfg. Co. 2484, 2485
Caddock Electronics 2824-2828
Cal-R Inc. 1537, 1963, 2349-2351, 2830, 2831
Calif. Electronic Mfg. Co. 1315
California Instruments Corp.
- Behlman Div. 670, 671
- Calico Div. 424
- Elin Div. 671

Capitol Machine & Switch 1896
Carborundum Co. 1964-1967, 2832-2834
Carling Electric, Inc. 1897
Carter Mfg. Corp. 2912, 2913
Carter Semiconductor Inc. 1795
CEA, Div. of Berkleonics, Inc...672, 673
CELCO (Constantine Engineering Labs, Co.) 339
Centralab Electronics Div. of Globe-Union Inc. 1898, 2348, 2918
Centralab Semiconductor 1796-1798
Centron Engrg. 1299
Cherry Electrical Products Corp...1899
Chester Cable Operations, Cities Service Co. 2997
Chicago Dynamic Industries 1900
Chicago Lock Co. 1901
Chicago Miniature Lamp Works 1443
Chicago Switch, Inc. 1902
Christie Electric Corp. 674, 675
Chrono-log Corp. 340
Chronetics 425
Cimco Wire & Cable Co. 2996
Cinch-Graphik, Div. of TRW 1297
Cinch Mfg., Div. of TRW 2600-2609
Cinch-Nuline, Div. of TRW 2610
Circon Corp. 2937
Circuit Power Inc. 676, 677
Circuit-Stik Inc. 1298, 1299
Clairex Electronics, Inc. 1636, 1637
Clare & Co., C.P. 1662-1674
Clarke-Hess Communication Research Corp. 426
Clauss Cutlery Co. 2933-2936
CML MaCarr, Inc. 661-668
Coast Coil Co. 2487

UNITED TECHNICAL PUBLICATIONS
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Mfr. Page

Cober Electronics, Inc. 600, 601
Columbia Components Corp. 2742
Columbia Electronic Cables..2998-3005
Columbia Technical Corp., Humiseal Div. 2478, 2479
Comar Electric Co. 1676-1681
Component Research Co. 2352-2373
Computer Components Inc. 1661
Computer Devices Corp. 2739-2741
Computer Devices (of Calif.) 1583
Computer Instruments Corp. 2914, 2915
Computer Labs 342, 343, 1279
Computer Power Systems, Inc. 669
Computer Products 341
Concord Electronics Corp. 2611
Connector Corp. 2612, 2613
Connor-Winfield Corp. 1376, 1377
Consolidated Reactive Metals 3014
Consolidated Wire & Associated Corporations 3006-3013
Constantine Engineerings Labs. Co. (Celco) 339
Continental Conector Corp...2614, 2615
Continental-Wirt Electronics (see CW Industries)
Control Electronics Co. 2743
Control Technology Co. 1868, 1869
Co-Ord Switch 2617
Cook Electric Automatic Controls 1903
Lectrohm, Inc. 1760, 2854-2856
Corning Electronics 2374, 2375, 2836, 2837
Cosmicar Optical Co.; Ltd. 1643
Coto-Coil Co. 1682, 1683
Couch Div., S.H., ESB Inc. 1675
Cox & Company, Inc. 1968
CPS (see Computer Power Systems)
Croven Limited 1378
Crown International 951
CTS Corp. 1538, 1894, 2829, 2910, 2911
CTS Knights, Inc. 1373-1375
Cunningham Corp. 322
Curtis Instruments Inc. 427
CW Industries (Continental-Wirt) 1895

D

Daburn Electronics & Cable Corp. 3032, 3033
Daco Instrument Co., Inc.....1444, 2783
Daico Industries, Inc. 1556
Dale Electronics, Inc.
Coils, Chokes, Inductors..2488, 2489
Connectors 2618, 2619
Resistors 2838-2849
Packaged Networks 1539
Potentiometers 2916, 2917
Motors, Relays 1584
Surge Arrestors 1906
Damon Corp. 1379
Data-Control Systems, Inc. 345
Data Delay Devices 2744, 2745
Data Devices (see DDC)
Data Graphics Corp. 346
Data Technology Corp. 429
Datacom, Inc. 344
Datak Corp. 1445
Datapulse (see Systron Donner)
Datascan, Inc. 428
Datron Systems (see Electronic Specialty)
DDC 347, 1282
Dearborn Wire & Cable Co. ..3015-3031
Del Electronics Corp. 678-680, 2377
Delco Electronics 1800, 1801
Delevan 1585, 2490
Deltrol Controls 1692
Deltron Inc. 682-685

Mfr. Page

Designatronics Inc.
Automatic Coil 2483
United Products Co. 2508
Dialight Corp. 1446, 1447
Digital Equipment Corp. 348
Digitran Co. 1904, 1905
Digitron Corp. 349
Display Devices, Inc. 1450
Diversified Electronics 1684, 1685
Dixson Inc. 430, 431
Dohrmann, Div. of Envirotech Corp. 592-594, 1969
Douglas Electronics, Inc. 1300-1303
Douglas Randall, Div. Walter Kidde 1381, 1686, 1687
Dow Key 1688-1691
Drake Manufacturing Co. 1448, 1449
Dranetz Engineering Labs 433-438, 1870, 1871
Dressen-Barnes Electronics 686-690
Durant Digital Instruments 1316
Dynage Inc. 692-700
Dynamic Instrument Corp. 681, 1586
Dynarad Inc. 439
Dynamics Instrumentation (see Multitech)
Dytro Corp. 440
Dytronics Co., Inc. 441

E

E-H Research Labs 442-447
E & M Laboratories 1557
E-Z Hook Test Products 2621-2623
Eagle Signal, Div. of Gulf & Western 1317, 1693
Eastern Air Devices, Inc. 1588, 1589
Eby Co., Hugh H. 2620
Ectron Corp. 1283
Edsyn, Inc. 2938
EEMCO Div., of Datron Systems 1590, 1591
EAI 2381
EIP Inc. 448
Elco Corp. 2624, 2625
Elcor Products 701
Eldema 1452-1455
Eldorado Electrodata Corp. 449
Electro Cube, Inc. 2378, 2379, 2950
Electro/Data Inc. 1558, 1559
Electro Impulse, Inc. 450, 603, 2784
Electro-Mech 1907
Electro-Mechanical Instr. Co. 451
Electro-Mechanics Co. 452
Electro Motive Mfg. Co. 2380
Electro-Numerics Corp. 453
Electro Scientific Industries 454, 455, 2919
Electro Switch Corp. 1908
Electronic Applications Co. ..1694-1696
Electronic Associates, Inc. (see EAI)
Electronic Controls, Inc. (see T-Bar)
Electronic Development Corp...456, 457
Electronic Devices, Inc. 1802-1805
Electronic Enclosures 2315
Electronic Engineering Co. of Calif. 1909
Electronic Enterprises Inc. 1996
Electronic Hardware Corp. 1456
Electronic Instrument & Specialty Corp. 1706
Electronic Measurements Inc. 702
Electronic Molding Corp. 2626
Electronic Research Co. 458, 1384
Electronic Specialty Co. 1698-1705
Electrons Co. 1451
Electrospace Corp. 323

Mfr. Page

Elexon Inc. 706
Elfab Corp. 2627
Elgar Corp. 703-705
Elgenco Inc. 460-465
Elin Div. (see California Instruments)
Elmwood Sensors, Inc. 1970
Empro Manufacturing Co. 459
Engelhard Industries, H.A. Wilson 2817
Envirotech Corp. (see Dohrmann)
Equipto Enclosure Systems 2316
ERA Transpac Corp. 707-709
Erie Frequency Control 1382, 1383
ESC Electronics Corp. 1513, 2747
ETC, Inc. 2628
Evans Corp., George 2785
Eveready (see Union Carbide)
Exact Electronics, Inc. 466
Executone, Printact Relay Div. 1784

F

F-Dyne Electronics Co. 2382, 2383
Fabricast, Inc. 1592, 1593
Fae Instrument Corp. 1587
Faratron Corp. 467, 711-713
Faria Meter Corp. 468
Fenwal Electronics, Inc. 1971
Ferrodyne Corp. 2951
Ferronics Inc. 2757
Ferrotran Electronics 715-717, 2954
Ferwalt, Inc., W.H. 1385
Flight Systems, Inc. 1707, 1910
Flite-Tronics Co., Inc. 714
Fluke Mfg. Co., John 470-479
Fork Standards, Inc. 718, 1387-1390
Formica Metal Products Co. 2317
Freed Transformer Co. 480-483, 2952, 2953
Frequency Control, Inc. 1386
Frequency Electronics, Inc. ..469, 1391
Frequency Engineering Labs ..604, 605
Frequency Sources Inc. 1560, 1561

G

Gamble Industries, Charles T. 2852
Gates Electronics Co. 720, 721
GC Electronics 2629
General Electric Co.
Batteries 719
Capacitors 2384, 2385
Indicating Lights 1462
Instruments, Measuring & Test 484, 485
Lamp Glass Dept. 2811
Miniature Lamp Dept. 1463
Motors 1595
Permanent Magnets 2758
Relays 1708, 1709
Semiconductors 1799
Soldering Irons 2939
Switches 1911
Terminal Boards 2630
Tubes, Microwave Devices 1997
General Electro-Mechanical Corp. 1594
General Illumination Inc. 1457-1461
General Instrument Corp. 2386, 2387
General Magnetics, Inc. 1318-1320

Mfr. Page

General Resistance, Inc. 2850, 2851
General Time, Industrial Controls Div. 1321
Genisco Technology Corp.
Eldema 1452-1455
RFI/EMI 1514, 1515
Geo Space Systems 350, 486, 608
Georator Corp. 722, 723
Geotech (see Teledyne Geotech)
Gibbs Mfg. & Research 1395-1402
Accutronics Inc. 1353-1360
Glass Technology Div., Gulton 2632
Globe Industries, Div. of TRW 1598-1607, 2787
Gordos Corp. 1912-1914
Gorn Connector Div. (see Positronic Industries)
Gould Inc., Brush Div. 588, 589
Graphite Metallizing Corp. 1596
Grayhill Inc. 1915
Greenray Industries, Inc. 606, 607, 1392, 1393
Oven Industries 1394
Griffith Plastics Corp., Nobex Div. 1466-1471
Grigsby-Barton, Inc. 1710, 1711
GTE Sylvania 1464, 1465
Guardian Electric 1712-1714, 1916
Gudeman Div., Gulton Inds. ..2388-2409
Gulton Industries, Inc.
Glass Technology Div. 2632
Gudeman Div. 2388-2409
Microceramics Div...1972, 2410-2413
Rustrak Instrument 595

H

Hamlin Electronics, Hamlin Electronics 1724, 1725, 1917
Harrel, Inc. 1973
Hart Advance, Relay Div. 1723
Hathaway Components 1715-1722, 1918
Haydon Co., A.W. 1597
Hecon Corp. 1332
Heinemann Electric Co. 1919
Hertz Filter Corp. 1516
Hewlett-Packard, N.J. Div. 729-732
Hexacon Electric Co. 2940
Hi-G, Inc.
Power Supplies 724, 725
Relays 1726-1738
Solenoids 1330, 1331
Timing & Sensing 1322-1329
Hickok Electrical Instr. 351, 487-489
HICO 1616
Hipotronics, Inc. 490-493, 726-728, 2415, 2955
Hiram Jones 2634, 2635
Hisonic Inc. 1517, 2491
Honeywell, Inc.
Test Instruments Div. 590
Wabash Div. 2318
Hopkins Engineering Co. 1519
Horizons International (HICO) 1616
Houston Instrument 591
Howard Industries 1617
Hoyt Electrical Instr. Works (Burton-Rogers) 494, 495
Hudson Lamp Co. 1472

Continued on next page

INDEX OF MANUFACTURERS' CATALOG PAGES

Mfr. Page

Hughes Aircraft Co.
Connecting Devices 2633
Indust. Products Div., Fact Systems 496
Microelectronic Prod. Div. 1403
MOS Div. 1540, 1541
Humiseal Div., Columbia Technical Corp. 2478, 2479
Hurst Mfg. Corp. 1608-1615
Hybrid Systems Corp. 352, 353, 1284

I

Icon Corp. 1333
Illumination Industries Inc. 1644
Industrial Control Co. 1872, 1873
Industrial Devices, Inc. 1474, 1475
Industrial Electronic Engineers 1476-1478
Industrial Test Equipment Co. 497, 733
Infodex, Inc. 498
Infotronics Instruments (see Dohrmann)
Instrument Specialties Co. ..2760, 2761
Instruments for Industry 1285
Inter-Computer Electronics 354-356
Inter-Market Inc. 1473, 1926
Inter-Technical Group 1998, 2759
Interelectronics Corp. 735
International Crystal Mfg. Co. 1404, 1405
International Electro Exchange 1922-1925
International Electro-Magnetics 310, 311
International Electronics Corp. 2418
International Rectifier 1807
Interstate Electronics 499
Interswitch 1927
Intronics, Inc. 734, 1288
IRC (see TRW)
ISC Magnetics 500, 1334, 1335, 1806, 1920, 1921
Ithaco 1286, 1287
ITT Cannon 2637-2641
ITT Jennings 501, 1740, 1741, 1928, 2416, 2417
ITT Jennings Industrial Products 1618, 1739
ITT Thermotech 2766-2773

J

J-B-T Instruments, Inc. 1929
Jackson Bros. (London) Ltd. 2419
James Electronics Inc. 1742, 1743
Janco Corp. 1930, 1931
JFD Electronics Corp. 2420
Johanson Manufacturing Corp. 2421
Johnson Co., E.F. 2422, 2423, 2642-2644
Jonard Industries Corp. 2941
Joslyn Electronic Systems 1933
Julie Research Labs. 502, 503, 2853

K

Kahle Engineering 947
Kappa Networks 1520, 1521, 2748, 2749
Kay Elementrics Corp. 504-509
KCC Shokai Ltd. 1479
Kemet (Union Carbide) 2424-2427
Kepco, Inc. 737-771, Back Cover, Vol. 1
Kessler-Ellis Products 1336
Keystone Carbon Co. 1974-1979
KGS Electronics 2956, 2957
Kilovac Corp.
Dow Key 1688-1691
Penta Labs 1744, 1745, 2428
Kilovolt Corp. 772, 773
K M S Industries, Inc.
Quan-Tech Div. 545-548
Microwave Cavity Labs 610, 611
Kratos Instrument Div. 510, 511
Kratos Precision Products 1783
Krohn-Hite Corp. 512, 1522
Kulka Electric Corp. 2645

L

La Marche 774, 775
Lambda Electronics Corp. 777-806
Lamps, Inc. 1480, 1481
Landis & Gyr 1337
Lansdale Transistor & Electronics 1808
Larson Instrument Co. 513
Lectrohm, Inc., Sub. of Cook Electric 1760, 2854-2856
Ledex, Inc.
Bramco Controls Div. 1406, 1523
Ledex Div. 1542, 1619-1621, 1940
Wilmington Controls Div. ..1936-1939
Leecraft Manufacturing Co. 1482
Legi Electronics Corp. 1483-1486
Liberty Controls 1746-1749
Licon, Div. Illinois Tool Works 357, 1934, 1935
Light Electric Corp. 808, 809
LogiMetrics, Inc. 514, 515
Logitek, Inc. 1338, 1750-1759
London Co. 516
Loral Corp.
Alpha Div. 2995
PFC Div. of Arco 2339-2345
Lorch-Adret Corp. 517
Lorch Electronics Corp. 609
LTV Electrosystems
Memcor Div. 2857, 2922
LVC Industries Inc.
Bloc-Lite 1441
Co-Ord Switch 2617

M

MAC-IRIS, Sub. of Dynarad 439
Magnecraft Electric 1762-1768
Magnedyne Inc. 1622
Magnetic Tech Div., Vernitron 386, 387, 1503, 1634, 1635
Magnetic Windings Co. 2964
Manhattan Electric Cable Corp. 3034
Marathon Battery Co. 810, 811
Marconi Instruments 519-521
Markel & Sons, L. Frank 2812, 3035
Matrix Corp. 361
Mauratron, Inc. 815
Maxi-Switch Co. 1941
McCoy Electronics Co. 1408-1411
McLean Engineering Labs ..1623, 2788
Melcor Electronics Corp. 1290
Meloy Labs 1407
Memcor Components 2857, 2922
Mepco, Inc. 2864
Metric Systems Corp. 358-360
Metrix Instrument Co. 518
Metropolitan Supply Co. 1809, 2000, 2001
MF Electronics Corp. 1412, 1413
Micro-Circuits Co. 2480
Micro Electronics Corp. 2646-2648
Microdot Inc. 522
Microsemiconductor Corp. ..1810-1813
Microtran Co. 2958-2963
Microwave Cavity Labs, Div. of KMS Industries, Inc. 610, 611
Microwave Devices, Div. of Bendix Corp. 1555, 2597, 2756
Mid-Eastern Industries, ...812-814
Midtex Inc., Aemco Div. 1761
Midwec Corp. 2430, 2431
Millen Mfg. Co., James
Capacitors 2429
Components, Dials, etc. ..1488, 1489
Inductors, Coils 2497
Oscilloscopes 523
Tube Shields 2762, 2763
Tube Sockets, Hardware, etc. ..1999
Miller Co., J.W. 2492-2496
Milwaukee Resistor Corp. 2858-2863
MM Electronic Enclosures 2319
Modutec, Inc. 524-527
Monitor Labs 364
Monitor Products Co., Inc. ..1414-1416
Monolithic Dielectrics 2432, 2433
Monsanto Electronic Instruments 528, 529
Motorola Communications & Electronics 1417
Motronics Corp. 1624
Mueller Electric Co. 2649
Multicore Sales Corp. 2942
Multimetrics, Inc. 1524
Multitech, Co.
Automation Products 362
Communications 324
Data Products 363
Dynamics Instrumentation 432
Microelectronics 1543
Power Systems 816
Murata Mfg. Co., Ltd. 1418

N

Natel Engineering Co. 366, 367
National Lead Co., (see NL Industries)
National Semiconductors 1814
National Tel-Tronics 2650
National Wire & Cable 3036-3045
Nationwide Electronic Systems 365
NEC America (see Nippon Elec.)
Neff Instrument Corp. 1291
Nelson Ross Electronics 536, 537
Neshaminy Transformer Co. 2965
New England Instrument 2920, 2921
New Product Engineering 1792, 1793
Nippon Electric/NEC America 1487
NJE Corp. 818-825
NL Industries 1980-1982
Norden, Div. of United Aircraft 370
Norman Industries 532
North Atlantic Industries 368, 369, 530, 531
North Electric Co., Electronetics Div. 826, 827, 2651
North Hills Electronics 817, 1339, 2967
Northern Engineering Labs 1419
Northfield Precision Instrument Corp. 1625
Norton Associates, Inc. 312-315
Nortronics Co. 316-319
Nova Electric Mfg. Co. 828
NWL Transformers 2966
Nytronics, Inc. 2434, 2498
Capacitor Div. 2434
Essex Electronics Div. 2498

O

Oak Mfg. Co. 1942, 1943
Ogallala Electronics 2754, 2755
Ohio Semitronics 533, 1986
Ohmite Mfg. Co.
Relays 1769
Resistors 2869
Rheostats 2923
Variable Transformers 2968
Omtronics Mfg., Inc. 2865-2868
Opad Electric Co. 829
Opamp Labs 1292
Optima Enclosures (see Scientific-Atlanta)
Oven Industries (Greenray) 1394
Ovenaire Inc. 1420-1423

P

Pacific Technology Inc. 830
Pamotor, Inc. 2789
Panduit Corp. 3047
Parabam, Inc. 371
Penn Airborne Products 534
Pennwood Numethron Co. (Tymeter) 372
Penta Labs 1744, 1745, 2428
Perfection Mica Co. 2002, 2003, 2321, 2764, 2765
Perkin-Elmer Corp. 2969
PFC Mfg. Div./Arco 2339-2345
Philadelphia Scientific Controls ..1770
Philbrick (see Teledyne Philbrick)
Philamon Inc. 1424
Pico Electronics 2970
Piezo Technology Inc. 1425
Pinlites Inc. 1490
Planet Instruments 1340, 1626
Polarad Electronic Instruments 536-540
Pomona Electronics 2652-2704

Mfr. Page

Positronic Industries 2631
Potter & Brumfield 1771-1782
Power Inc. 831
Power Designs 832-835
Power/Mate Corp. 836-859
Powertec 860-864
PPM Inc. 535
Precision Mechanisms Corp. 1876
Precision Metal Products 2705
Precision Monolithics 1545-1547
Precision Standards Corp. 541-544
Precision Timer Co. 1341-1344
Premier Metal Products 2322, 2323
Presin Co. 1345
Preston Scientific 373, 549, 1293
Primo Co., Ltd. 320
Printact Relay Div. of Executone ..1784
Program Data Co. 2706

Q

Quan-Tech 545-548
Quindar Electronics 953

R

Radio Materials Co.,
Div. of P.R. Mallory 2435
Raytheon Co.
Industrial Components Oper. 2005
Sorensen Power Supplies 878, 879
Raytheon Computer 374-376
RCA Electronics 550-552
RCL Electronics 1946-1948, 2750, 2751, 2870-2873
RDI Reed Devices Inc. 1785
Re-el Circuits 326, 327
Rectifier Components Corp. 1815
Reeves-Hoffman 1426, 1427
REMEX 377
Renco Corp. 378
Republic Electronics 2436
Resistance Products Co. 2874, 2875
Resistors, Inc. 2876
RF Communications 553
RF Interonics 1528
RFL Industries
Instrument Div. 554
Thermocontrol Div. 1983
RHG Electronics Laboratory ..612, 1562
Ripley Co. 2791
RLC Electronics 1563
RO Associates 865-869
Robertshaw Controls 1944, 1945
Rockland Systems Corp. 1526, 1527
Rogan Brothers 1491
Rosemount Plug-in 870
Ross Engineering 1786
Rotating Components 1627-1629, 2792, 2793
Rotron Inc. 2794-2807
Rowe Industries 2707
Rustrak Instrument Div. 595
Rye Industries 2708
Ryka 1564

S

S & EI Manufacturing 2438, 2439
Sae Advanced Packaging 2712, 2713
Sage Electronics 2878, 2879
San Fernando Electric 2437
Sangamo Electric
Capacitor Div. 2440
Data Systems Div. 379
Sankyo Seiki Mfg. Co. 1630
Sawyer Industries 1631
Saxton Products 3048-3053
Scanbe Mfg. 2324
Schauer Mfg. Corp. 1821
Schaevitz Engineering 390, 948, 1346, 1988-1991
Schrack Electrical Sales 1787
Scientific-Atlanta, Optima Div. 2320
Scientific Columbus 1987
Seacor Inc. 1949, 2441
Sealectro Corp.
Circuit Hardware 2709
R.F. Components 2710
Programming Devices 380, 2711
SEG Electronics Corp. 1525
Self-Organizing Systems 1790
Semtech Corp. 1816-1820
Sennheiser Electronic Corp. 321
Sensor Technology 1638
Servo-Tek Products 1632
SGL Industries 2774
Shallco 1950, 1951
Shallcross 555, 2880, 2881
Showa Musen Kogyo Co., Ltd. 2715
Sierra Systems 872
Signal Transformer Co. 2971-2982
Signalite 1492, 1952
Silicon Transistor Corp. 1822-1835
Simpson Electric Co. 556, 557
Singer Instrumentation 562
Slaughter Co. 558, 559
Sloan Co. 1494-1499
Smith, Herman H. 2716, 2717
Snelgrove Co. Ltd., C.R. 1428
Solid State Devices 1836-1840
Solid State Electronics 954, 2006
Sonex Inc. 955
Sorensen Power Supplies,
Div. Raytheon 878, 879
Sorenson Lighted Controls 1493
Soshin Electric Co., Ltd. 2442
Southern Electronics Corp. 1548, 1549, 2444-2473
Specific Products 325
Spectra-Strip Corp. 3054-3056
Spectrol Electronics Corp. ..2924, 2925
Spectrum Technology Inc. 1429
Spellman High-Voltage
Electronics Corp. 873-877
Sprague Electric Co. 2474
Square D Co. 1347
SRC Division/Moxon 560, 561, 871, 1992-1994
Stackpole Carbon Co. 2877
Stackpole Components 1953
Staco, Inc. 2983
Standard Condenser Corp. 2475
Standard Grigsby Co. 1954, 1955
Standard Pneumatic Motor Co. 2943
Standard Wire & Cable Co. 3057
Stantron Div.,
Wyco Metal Products 2325
Stevens-Arnold 2007
Sticht Co., Herman H. 563
Summit Engineering 1565
Sylvania (GTE) 1464, 1465
Syntronic Instruments 2499
Syracuse Electronics Corp. 1348
Systron Donner 564, 565
Systron Donner
Alpha Div. 565
Concord Instrument 564, 565
Datapulse 564
Kruse 565
Trygon Electronics 564, 933

T

T-Bar Inc. 1697
Tapeswitch Corp. of Amer. 1956
Taurus Corp. 381
Tech Labs 1957
Techmar Corp. 2327
Techni-Rite Electronics 596, 597
Technipower Inc. 905-928
Techno Components Corp....2926, 2927
Tecnetics 880-885
Tektronix, Inc. 566
TEL Labs 2882, 2883
Teledyne Geotech 950
Teledyne Philbrick 1294
Teledyne Relays 1788, 1789
Telequipment, Ltd. (see Tektronix)
Tempo/UTI 384, 1349
Tensolite 3059
Texscan Corp. 578
Thermotech, Div. of ITT 2766-2773
Thunder International Corp. 886-895
T.M.C. Systems (Ariz.) 1430, 1431
Tobe Deutschmann Labs 2476
Todd Products Corp. 929-931
Tohoku Metal Industries, Ltd. 2501
Tokyo Electric Co., Ltd. 1350
Topaz Electronics 896-904
Torotel Inc.
Crystals 1432
Filters 1529
Inductors 2502-2505
Transformers 2984, 2985
Torwico Electronics ..2506, 2507, 2987
Transco Products 613
Transcon Mfg. Co. 1844, 1845, 3060-3067
Transmagnetics ..382, 383, 1874, 1875
Triac Electronic Systems 1351
Trimm Inc. 2718
Trio Labs 932
Triplett Corp. 567-577
Trompeter Electronics 1958, 2719
TRW Inc.
Boone Div. 2889-2895
Burlington Div. 2885-2888
Cinch-Graphic Div. 1297
Cinch Mfg. Div. 2600-2609
Cinch Nu-Line 2610
Globe Industries 1598-1607, 2787
Phila. Div. 2896
St. Petersburg Div. 2928-2931
UTC Div. 1533, 2988, 2989
Trygon Electronics 564, 933
TT Electronics 1530, 1531
Tung-Sol Div. Wagner
Electric 1500-1502, 1841-1843

U

UID Electronics Corp. 1959
Uniform Tubes, Inc. 3068
Unimax Switch Corp. 1960
Union Carbide Corp.
Eveready Div. 710
Material Systems 2424-2427
UNISEM (see United Aircraft)
United Aircraft Corp.
Norden Div. 370
Unisem Div. ....1550, 1551, 1846, 1847, Back Cover, Vol. 2
United Detector Technology 1639
United-Page, Inc. 1856
United Products Co. 2508
United Transformer Div.,
TRW (UTC) 1533, 2988, 2989
Unitrode Corp. 1566, 1848-1855
Unitron 935-937
Universal Ad-Yu Electronics ..579, 2752
Universal Electronics Co. 938, 939
Universal Voltronics 940, 941
USCC/Centralab 1532, 2477

V

Vaco Products 2944
Vactec Inc. 1640
Varadyne, Inc.
Varadyne Power Systems 934
Varadyne Systems 385
Varflex Corp. 2813
Vari-L Co. 1534, 1568-1570, 2509, 2990, 2991
Vector Electronic Co. 2722
Vector Engineering 942, 943
Vectron Laboratories 1433
Veeder-Root Co. 1352
Vega Precision Labs 614, 615
Vemaline Products Co., Inc.
Control Knobs 1504
Heat Sinks 1857
Indicator Panels & Lights 1505
Planetary Drives 2775
Rack Handles 2328
Venus Scientific 944, 945
Vernitron Corp. 1503, 1634, 1635
Beau Products Div. 2720, 2721
Magnetic Tech Div. 386, 387, 1503, 1634, 1635
Motor Products Div. 386, 387
Vero Electronics 2329
Victor Wire & Cable 3069
Victoreen Instrument 2897
Virginia Panel Corp. 2723
Vishay Resistor Products 2898, 2899, 2932

W

Wabash
(see New Product Engineering)
Wagner Electric (see Tung-Sol)
Wall Mfg. Co. 2945
Wanlass 946
Watkins-Johnson Co. 949, 1295
Waveline 1567
Wavetek 583-585
Weed Instrument Co. 1984
Weinschel Engineering 1571
Weller 2946
Welwyn International 2900
Western Reserve Electronics ..580, 581
Westinghouse Electric Corp.
Panel Instruments 582
Semiconductors 1858-1864
Wheelock Signals 1791
Whitmor Wire & Cable 3070
Wilbrecht Electronics 1961
Wild Rover Corp. 1962
Winchester Electronics 2724, 2725
Wiremold Co. 2726, 2727
Wyco Metal Products
(see Stantron Div.)

X

X-Tron Electronics 1434

Y

Yamashina Seiki Co., Ltd. 1633

Z

Zaring Industries 2992, 2993

eem
CATALOG SECTION

Volume 1
test instruments equipment and systems

This volume contains:

Section	Product	Starting Page
	Trade Name Directory	957
1200	Antennas & Accessories	307
1300	Audio Equipment & Accessories	308
1900	Communications Equipment (Facsimile, Telephone, Television)	322
2000	Computing, Data Handling Equipment & Accessories	328
2550	Environmental Test Equipment	388
2900	Instruments, Measuring & Test	391
3000	Instruments, Graphic Recording	587
3400	Microwave, Laser & Radar (Systems & Subsystems)	598
4000	Power Supplies, Converters, Inverters, Batteries, etc.	616
4100	Production Machinery & Automation Equipment	947
4300	Recording Equipment (Non-Audio Types)	950
5000	Studio Equipment	951
5200	Telemetering Equipment	953

eem consists of 3 volumes.

The contents of Volumes 2 and 3 are shown at right.

Volume 2

active components
circuit assemblies
controls and drives

Pages 989-2008

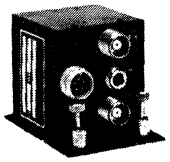
Tubes
Amplifiers
Filters
Crystals
Microwave Components
Motors and Servo
Transducers
Semiconductor Devices
Integrated Circuits
Photoelectric and Optical
Relays and Switching Devices
Thermal Devices
Panel Components and Readouts

Volume 3

passive components
materials/hardware

Pages 2009-3072

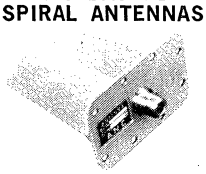
Capacitors
Delay Lines
Connectors
Transformers
Coils
Insulators
Hand Tools
Resistors, Fixed and Variable
Fans and Blowers
Materials and Chemicals
Wire, Cable and Accessories
Cabinets, Fabricated Parts and Hardware
Manufacturing Services



SOLID STATE SWITCH

SLEEVED DIPOLE

CAVITY BACKED SPIRAL ANTENNAS



BLADE ANTENNA

ANTENNA SELECTORS

SPEC.	AS-103	AS-101	AS-121
Input Power	28 VDC MIL-STD 704 Cat. B	28 VDC MIL-STD 704 Cat. B	28 VDC MIL-STD 704 Cat. B
Cycle Sw. Rate	70 ±15 CPM	15 ±1 CPM	70 CPM ±10% or 20 CPM ±10%
Control Signal	100-4000 Hz 50 MV to 1V RMS	±DC or 135 Hz −5 to +5 VDC .5 to 5 VRMS	10 ±1 VDC
RF Relay Output	2 amps max.	2 amps max.	2 amps max.
Weight	3 lbs. max.	3 lbs. max.	1.0 lbs. max. Delayed Keyline output 50 ±5 msec.

SOLID STATE SWITCHES

SPEC	S-102	SL-101	S-109
Frequency	1000-1120 MHz	DC - 1.0 GHz	2700-3000 GHz Also Avail. in Octave Bandwidth to 12 GHz
VSWR (w/r 5Ω)	1.2:1 max.	1.2:1 max.	1.6:1 max.
Invertion Loss	0.5 db max.	0.3 db max.	1 db max. at 2700 GHz
Isolation	30 db min.	40 db min.	
Power Handling	1 Kw peak; 1 w. avg.	Receive	1 Kw peak 1 watt av
Configuration	SP2T Lobing	SPST	
Switching Time	38 ±5 cps	5 ms max.	75 ±3 CPS
Operating Power	115V 400 Hz 300 ma	12 VDC 100 ma	28 VDC 300 ma
Weight	1 lb. max.	1 oz. max.	10 oz. max.
RF Output Phase			0° to 180°

SLEEVED DIPOLES

SPEC	AL-106	AL-168	AX-135	AL-244
Frequency	1.25 to 1.35 GHz	1.0 to 1.1 GHz	9.0-10.0 GHz	1.0 to 1.1 GHz
VSWR (w/r 50Ω)	2.0:1	1.8:1 max.	1.75 max.	1.8:1 max.
Gain	1 db	2 db nom.	2 db nom.	
Polarization	Linear	Linear	Linear	Vertical
Power Handling Capability	100 watts Avg.	3 KW peak 100 w. avg.	100 w. avg.	3 KW peak, 100 w. avg.
Pattern	Omni Azm	Omni Azm	Omni Azm	Omni Directional in azimuth
Mil Spec	MIL-E-5400	MIL-E-5400	MIL-E-5400	MIL-E-5400
Weight	2 oz.	6 oz.	¼ oz.	7 oz.

AMERICAN NUCLEONICS CORPORATION

Typical integrated components include the following product lines.

- **Antennas**
- **Mixers**
- **Stripline Components**
- **Microstrip IC Components**
- **Solid-State Sources**
- **Filters**
- **Phase and Amplitude Comparators**

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- **Flight Control Systems**
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- **Stray Energy Monitoring Devices**

SIGNAL PROCESSING SYSTEMS

- **Interference Cancellation Systems**
- **Jamming Suppression Systems**
- **Radiometric Detection Systems**
- **Antenna Systems**

CAVITY BACKED SPIRAL ANTENNAS

SPEC.	AM-203	MA-104	AM-126	AC-204	AM-227	AK-264
Frequency	8.275 to 8.290 GHz	2.0 to 11.0 GHz	2.0-8.0 GHz	4.5 to 4.750 GHz	2-16 GHz	12 to 18 GHz
VSWR (w/r 50Ω)	1.7:1	2:1 max.	2.25 max.	1.7:1 max.	2:1 max.	2.0:1
Gain (Ref to CP)	7 db min.	0-7 db (3-6 GHz) 7 db (6-11 GHz)	3 db @ 3 GHz (w/r linear)	7 db min.	−3 db @ 2 GHz	−3.0 dbi at 12 GHz −1.0 dbi at 18 GHz (w/r linear)
Beam Tilt	3° nominal	±13° max.	±13° max.	3° nominal	2.5 typ., 4° max.	
Polarization	RHCP	LHCP	RHCP	LHCP	RHCP	RHCP
Axial Ratio	1 db max.	3 db max.	2 db max.	1 db max.	0°-0.4 db typ. 1 db max. 45°-3 db max. 80°-8 db max.	1 db on axis 3 db ±45° 7 db ±90°
3 db Beam Width	50°	60-90° (2-5 GHz) 40-90° (5-11 GHz)	45° min.	50°	77° ±10° (2-4 GHz) 70° ±12° (4-16 GHz)	80° ±10° (phase tracking ±6°, 0°-70° off axis)
Gain Tracking (w/r Linear Polarization)	±0.5 db on axis	±0.5 db on axis	±0.5 db on axis	±0.5 db on axis	±0.5 db on axis	±0.5 db on axis
Weight	3 oz. max.	7.5 oz. max.	3.5 oz. max.	3 oz. max.	8 oz. max.	1.2 oz. max.
Mil Spec	MIL-E-5400 Class 2	MIL-E-5400 Class 2	MIL-E-5400	MIL-E-5400 Class 2	MIL-E-5400 Class 2	MIL-E-5400 Class 2

OSCILLATOR

SPEC	TV-102
Frequency	1750 to 1850
Band	MHz (tunable)
Freq. Stability	±2 MHz
Power Output	1 watt min.
Primary Input	+19 VDC @
Power	600 MA
Weight	8 oz. max.
Modulation	FM-DC — 2 MHz
Deviation	±3 MHz
Linearity	±10%
Sensitivity	1 MHz/Volt

ANTENNA BLADES

SPEC	AM-221	LA-103	AM-231	AU-173	STUB AM-142	HELIX AX-187
Frequency Range	225-1500 MHz	500 to 1000 MHz	500-1800 MHz	225-420 MHz	2.0-10.0 GHz	7.0-11.0 GHz
VSWR (w/r 50Ω)	2.5:1 max.	Less than 2.0:1 when mounted on a 3 ft. sq. plane	2.0:1 reference to 50 ohms	2.0:1 max.	2.0:1 max.	2.0:1 max.
Azimuth Pattern		Omnidirectional				
Polarization	Vertical	Vertical	Vertical	Vertical	Vertical	Circular
Radiation Pattern	That of λ/4 Stub			That of λ/4 Stub	That of λ/4 Stub	Unidirectional
Beamwidth	λ/4 stub			λ/4 stub	λ/4 stub	45° nominal; 10
Power Handling Capability	100 watts Avg.	250 watts CW	250 watts CW	100 watts Avg.	100 watts Avg.	Receive
Mil Spec	MIL-E-5400	MIL-E-5400, MIL-E-5272	MIL-E-5400	MIL-E-5400	MIL-E-5400	MIL-E-5400
Efficiency		85%	85%			
Gain	λ/4 stub			λ/4 Stub	λ/4 Stub	10 db w/r, C.P. ref.
Temp. Range		−65 to +250°F	−65 to +250°F			
Altitude		70,000 ft.	70,000 ft.			
Side Loading		18 PSI at 70°F	18 PSI at 70°F			
Vibration			12G 0-500 cycles			
Weight	18 oz.	7 oz.	8 oz. max.	16 oz.	3 oz.	3 oz.

American Nucleonics Corporation

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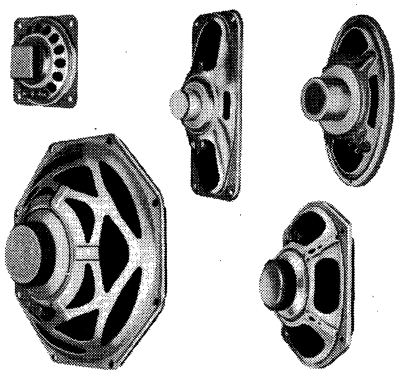
Amperex INDUSTRIAL AND HIGH FIDELITY Speakers

STANDARD SPEAKER SERIES



Amperex standard speakers offer a wide diversity in characteristics, size, and price for all kinds of radio and television sets, phonographs, tape recorders, sound columns, etc.

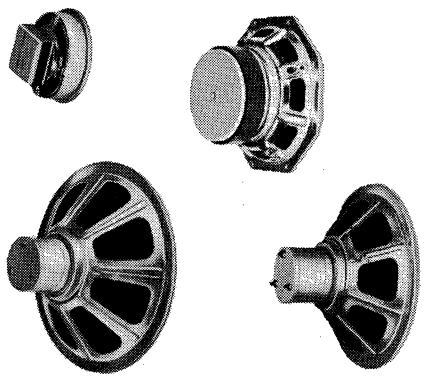
Most standard speakers have a flat magnet system of powerful Ferroxdure ceramic. For television sets and other applications where the leakage field should be kept as small as possible, there are Amperex loudspeakers with a Ticonal magnet in a pot system. Due to the use of Ticonal 750 these pot systems are very small.

NOTE: ALL STANDARD SPEAKERS AVAILABLE IN 4, 8, 15, AND 25 OHM IMPEDANCES.

*Ticonal Magnet in pot system
**Dual-Cone °Inverted Magnet

Size (inches)	Model No.	Magnet Weight (oz.)	Power Handling (watts)	Voice Coil Diameter (inches)	Total Depth (inches)	Resonant Frequency (Hertz)
ROUND GROUP						
2½	AD2070/Z	.70	1	9/16	4/5	360
3	AD3370/Y	.70	2	9/16	1 1/8	250
4	AD4470/Y	.70	2	9/16	1 1/6	200
4	AD4080/X	4.0	6	3/4	1 3/5	165
4	AD4080/Z	4.0	6	3/4	1 3/5	185
4	AD4090/X	1.0*	4	3/4	1 1/2	175
5	AD5080/Z	4.0	8	3/4	2	155
5	AD5080/X	4.0	12	3/4	2	140
5**	AD5080/M	4.0	8	3/4	2	130
6½	AD7080/X	4.0	12	3/4	2 1/2	110
6½**	AD7080/M	4.0	8	3/4	2 1/2	95
6½°	AD7091/M	1.5*	6	3/4	1 4/5	95
8	AD8080/X	4.0	12	3/4	2 3/4	95
8**	AD8080/M	4.0	12	3/4	2 3/4	75
OVAL GROUP						
3 x 5	AD3590/X	1.0*	4	9/16	1 3/5	200
3 x 8	AD3880/X	4.0	4	3/4	2	120
3 x 8	AD3890/X	1.0*	4	3/4	2 1/8	120
4 x 6	AD4680/Z	4.0	6	3/4	1 4/5	155
4 x 6	AD4680/X	4.0	12	3/4	1 4/5	140
4 x 6**	AD4680/M	4.0	8	3/4	1 4/5	125
4 x 6	AD4690/X	1.0*	12	3/4	2	140
4 x 6**	AD4690/M	1.0*	8	3/4	2	135
5 x 7	AD5780/X	4.0	6	3/4	2 1/4	115
5 x 7**	AD5780/M	4.0	8	3/4	2 1/4	100
5 x 7	AD5790/X	1.5*	12	3/4	2 1/2	115
6 x 9	AD6980/X	4.0	12	3/4	2 3/4	85
6 x 9	AD6980/M	4.0	12	3/4	2 3/4	72

HIGH QUALITY SPEAKER SERIES



The high-quality speakers have been specially designed for use in Hi-Fi equipment, where a high power-handling capacity, a very wide frequency-range and a negligible distortion level are required. Examples of application: acoustic boxes, bass-reflex boxes, juke boxes, Hi-Fi enclosures with or without cross-over network and stereo columns.

*Ticonal Magnet

Size (inches)	Model No.	Magnet Weight (oz.)	Power Handling (watts)	Voice Coil Diameter (inches)	Total Depth (inches)	Resonant Frequency (Hertz)
TWEETERS						
1" Dome	AD0160/T	10.0	20*	1	1	1000
2¼"	AD2070/T	.70	10	9/16	1 1/8	800
*Cross-over frequency 1500 Hz. Power handling capacity is 40 watts if cross-over frequency is 4000Hz.						
WOOFERS						
(All woofers have rigid paper cone with highly flexible butyl-rubber suspension.)						
5	AD5060/W	10.0	10	1	2 1/4	50
6½	AD7065/W	14.4	20	1	2 3/5	28
8	AD8065/W	14.4	20	1	3 2/5	28
10	AD1055/W	32*	40	1 1/2	6	24
12	AD1256/W	20*	40	2	6 3/4	15
FULL RANGE						
5	AD5060/M	10	8	1	2 1/4	85
6½	AD7060/M	10	10	1	2 3/5	55
8	AD8050/M	14*	15	1 1/2	5	60
8½	AD9710/M	10*	15	1 1/2	4 3/4	50
10	AD1050/M	14*	15	1 1/2	5 1/2	50
12	AD1260/M	10	15	1	4 3/4	50
12	AD1250/M	14*	30	1 1/2	5 1/4	50
12	AD1255/M	20*	30	1 1/2	6 3/4	50
12	AD1255/HP	20*	50	2	6 3/4	60

AMPEREX ELECTRONIC CORPORATION
Component Division: 35 Hoffman Ave., Hauppauge, N.Y.
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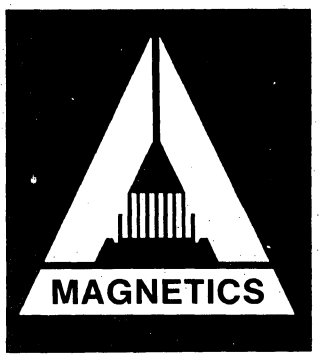
Magnetic heads to your specifications



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Arvin Magnetics concentrates on multi-channel heads for the computer and instrumentation industry. Capability exists to manufacture to your design and/or specifications and to design to your system requirements. Experience with all types of core materials and head construction techniques enables Arvin Magnetics to utilize the best approach to your magnetic head needs.

FERRITE PRODUCTS

Core Material With the Big Future

Arvin Magnetics is dedicated to anticipating trends in the magnetic head area and being ready to serve our customers' future needs. A major part of this policy is the belief, based upon outside market surveys and our knowledge of the field, that ferrites will play a major role as the core material of the future in magnetic heads.

We have a multi-faceted program in the ferrite area that includes:

a. Sources of ferrite—Both internal and external sources are utilized to assure our customers of the widest range of ferrite material.

b. Machining—Trained personnel and slicers and dicers, parallel lapping machines, toroid cutters, etc., enable us to process ferrite for any application.

c. Glass-Bonding—Arvin Magnetics is licensed by North American Philips Company, Incorporated, to do glass-bonding.

Interested in seeing how Arvin Magnetics would solve your head problem? Contact Manager, Arvin Magnetics, to arrange for a presentation on the total capability of Arvin Magnetics and a discussion on how this capability can be applied to your problems.

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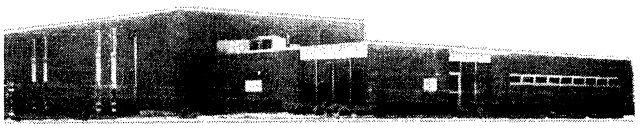

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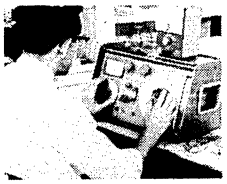
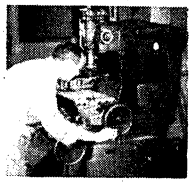


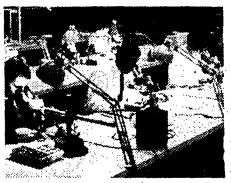
Electrical testing under laboratory conditions, NBS traceable.

FACILITIES CAPABILITIES QUALITY



Jig borer oriented machine shop represents the ultimate in precise machining.

Completely equipped machine shop for mass production of machined parts.



Proficient line personnel perform the delicate assembly operations.

Ultra precise mechanical checkout. NBS traceable accuracy.

Complete facilities for both engineering and fabrication makes IEM an ideal partner in your special short run requirements. Below are a few items developed with both customer and company sponsored programs.

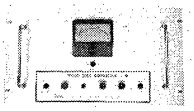
SPECIAL SYSTEMS

"Run-in" and Test Line for General Purpose Instrumentation decks

Check-out Line for IEM® "Run-in" Machine

Miniature Personal Recorder Measures 7/8" x 3½" x 5"

Two Station Semi-Automatic High Speed Cartridge or Cassette Tape Loader



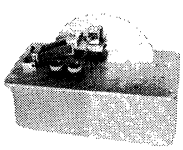
Bias Amplifier Mega Cycle Range Rated 50 Watts

The flux sensitive system represents an efficient method of sensing static magnetic information, making data output independent of tape speed.
The system is flexible, simple, and economical, the accuracy being mainly a function of the drive element. All circuitry is solid state utilizing plug in board, thus reducing maintenance and trouble shooting to within the scope of the average user.

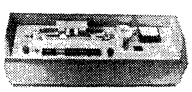
— USES —

- **FEEDBACK SYSTEM FOR POSITION CONTROL**
- **LOAD ACTUATION TO INITIATE AN OPERATION**
- **METERED OUTPUT FOR QUANTITATIVE MEASUREMENT**
- **LOGIC SYSTEM FOR NUMERICAL CONTROL**
- **TRIGGER CIRCUIT FOR COUNTING**
- **LINEAR RESOLVER**
- **ANGULAR RESOLVER**
- **ANALOG ULTRA LOW FREQUENCY PLAYBACK**

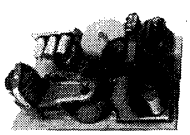
FLUX RESPONSIVE SYSTEMS



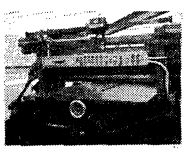
Angular Resolver



Flux-Sensitive Linear Resolver for Machine Control and Measuring Applications



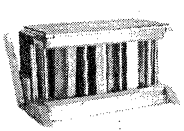
Analog Ultra Low Frequency Playback System Response to DC



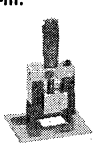
Flux Sensitive Programmable Machine Control System

Professional recording assemblies represent the state of the art for precision magnetic components. They encompass most of the standard and special recording formats and electronics. They can be incorporated for upgrading most existing professional equipment. They are also available as OEM equipment for systems manufacturers. All parts are precision ground for accuracy and permanent alignment. • Guide surfaces are of tungsten carbide for maximum life and accuracy. • IEM unique MEGA-BIAS design permits head change in seconds with positive azimuth and zenith lock-in.

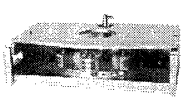
RECORDING ASSEMBLIES



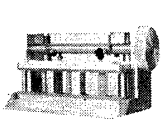
Complete 16 Track 2 In. System Incorporating Tape Lift Off, Flutter Rollers and Magnetic Shielding, for Up-Dating Studio Recorders.



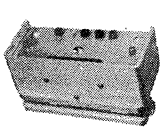
Micrometer Calibration Head



Turret Head Mount



Cam Actuated Head System for Ultra Precise Recording of Master Tape



Quick Change Mount with Integrated Bias Current Control Panel

Complete service for refurbishing, including cleaning, relapping, replacement of guides and inspection. Standard audio types — all formats. Duplicator types — slave and master assemblies. Video tape recorder audio heads. Complete conversion service for various tape formats.

REFURBISHING RECONDITIONING SERVICES

iem.

INTERNATIONAL ELECTRO-MAGNETICS, INC.

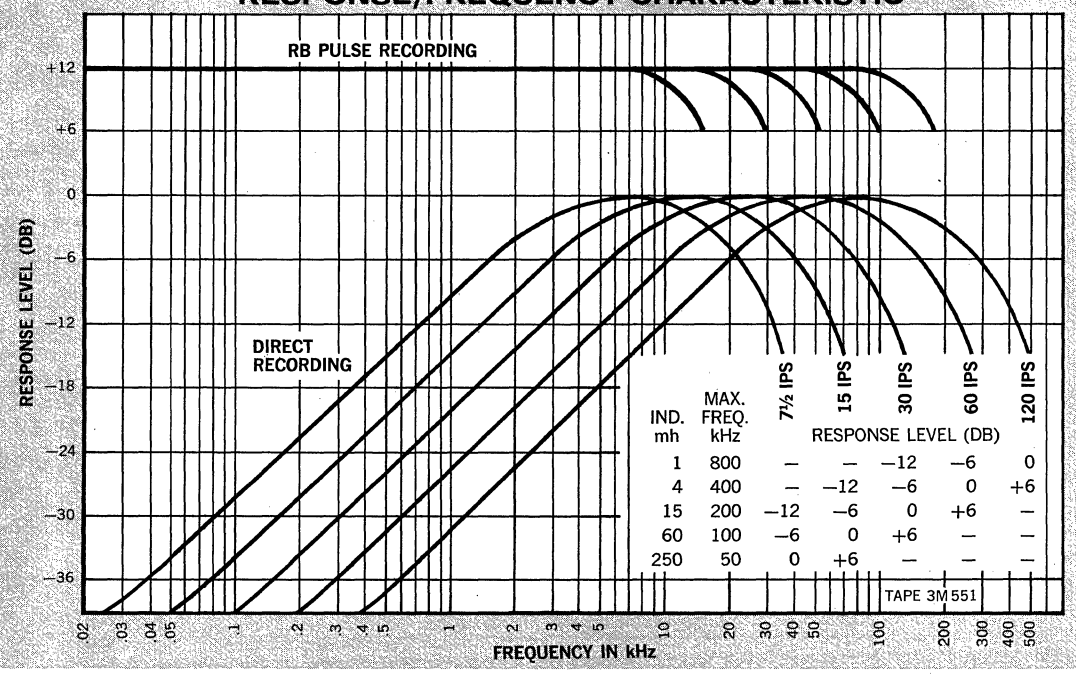
ERIC DRIVE AND CORNELL AVENUE, PALATINE, ILL., 60067, AC #312-358-4622

NORTON® MAGNETIC HEADS

MULTITRACK

SERIES 2000/7500 — ERASE RECORD PLAY

RESPONSE/FREQUENCY CHARACTERISTIC



IND. mh	MAX. FREQ. kHz	7½ IPS	15 IPS	30 IPS	60 IPS	120 IPS
		RESPONSE LEVEL (DB)				
1	800	—	—	−12	−6	0
4	400	—	−12	−6	0	+6
15	200	−12	−6	0	+6	—
60	100	−6	0	+6	—	—
250	50	0	+6	—	—	—

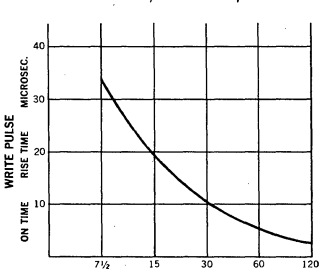
The Response/Frequency characteristics above, illustrate the exceptional performance of the Series 2000 thru 7500 Norton Magnetic Heads in direct and digital recording. The upper curves relate to the readback pulse amplitude for RB (return to bias) writing with the digital models and the lower curves relate to the unequalized playback amplitude of the analog models for constant current direct recording, both as a function of frequency (or rep rate). The five standard impedances available, together with the five tape speeds illustrated, total 25 different curves in each group, too many to clearly represent on a single chart. Pairs of inductance and tape speed are selected, which result in a set of curves peaking at the same level and having upper frequency limits proportional to tape speed. Therefore, the 1 mh inductance record/play response is at 120 ips; the 4 mh at 60 ips, and so on to the 250 mh response at 7½ ips. The other inductances are related to each as set forth in the included table. Each curve is at the same mv level as the others and so enables a quick comparison of level, frequency response, and required tape speed to achieve a desired performance goal. To read the curves, first refer to any Series found on the following pages, and note the Typical Operation data and the 0 DB playback reference level in mv rms for direct recording or +12 DB reference level in mv p-p for RB pulse recording. Then referring to the curves, calculate the response obtainable at the inductance and tape speed contemplated.

DIGITAL RECORDING

Selecting the 5500 Series from the following pages for analysis, the 60 mh track for RB pulse recording has a +12 DB reference level of 10 mv p-p at 15 ips. The readback pulse at 15 ips is 10 mv p-p and constant up to a 15 kHz rep rate, equivalent to a 1000 ppi recording density, with a 20 μsec, 3 ma p-p write pulse (rise time 20 μsec). At a faster rep rate of 30 kHz (2000 ppi) at 15 ips and a 10 μsec, 3 ma p-p pulse (rise time 10 μsec) the readback pulse is 5 mv p-p (10 mv less 6 DB) with all pulses present, and 10 mv p-p for an isolated pulse.

Writing and reading at 7½ ips the readback pulse amplitude of the 60 mh track is 5 mv p-p (10 mv less 6 DB) and flat to 7.5 kHz, with a 30 μsec 3 ma p-p pulse (rise time 30 μsec).

Full output is obtained up to a recording density of 1000 ppi with equal pulse on time and rise time at the values shown in the graph below. Operation up to 2000 ppi at reduced read amplitude requires halving these times. Increasing the times will reduce the recording density and readback level, and is not recommended. A better solution is to choose a lower inductance to preserve the recording density capability.

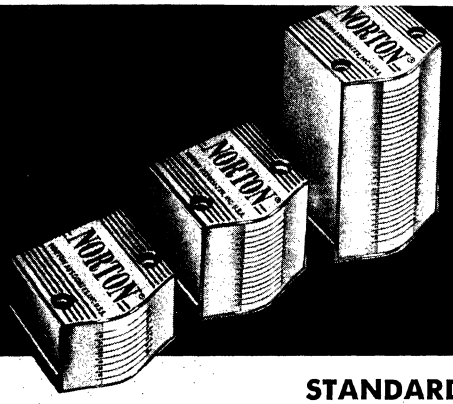


DIRECT RECORDING

Selecting the 2000 Series from the following pages for analysis, the 15 mh track for direct (bias) recording has a stated playback 0 DB reference level of 1.8 mv rms which at 30 ips is at 30 kHz. At 1 kHz the playback level drops to 0.15 mv rms (21 db below 1.8 mv). Operated at 7½ ips its 1 kHz and 30 kHz levels are both 0.15 mv rms (1.8 mv less 12 db less 9 DB). Increasing the inductance to 250 mh would increase the 1 and 30 kHz play level to 0.6 mv rms (1.8 mv less 9 DB) at 7½ ips. It can be seen that the short wavelength response to over 4000 cpi together with a maximum contour effect deviation of ±2 DB from the 6 DB/octave slope permits a useful bandwidth of over 10 octaves at any tape speed, and with the range of inductances available, permits the highest play level consistent with the frequency range of the system.

NORTON® SERIES SELECTOR

NUMBER OF TRACKS	TAPE WIDTH		
	¼ INCH	½ INCH	1 INCH
2	2000		
3	3500		
4	4500 5000	2000	
5	5500	3500	
6	6500		
7	7500	4500	
8		5000	2000
9		5200	
10		5500	3500
12		6500	
14		7500	4500
16			5000
18			5200
20			5500
24			6500
28			7500

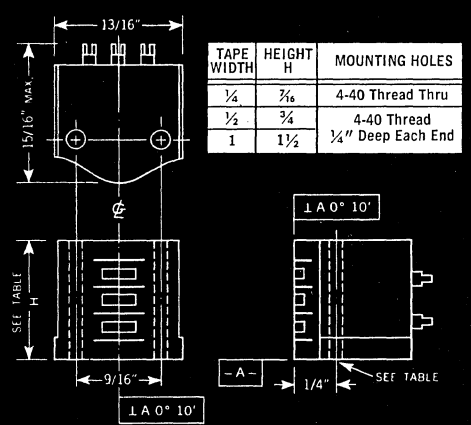


NORTON®
MAGNETIC HEADS
MULTITRACK
ERASE RECORD PLAY

STANDARD FEATURES SERIES 2000/7500

Standard features include extremely low crosstalk ratings and +75°C temperature operation without derating, plus a mechanical accuracy permitting hard mount or adjustable mount installation. Rugged solid metal construction, shock and vibration resistant, provides a hard, stable, low friction, long wear surface for the tape. The cores, shields and all metallic members are mechanically and electrically bonded together for effective electrostatic shielding and grounding of static charges. Precision finishing of the recording face to micro-inch tolerance insures intimate contact of the tape with every channel for uniformly excellent response independent of track location.

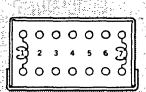
OUTLINE & MOUNTING DIMENSIONS



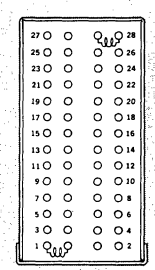
TAPE WIDTH	HEIGHT H	MOUNTING HOLES
¼	7/16	4-40 Thread Thru
½	¾	4-40 Thread ¼" Deep Each End
1	1½	

TERMINAL BOARD CONNECTION DIAGRAM

TERMINATION: Silver plated solder lugs on a high temperature glass-epoxy terminal board are standard on all series. Tracks are numbered from 1 through 28 (bottom to top). Start and finish terminal pairs of each track are correspondingly numbered and located as illustrated.



2 TO 7 TRACKS



8 TO 28 TRACKS

SELECTIVE ERASE HEADS

Multitrack selective erase heads to match the formats of the NORTON Series 2000/7500 units are available. All heads offer erase track widths at least 10 mils wider than the record tracks to insure full erasure. Outline and mounting dimensions are the same, and a standard 1 mh inductance is stock with other impedances available on request.

Erase heads for the Series 2000 and 3500 heads are a single unit with the same number of tracks and track spacing as the record head. Erase heads for the Series 4500 thru 7500 units consists of a pair of heads, each with double track spacing. Odd number tracks are on one unit, and even number tracks on the other.

Catalog numbers for the erase heads have the same Series number as the record head except for the suffix which changes to 1E as in the following example: Catalog #3510-1E is a 1mh erase head for use with the 10 track 1" tape head in the Series 3500.

ORDERING INFORMATION

To specify the complete catalog number for ordering purposes designate the Series number of the head you require, the inductance in mh and the function ie. Record (AR) only, Record/Play (ARP), or Play (AP) only for audio and analog applications: or Record (DR) only, Record/Play (DRP), or Play (DP) only for digital applications, as in the following example: Catalog #4507—15 DP which is the Series 4500, 7 tracks, 15mh Digital Play Head for ½" tape.

NORTON ASSOCIATES, INC.

10 Di Tomas Court, Copiague, New York • (516) 842-4666

SERIES 2000

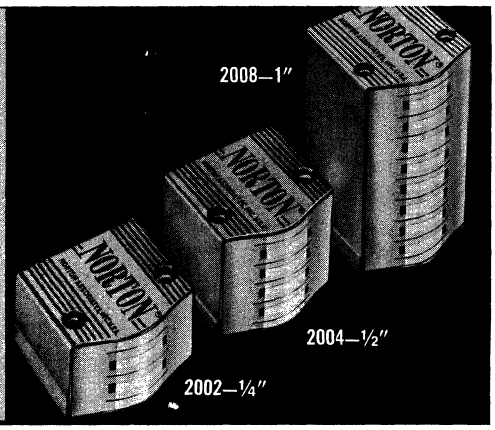
CROSSTALK — 60 DB

TRACK WIDTH — 2002 — .080
2004, 2008 — .070

TRACK SPACING — 2002 — .160 ctoc
2004, 2008 — .130 ctoc

INDUCTANCE mh	MAXIMUM RATING AT 75°C ma rms	TYPICAL OPERATION				
		BIAS RECORDING			RB PULSE RECORDING	
		Bias Current ma rms	Record Current ma rms	Playback 0 DB mv rms	Write Pulse ma p-p	Read Pulse +12DB mv p-p
1	60	10	1.5	1.8	40	18
4	40	5	.8		20	
15	20	2.5	.4		10	
60	10	1.3	.2		5	
250	5	.7	.1		2.5	

NUMBER OF TRACKS	TAPE WIDTH	CATALOG NUMBER			
		SERIES	INDUCTANCE	ANALOG OR DIGITAL	FUNCTION
2	¼"	2002	1, 4, 15, 60 or 250	A or D	R, R/P or P
4	½"	2004			
8	1"	2008			



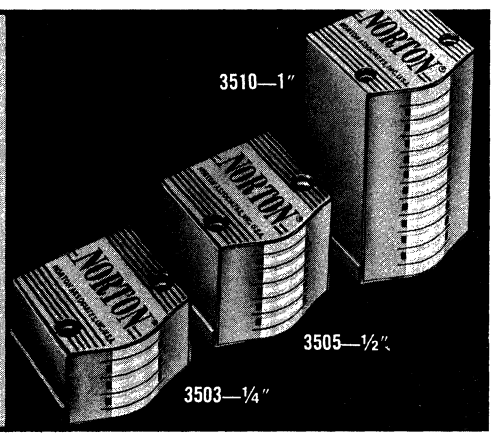
SERIES 3500

CROSSTALK — 60 DB

TRACK WIDTH — .040 TRACK SPACING — .100 ctoc

INDUCTANCE mh	MAXIMUM RATING AT 75°C ma rms	TYPICAL OPERATION				
		BIAS RECORDING			RB PULSE RECORDING	
		Bias Current ma rms	Record Current ma rms	Playback 0 DB mv rms	Write Pulse ma p-p	Read Pulse +12DB mv p-p
1	50	8	1	1.2	32	12
4	40	4	.5		16	
15	20	2	.25		8	
60	10	1	.12		4	
250	5	.5	.06		2	

NUMBER OF TRACKS	TAPE WIDTH	CATALOG NUMBER			
		SERIES	INDUCTANCE	ANALOG OR DIGITAL	FUNCTION
3	¼"	3503	1, 4, 15, 60 or 250	A or D	R, R/P or P
5	½"	3505			
10	1"	3510			



NORTON® MAGNETIC HEADS

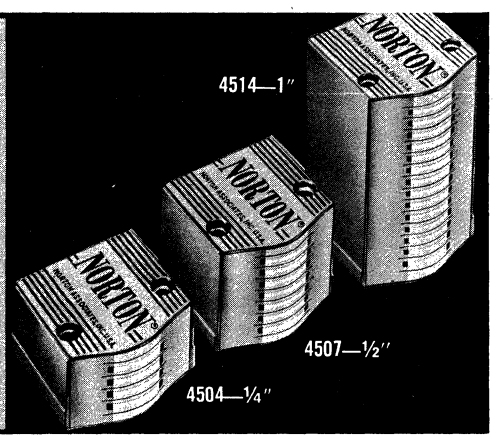
SERIES 4500

CROSSTALK — 50 DB

TRACK WIDTH — .032 TRACK SPACING — .070 ctoc

INDUCTANCE mh	MAXIMUM RATING AT 75°C ma rms	TYPICAL OPERATION				
		BIAS RECORDING			RB PULSE RECORDING	
		Bias Current ma rms	Record Current ma rms	Playback 0 DB mv rms	Write Pulse ma p-p	Read Pulse +12DB mv p-p
1	40	6	.8	1.0	24	10
4	20	3	.4		12	
15	10	1.5	.2		6	
60	5	.8	.1		3	
250	5	.4	.05		1.5	

NUMBER OF TRACKS	TAPE WIDTH	CATALOG NUMBER			
		SERIES	INDUCTANCE	ANALOG OR DIGITAL	FUNCTION
4	¼"	4504	1, 4, 15, 60 or 250	A or D	R, R/P or P
7	½"	4507			
14	1"	4514			



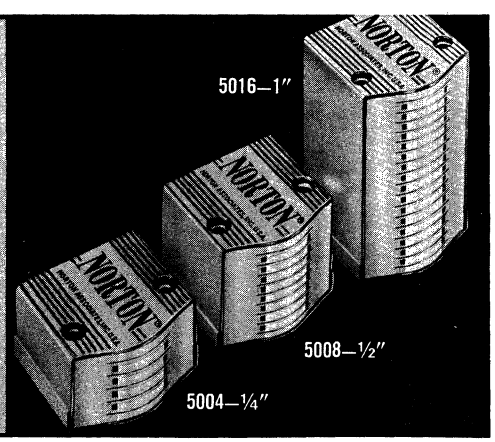
SERIES 5000

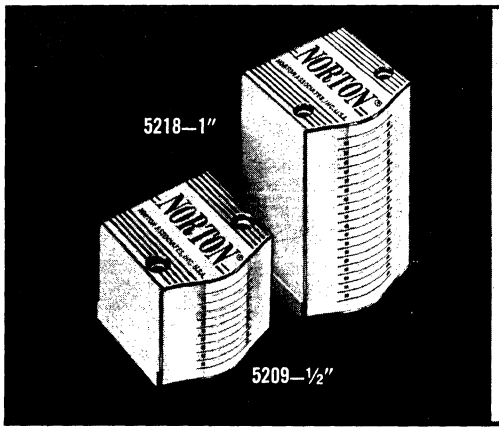
CROSSTALK — 50 DB

TRACK WIDTH — .024 TRACK SPACING — 5004 — .0635 ctoc
5008, 5016 — .064 ctoc

INDUCTANCE mh	MAXIMUM RATING AT 75°C ma rms	TYPICAL OPERATION				
		BIAS RECORDING			RB PULSE RECORDING	
		Bias Current ma rms	Record Current ma rms	Playback 0 DB mv rms	Write Pulse ma p-p	Read Pulse +12DB mv p-p
1	40	6	.8	1.0	24	10
4	20	3	.4		12	
15	10	1.5	.2		6	
60	5	.8	.1		3	
250	5	.4	.05		1.5	

NUMBER OF TRACKS	TAPE WIDTH	CATALOG NUMBER			
		SERIES	INDUCTANCE	ANALOG OR DIGITAL	FUNCTION
4	¼"	5004	1, 4, 15, 60 or 250	A or D	R, R/P or P
8	½"	5008			
16	1"	5016			





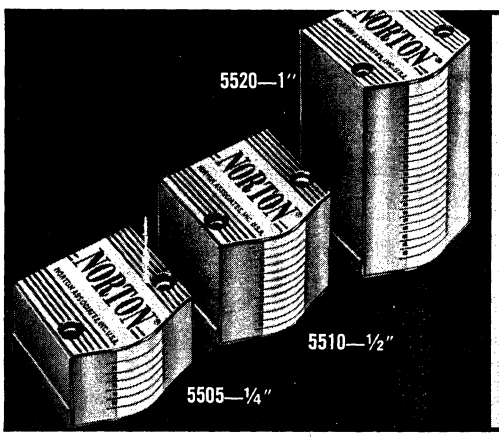
SERIES 5200

CROSSTALK—40 DB

TRACK WIDTH—.024 TRACK SPACING—.055 ctoc

INDUCTANCE mh	MAXIMUM RATING AT 75°C ma rms	TYPICAL OPERATION				
		BIAS RECORDING			RB PULSE RECORDING	
		Bias Current ma rms	Record Current ma rms	Playback 0 DB mv rms	Write Pulse ma p-p	Read Pulse +12DB mv p-p
1	40	6	.8	1.0	24	10
4	20	3	.4		12	
15	10	1.5	.2		6	
60	5	.8	.1		3	
250	5	.4	.05		1.5	

NUMBER OF TRACKS	TAPE WIDTH	CATALOG NUMBER			
		SERIES	INDUCTANCE	ANALOG OR DIGITAL	FUNCTION
9	½″	5209	1, 4, 15, 60 or 250	A or D	R, R/P or P
18	1″	5218			



SERIES 5500

CROSSTALK—40 DB

TRACK WIDTH—.024 TRACK SPACING—.050 ctoc

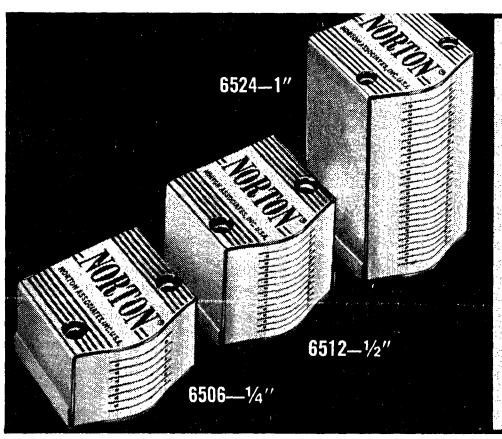
INDUCTANCE mh	MAXIMUM RATING AT 75°C ma rms	TYPICAL OPERATION				
		BIAS RECORDING			RB PULSE RECORDING	
		Bias Current ma rms	Record Current ma rms	Playback 0 DB mv rms	Write Pulse ma p-p	Read Pulse +12DB mv p-p
1	40	6	.8	1.0	24	10
4	20	3	.4		12	
15	10	1.5	.2		6	
60	5	.8	.1		3	
250	5	.4	.05		1.5	

NUMBER OF TRACKS	TAPE WIDTH	CATALOG NUMBER			
		SERIES	INDUCTANCE	ANALOG OR DIGITAL	FUNCTION
5	¼″	5505	1, 4, 15, 60 or 250	A or D	R, R/P or P
10	½″	5510			
20	1″	5520			

MULTITRACK
ERASE RECORD PLAY

NORTON ASSOCIATES, INC.

10 Di Tomas Court, New York 11726 • (516) 842-4666



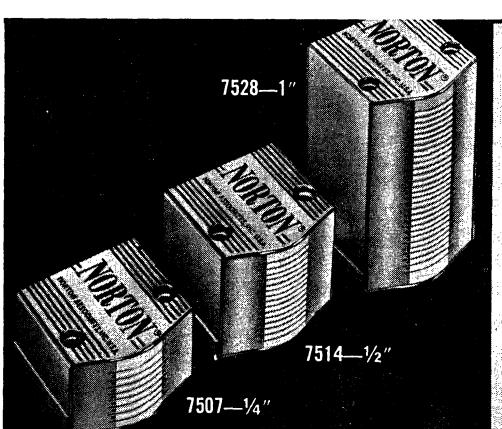
SERIES 6500

CROSSTALK—40 DB

TRACK WIDTH—.018 TRACK SPACING—6506—.045 ctoc
6512, 6524—.042 ctoc

INDUCTANCE mh	MAXIMUM RATING AT 75°C ma rms	TYPICAL OPERATION				
		BIAS RECORDING			RB PULSE RECORDING	
		Bias Current ma rms	Record Current ma rms	Playback 0 DB mv rms	Write Pulse ma p-p	Read Pulse +12DB mv p-p
1	40	5	.6	0.9	20	9
4	30	2.5	.3		10	
15	10	1.3	.15		5	
60	5	.7	.08		2.5	
250	5	.4	.04		1.3	

NUMBER OF TRACKS	TAPE WIDTH	CATALOG NUMBER			
		SERIES	INDUCTANCE	ANALOG OR DIGITAL	FUNCTION
6	¼″	6506	1, 4, 15, 60 or 250	A or D	R, R/P or P
12	½″	6512			
24	1″	6524			



SERIES 7500

CROSSTALK—40 DB

TRACK WIDTH—.012 TRACK SPACING—7507 — .038 ctoc
7514, 7528 — .036 ctoc

INDUCTANCE mh	MAXIMUM RATING AT 75°C ma rms	TYPICAL OPERATION				
		BIAS RECORDING			RB PULSE RECORDING	
		Bias Current ma rms	Record Current ma rms	Playback 0 DB mv rms	Write Pulse ma p-p	Read Pulse +12DB mv p-p
1	30	4	.6	0.7	16	7
4	15	2	.3		8	
15	10	1	.15		4	
60	5	.5	.08		2	
250	5	.3	.04		1	

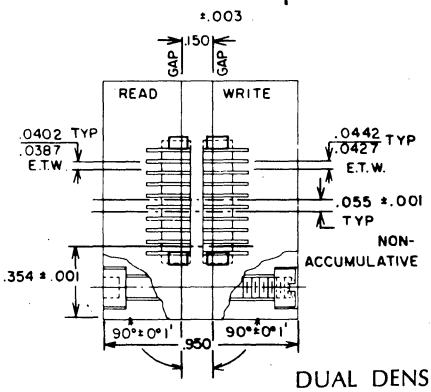
NUMBER OF TRACKS	TAPE WIDTH	CATALOG NUMBER			
		SERIES	INDUCTANCE	ANALOG OR DIGITAL	FUNCTION
7	¼″	7507	1, 4, 15, 60 or 250	A or D	R, R/P or P
14	½″	7514			
28	1″	7528			

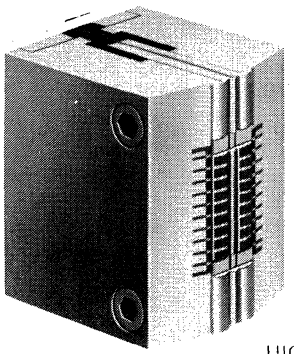
NORTRONICS IBM-COMPATIBLE

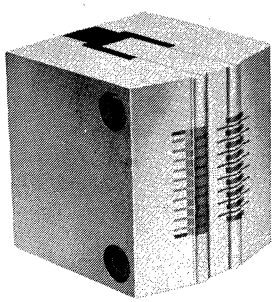
DIGITAL HEADS

Datum Series • Dual Gap

Full line of Standard 7 and 9 track read-write and read-after write heads also available. Ask for digital catalog and supplement.







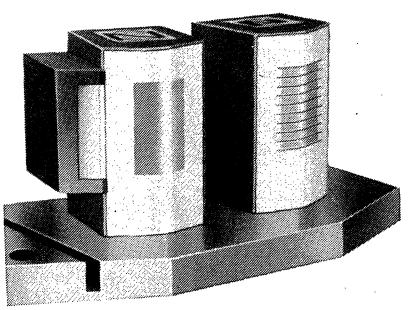
DUAL DENSITY

HIGH SPEED READ AFTER WRITE 200 IPS TAPE SPEEDS

READ/READ 7 TRACK OR 9 TRACK

MODEL NUMBER		D92C028	D92C029	D92C004	D92C022	D92G020	D92C021	D79E026	D79E027
					WITH FLUX GATE	NO FLUX GATE			
Number of Channels		9			9			7 and 9 Ch.	
Recording Density FRPI		800—3200			3200	800 & 3200	3200	800—7 Ch. / 3200—9 Ch.	800
Tape Speed IPS		Up to 150			200	100 or 200	200	Up to 112.5	
Saturation Current in ma O-Peak, ½ Coil for 95% of Max. output @ 800 FRPI		20	26	70	@ 3200 FRPI	36		N/A	
Typical Operating Current in ma O-Peak		20 @ 3200 / 30 @ 800	22 @ 3200 / 40 @ 800	.65 @ 3200 / 120 @ 800	65			N/A	
Read Output (mv) E_o @ 800 FRPI	37.5 IPS	12	7	6	1600 FRPI	100 IPS N/A	8	N/A	112.5 IPS 28—7 Ch.
	112.5 IPS	40	22	20	200 IPS 16	16	16		28—9 Ch.
Max. Crossfeed Write to Read @ 112.5 IPS		3%			3% @ 200 IPS	8% @ 100 IPS	8% @ 200 IPS	N/A	
Crosstalk Read to Read		2%			2%	4%		3%	
Min. Resolution: $\frac{E_o \text{ @ 3200 FRPI}}{E_o \text{ @ 200 FRPI}} \times 100\%$		36%	44%	36%	50%			@ 800 FRPI / @ 200 FRPI 85%	
Inductance @ 1.0 KHz	Max. Write	1.5 MH (1 leg)	400 μH (1 leg)	60 μH (1 leg)	@ 100 KHz	100 μH (1 leg)		9 Ch 1.75 MH	3.0 MH
	Nom. Read	3.5 MH (total)	1.7 MH (total)	1.7 MH (total)		800 μH total		7 Ch 3.5 MH	
D.C. Resis. ohms	Nom. Write	7.0 (1 leg)	4.0 (1 leg)	3.0 (1 leg)	1.5 (1 leg)			9 Ch 15	14
	Nom. Read	30 Total	6 Total	8 Total	7 total			7 Ch 17	
Electrical Skew @ 112.5 IPS	Write	1.3 μ sec			μsec/IPS .75/112.5	0.75/200		9 Ch 1.3μ sec	
	Read	1.3 μ sec						7 Ch 1.3μ sec	
Track Width: (Inches)	Write	0.0427—0.0442			0.0427-0.0442			9 Ch 0.0387—0.0402	
	Read	0.0387—0.0402			0.0387-0.0402			7 Ch 0.0290—0.0310	
Track Location, " C to C		0.055 ± 0.001 Non Accumulative Tolerance			0.055 ± 0.001 Non Accumulative Tolerances			9 Ch 0.055 ± 0.001 Non Accumulative Tolerances	
								7 Ch 0.070 ± 0.001 Non Accumulative Tolerances	
Location Tolerance From Mntg. Surface:		± 0.001 to any track			± 0.001 to any track			± 0.001 to any track	
Gap Length (Microinches)	Write	100			100			9 Ch 100	
	Read	100			100			7 Ch 250	
Write Gap to Read Gap Distance—Inches		0.150 ± 0.003			150 ± 0.003			0.225 ± 0.003	
Perpendicularity of Gaps to Mounting Surface		150 Microinches Across the Effective Track Width							

Tape Certifier/Evaluator Heads



Full width write head and 9-channel read head supplied custom-mounted to your nest requirements, with or without erase head piggy-backed.

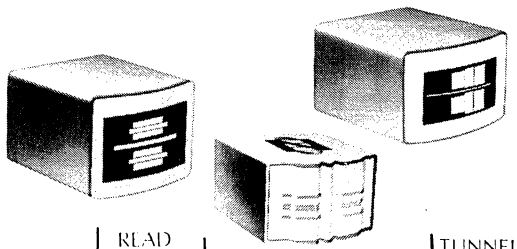
MODEL NUMBER		D11A015	D11A016	D91A07	D91A017
Recording Density (FRPI)		800	3200	800	3200
Tape Speed (IPS)			Up to 150		
Saturation Current in ma O-Peak, ½ Coil for 95% of Max. output @ 800 FRPI		220	250	N/A	
Typical Operating Current in ma O-Peak		350	250	N/A	
Read Output @ (mv) E_o	150 IPS	N/A		35	10
	112.5 IPS	N/A		27	7
Max. Crossfeed—Write to Read		N/A			
Crosstalk—Read to Read		N/A		2%	2%
Min. Resolution: $\frac{E_o \text{ @ 800 FRPI}}{E_o \text{ @ 200 FRPI}} \times 100\%$		N/A		8.5%	$\frac{E_o \text{@3200}}{E_o \text{@2000}} \times 100\% = 36\%$
Inductance @ 1.0 KHz	Write	150μ H	190μ H	N/A	
	Read	N/A		6.0 MH	1.1 MH
D.C. Resis. (ohms)	Write	1.2	1.0		
	Read			60	10
Electrical Skew @ 112.5 IPS	Write		N/A		
	Read	N/A		1.3μ sec	1.3μ sec
Track Width: (Inches)	Write	0.530	0.530	N/A	
	Read	N/A		0.038—0.041	0.038—0.041
Track Location, " C to C		N/A		.055 ± .001	.055 ± .001
Location Tol. from Mntg. Surface:		± 0.003		± 0.001	
Gap Length (Microinches)	Write	500	100	N/A	
	Read	N/A		200	100
Write Gap to Read Gap Distance—Inches		Variable			
Perpendicularity of Gaps to Mounting Surface		150 Microinches Across the Effective Track Width			

NOTES: N/A = Not Applicable FRPI = Flux Reversals per Inch IPS = Inches per Second (tape speed)

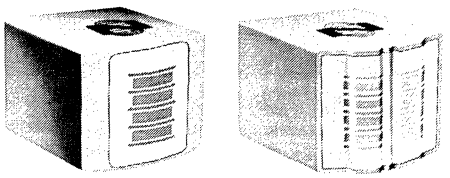
NORTRONICS MINI-DIGITAL HEADS

- Computer capabilities at desk-top
- Electrical specifications available to exact customer needs
- For flexible or rigid media—Tape, Drum, Card Reader, etc.
- All heads are available to meet the ANSI, ECMA, and ISO proposed standards requirement

.150" CASSETTE FORMAT



¼" FORMAT



ELECTRICAL		READ WRITE	READ AFTER WRITE		TUNNEL ERASE	SINGLE GAP READ WRITE		DUAL GAP READ AFTER WRITE	
MODEL NUMBER		DC11R07N, DC21R07N	DC12A01K, DC22A01K	DC12P11L ECMA	DC2ZR21N	1 to 4 channel DQ 11, 21, 41	5 channel DQ 51	1 to 4 channel DQ 12, 22, 42	5 channel DQ 52
Recorded Density—FRPI		800	3200/800	1600	800	3200/800			
Tape Speed—IPS		Up to 50	Up to 50	Up to 24	Up to 50	UP TO 50			
Reference Current (Ir) P-Peak in ma—Min. Current for 95% P-Peak output at 800 FRPI		5.0	3200 FRPI 22	20	4.5	3200 FRPI 1.5		12	
Typical Operating Current (Im), P-Peak ma = 1.5 x Ir		7.5	33	30	6.7	(1.8 Ir) 2.7		22	
Read Output @ (mv) E_o 200 FRPI	3.75 IPS	4.0	3200 FRPI 2.8	4.0 @800FRPI	4.0	3200 FRPI 7½ IPS 4	3.0	30 IPS 6	5
	15 IPS	15.0			15.0				
Crossfeed @ Ir—Write to Read*			12%	13%				30 IPS* Max. 20%	
Crosstalk—Read to Read	Max.	2% E_o	1% E_o	N/A	1% E	2% E_o		2% E_o	
Resolution: $\frac{E_o @ 800 \text{ FRPI}}{E_o @ 200 \text{ FRPI}}$ x 100%		85%	3200 FRPI 36%	65%	85%	3200 FRPI 36%		36%	
Inductance @ 1 KHz, Mhy	Max. Write		0.350	0.33				3	
	Nom. Read		20	14				18	
	Read/Write	10			10	40			
	Erase				15				
D.C. Resistance OHMS	Nom. Write		1.8	1.9				12	
	Nom. Read		60	50				30	
	Read/Write	50			50	40			
	Erase				150				
D.C. Current for 99% Erasure of Im (ma)					20				
MECHANICAL									
Track Width: (Inches)	Read/Write Read	.056	Write .042 Read .031	Write .057 ± Read .036 .002	.056	Write .036 Read	.031	Write .036 Read .026	.031 .021
	Erase				.066				
Track Location (Inches) Center to Center		.088	.088	Read .088 Write .092	.088	Write .064 Read	.053	.064	.053
Gap Length (Microinches)	Read/Write Read	200	Read 100 Write	Read 160 Write 160	200	Write Read 100		Write Read 100	
	Erase				3000				
Write Gap to Read Gap Distance (Inches)			.150 ±.005	.150				.150	

NOTES:

NA = Not Applicable.
FRPI = Flux Reversals Per Inch.
IPS = Inches Per Second (Tape Speed).

E_o Load = 10K + 150 pf
*Reading taken without external flux shield.

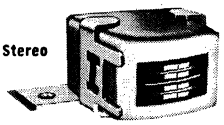
Im = Typical Operating Current (P-P in ma) = 1.5 x Ir.
Ir = Reference Current (P-P in ma) = Minimum Current for 95% P-P E_o at 3200 FRPI.

NORTRONICS

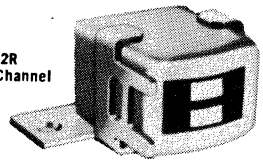
Studio, Cassette, SMPTE, and Specialty Heads

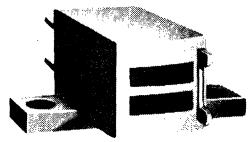
CASSETTE TYPE HEADS

MODEL W4J
MODEL ZW4J
4 Track, 4 Channel Stereo



MODEL W2R
2 Track Dual Channel

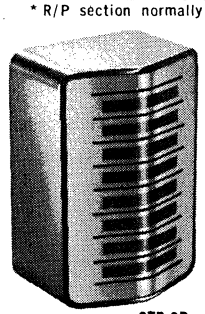




MODEL W2ER
2 Channel Erase Head

	MODEL NUMBER	W1R6F W2R6F	W1R8N W2R8N	ZW1R36K ZW2R36K	W2J6F	W4J8N W2J8N	W4J4F	ZW4J34F	W2ER3
	FUNCTION	R/P	R	E/R/P	R/P	R	P	E/R/P	E
R/P	Track Width (Inches)	.056	.056	.056	.021	.021	.021	.021	.070
R/P	Inductance (MHY) @ 100 MV-1 KHz	200	10	100	160	10	80	50	---
R/P	Resistance, DC (OHMS)	270	50	200	430	60	150	140	---
R/P	Interchannel Crosstalk @ 1 KHz Rejection (DB)				25 DB		30 DB	1-2/3-4	-
R/P		50	50	50	50	50	50 DB	2-3	---
R/P	Gap (Micro Inches)	50	200	100		200	50	50	---
ERASE	Induction (MHY) @ 100 MV, 1 KHz	---	—	1.5		—	—	2	2
ERASE	Resistance DC (OHMS)	---	—	30		—	—	38	12
ERASE	Erasure From Sat. 400 Hz (DB)	---	—	50		—	—	50	60
ERASE		Average constant-current unequalized R/P characteristics using 3M 272 tape. Biased for peak 1 KHz output at level 10-12 DB below tape saturation. Tape speed, 1.875 inches per second							
ERASE	Bias Voltage @ 60 KHz (Volts Rms)	20	7.0	25*	18	3.5	—	30*	13
ERASE	Bias Current @ 60 KHz (Ma Rms)	33	1.5	70*	.40	1.6	—	60*	17
ERASE	Record Current (MA)	.028	.140	.070	.030	.130	—	.070	---
ERASE	1 KHz Playback Output (MV)	.4	—	.4	.22	—	.17	.15	---
ERASE	5 KHz Output Vs. 1 KHz Output (DB)	−1	—	−8		—	—	—	---
ERASE	10 KHz Output Vs. 1 KHz Output (DB)	—	—	—	−12	—	−14	−14	-

* R/P section normally receives sufficient bias thru magnetic leakage from the erase section, 50 pf across R/P coil during record.



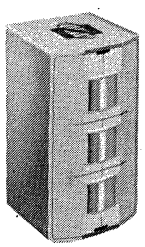
STR-8B

STUDIO SERIES

1" HEAD
8 CHANNEL

	BASIC MODEL NUMBER			
TAPE WIDTH	ERASE	RECORD	PLAYBACK	
ONE HALF INCH TAPE	STE- 3B6 STE- 4B6	STR- 3B7 STR- 4B7	STP- 3B3 STP- 4B3	STP- 3B8 STP- 4B8
ONE INCH TAPE	STE- 8B6 STE-12B6	STR- 8B7 STR-12B7	STP- 8B3 STP-12B3	STP- 8B8 STP-12B8
TWO INCH TAPE	STE-16B6	STR-16B7	STP-16B3	STP-16B8
Inductance, 1 KHZ	215 UHY	4.0 MHY	300 MHY	650 MHY
Resistance, D.C. (OHMS)	1.3	8.3	245	530
Track Width (Inches	.080	.070	.070	.070
Track Spacing (Inches)	.130	.130	.130	.130
Gap Width (Microinches)	—	500	100	200
AVERAGE RECORD/PLAYBACK CHARACTERISTICS, USING 3M 201 TAPE, BIASED FOR PEAK 1 KHZ OUTPUT AT A LEVEL OF 12 DB BELOW TAPE SATURATION @ 1 KHZ				
Erase Voltage @ 100 KHZ	11 Volts	—	—	—
Erase Current @ 100 KHZ	100 MA	—	—	—
Bias Voltage @ 180 KHZ @ 15 IPS	—	17 Volts	—	—
Bias Voltage @ 180 KHZ @ 7.5 IPS	—	16 Volts	—	—
Bias Current @ 180 KHZ @ 15 IPS	—	8.0 MA	—	—
Bias Current @ 180 KHZ @ 7.5 IPS	—	7.5 MA	—	—
Audio Record Current @ 15 IPS	—	.40 MA	—	—
Audio Record Current @ 7.5 IPS	—	.38 MA	—	—
1 KHZ OUTPUT (15 IPS)	—	—	2.1 MV	3.2 MV
1 KHZ OUTPUT (7.5 IPS)	—	—	1.9 MV	3.0 MV
10 KHZ/1 KHZ Output (15 IPS)	—	—	+11 DB	+10 DB
10 KHZ/1 KHZ Output (7.5 IPS)	—	—	+5 DB	+3 DB
15 KHZ/10 KHZ Output (15 IPS)	—	—	+1 DB	−1.5 DB
15 KHZ/10 KHZ Output (7.5 IPS)	—	—	−1 DB	−4 DB

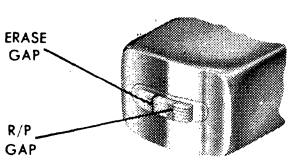
Specifications subject to change without notice.



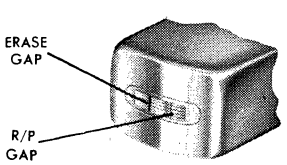
SMPTE—COMPATIBLE HEADS

- 1, 3 and 4 track. 35 MM. Heads.
- 1 track edge, center, and stripe 16 MM. Heads
- Mu Metal, Alfenol, or Ferrite Cores
- ½" and 1" frame sizes.
- Typical Specs: Gap lengths of 200 or 500 micro-inches, coil inductance 5 to 400 MHY.

NARROW TRACK AND EXTENDED POLE PIECE HEADS



"XZ" EXTENDED POLE



"Z" FLUSH FACE

***Z Combo — Type Z** — Combination erase and R P head places all three functions within a single head. Ideal for dictation machines, card readers and film stripe applications. "Close-coupled" gap provides internal bias coupling that simplifies required circuitry and permits accurate editing.

Type XZ offers additional advantage of extended pole tip (.010-.020 inches) for gap to oxide contact on hard or non-compliant surfaces.

***R/P Heads — Type X** — Extended pole tip R P heads feature high sensitivity mu-metal cores.

Type XA — Extended pole tip R P heads feature long wearing alfenol cores.

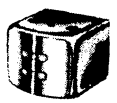
BASIC MODEL NO.	X-ZRINC	X-ZRILC	CILC RILC	ZRILC	XACILC
Track Width (Inches)	.0135	.020	.020	.020	.020
Electrical Code	75 K	96 K	7 K	47 K	13 K
Head Function	Erase—R/P	Erase—R/P	R/P	Erase—R/P	R/P
R/P Inductance	500 MHY	220 MHY	400 MHY	450 MHY	170 MHY
R/P Gap Spacer	0.1 MIL	0.1 MIL	0.1 MIL	0.1 MIL	0.1 MIL
Erase Inductance	0.3 MHY	8 MHY	—	14 MHY	—
Erase Current (Bias)	65 MA	15 MA	—	12 MA	—
Erase Voltage (Bias)	2.5 V	28 V	—	32 V	—
Record Current	35 UA	30 UA	—	22 UA	—
1 KHZ Output	0.8 MV	0.5 MV	0.8 MV	0.7 MV	0.4 MV
10 KHZ/1 KHZ Ratio	−12 DB	−12 DB	−12 DB	−15 DB	−12 DB

Typical 3.75 IPS constant current R/P characteristic using 3M190 tape. Peak biased at 60 KHZ at 1 KC and recorded 12 DB below tape saturation.

NORTRONICS HEADS for ¼" tape audio applications

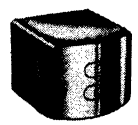
8-Tr. Stereo Z-Combo
ZJ2L
(No Mount)

8-Track
4-Channel
P-BQL-N
(No Mount)

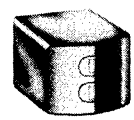


8-Tr. Stereo
B2L-N
(No Mount)

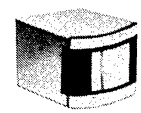
P-BQQ-N
(No Mount)



4-Tr. Stereo
PB2Q-N
(No Mount)



2-Tr. Stereo
PB2H-N
(No Mount)



PR-B1F

	8 TRACK			4 TRACK				2 TRACK		FULL TRACK	
BASIC MODEL NUMBER	P-BQL	Z-J2L	B2L	P-BQQ		PB2Q, PA1QC*, PA2Q*		PB2H, PG1H, PB1HY, PA1HC*, PA2H*		PR-B1F	
ELECTRICAL CODE	6K	47 K	7K	4R	7K	4R	7K	4R	7K	11R	12N
HEAD FUNCTION	Record/ Playback	Erase/ Record/ Playback	Record/ Playback	Record Only	Record/ Playback	Record Only	Record/ Playback	Record Only	Record/ Playback	Record Only	Playback
TYPE OF CIRCUIT	Tubes/ Transistors	R/P Section Data	Tubes/ Transistors	Tubes/ Transistors	Tubes/ Transistors	Tubes Transistors	Tubes/ Transistors	Tubes/ Transistors	Tubes/ Transistors	Tubes/ Transistors	Tubes/ Transistors
Inductance, 1 KC	200 MHY	400 MHY	400 MHY	50 MHY	400 MHY	50 MHY	400 MHY	50 MHY	400 MHY	4.0 MHY	650 MHY
Impedance, 1 KC	1.5 K	2.5 K	2.5 K	320 Ω	2.2 K	400 Ω	2.5 K	320 Ω	2.5 K	27 Ω	4 K
Maximum Bias Frequency	100 KC	100 KC	100 KC	150 KC	80 KC	250 KC	100 KC	200 KC	100 KC	500 KHz	—
Resistance, D.C. Mono		—	520 Ω			90 Ω	210 Ω	70 Ω	165 Ω	3.35 Ω	275 Ω
Resistance, D.C. Stereo	500 Ω	680 Ω	700 Ω	220 Ω	690 Ω	90 Ω	390 Ω	130 Ω	410 Ω		
Gap Spacer	0.1 MIL	0.1 MIL	0.1 MIL	0.5 MIL	0.1 MIL	0.5 MIL	0.1 MIL	0.5 MIL	0.1 MIL	0.5 MIL	0.2 MIL
Track Spacing	0.635 INCH	.127 INCH	.127 INCH	.071 INCH	.071 INCH	.136 INCH	.136 MIL	.160 INCH	.160 INCH		
1 KC Crosstalk Rej.	50 DB	50 DB	50 DB	55 DB	55 DB	55 DB	55 DB	55 DB	55 DB		
Peak Bias Current, 60 KC	0.35 MA	•15 MA	0.15 MA	0.60 MA	0.30 MA	0.65 MA	0.25 MA	0.70 MA	0.33 MA	9.0 MA	—
Bias Voltage RMS, 60 KC	22 VOLTS	•45 VOLTS	21 VOLTS	7 V	30 V	7.5 V	35 V	9 V	40 V	25 V	—
Record Current	35 UA	30 UA	19 UA	60 UA	34 UA	60 UA	35 UA	75 UA	40 UA	.540 MA	—
1 KC Output	0.8 MV	0.9 MV	1.0 MV	—	1.4 MV	—	1.8 MV	—	2.4 MV	—	5.0 MV
10 KC/1 KC Ratio	0 DB	−3 DB	0 DB	—	0 DB	—	+1 DB	—	+1 DB	—	+3 DB

ERASE HEADS

ELECTRICAL CODE	Z-J2L	SEQ; B2EQ	SEH; B2EH	PR-B1EF
Inductance, 1 KC	ERASE SECTION DATA	4	4	4
Resistance, D.C.	Inductance @ 60 KC 12 MHY	10 MHY	8 MHY	1.2 MHY
†Erase Cur. Oper.	Erasure @ 60 KC 50 DB	38 Ω	30 Ω	3.8 Ω
Impedance, 60 KC	• Erase section data:	13 MA	20 MA	95 MA
Volt., 60 KC RMS	RP bias internally coupled.	3 K	2 K	42 Ω
		40 V	40 V	40 V

†For 56 DB erasure of Saturated Tape.

• R/P/E functions in one head; electrical data per tables.

MODEL ZJ2L Z-Combo

Record/playback and erase functions in one head for 8-track stereo applications. Patented unique "Z-Combo" construction places the erase and R/P gaps only .030 apart in the same pole structure, resulting in extremely accurate height alignment and tracking.

Advantages of Z-Combo Close-Coupled Gaps

- Initimate tape contact with single or no pressure pad
- Insures overlap alignment of erase when R/P section is azimuth aligned
- Prevents adjacent channel erasure in close spaced track configurations when R/P section is azimuth aligned

MODEL P-BQL

SUITABLE FOR HIGH SPEED DUPLICATORS, LOW SPEED LOGGING APPLICATIONS, AND GENERAL PURPOSE RECORDING AND PLAYBACK.

The NORTRONICS Premium Quality P-BQL four-channel magnetic tape head utilizes the most advanced design and manufacturing techniques. Fine-laminated cores and precision-deposited gaps give extended frequency response capability. Ideal as high speed slave heads for duplication of 8-track stereo at speeds up to 8X or 16X, with bias frequencies up to 750 KHz.

MODEL B2L-N

Standard playback — only or record/playback head for automobile or home type Stereo — 8 tape cartridge players. Premium version of above head is available with extra-fine laminated cores for improved high frequency response to 15 KHz at 3.75 ips tape speed. Also available Alfenol Premium record-only head for heavy-duty high speed duplicating applications. Give five times normal life.

PBQQ

Typical Applications—Instrumentation recording including carrier modulated types such as AM, FM or Pulse, as well as straight digital and analog recording. Tracks of the P-BQQ head are compatible with the 4-track stereo system making it ideal for audio duplication, background music and 4-channel in-line stereo.

"L" SERIES
(5/16"W x 5/16"H x 3/8"D)

"M" SERIES
(1/4"W x 1/4"H x 1/4"D)

PR SERIES

- Sets a new standard for high performance magnetic heads.
- Unexcelled response from 20HZ to 20KHZ.

Professional series full track—PR-B1F, designed especially for long wave length response with extra wide pick-up poles, smooth response characteristics are obtained to below 20HZ. Fine precision lapped laminated core stacks and deposited gaps extend short wavelength response. Extra deep deposited quartz gap.

Companion PR-B1EF ERASE also available.

MINIATURE TAPE HEADS

TYPICAL APPLICATIONS — Magnetic drums and discs, magnetic stripes on motion picture film and miniature tape recorders. When used with magnetic drums, discs and film stripes, it is recommended that a projecting track version be selected.

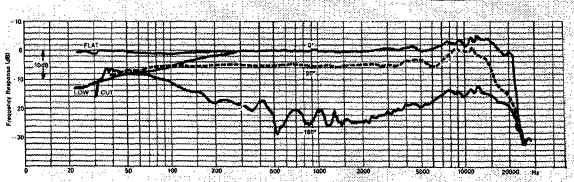
NORTRONICS ACCESSORIES

Bias Oscillator Transformers, Connector Plugs, Plug & Cable Assemblies, Pin Clips, Clip & Cable Assemblies, Contactor Heads, Tape Guide Posts, Mounting Brackets.

SEND FOR NORTRONICS FULL LINE CATALOG

CONDENSER MICROPHONE UNI-DIRECTIONAL CMU-503

The Primo Model CMU-503 Condenser Microphone has excellent audio properties and stable characteristics, making it suitable for diverse applications. Whether your talking about a large wind and string orchestra, a small group, or plain indoor music of a classical or popular, this microphone will satisfy any and all requirements. It may be used for group or solo pickup, or for vocals, choral jazz, or group singing. Whatever the task, quality performance is yours.



For Using
1. Broadcasting 2. Studio recording

SPECIFICATIONS
- Directivity: cardioid
- Sensitivity: −67dB ±1.5dB/μbar at 1KHz
- Impedance: 600 ohms ±10%
- Signal to noise ratio: 53dB ±3dB (Equivalent self noise −21dB ±3dB)
- Maximum in put level: 134dB distortion: 0.7%
- Attenuator: −10dB
- Tone controll: M − flat, V − −6dB at 100Hz
- Power supply: DC SYSTEM DC − Battery, Marolly H7D/A (or Everedy E126)
- Operation hours: 200 hours (continuous)
- Dimensions: 21φ×145mm(mic.)
- Cable length: 6m (with cannon 3p connector)

MAIN PRODUCTS:
- HEADPHONES
- MICROPHONES

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SEAS LOUDSPEAKERS AND SYSTEMS FOR EVERY APPLICATION

innovative electroacoustic technology backed by traditional Scandinavian craftsmanship

The specifications and curves below indicate the calibre of products comprising the SEAS line of speakers, crossovers and systems. But besides the extended range, flat response, high efficiency and good power handling capabilities, these speakers feature something not revealed in the specifications. Craftsmanship. The kind of old-world dedication in every step from design through manufacture that insures consistent product quality and durability. Backed by second- and third-generation speaker craftsmen using the latest production and test equipment.

Of especial note are SEAS' unique BAFF-L-KITS, which permit the manufacturer to install a pre-matched, fully-assembled and pre-wired *system* into the housing of his choice.

Needless to say, the speakers below represent only a small sampling of the more popular speakers in our line. For further information on these speakers, systems and crossovers, as well as other stock items and custom-manufactured units available in quantity, please write or call us.

SPEAKERS FOR 2- AND 3-WAY SYSTEMS*

The specifications and curves below indicate the kind of performance you can expect from SEAS high fidelity speakers. But their prices indicate SEAS means as much in value as it does in performance.

	Model	Diameter Power Rating	Frequency Range Cone Resonance	Magnet Weight Flux Density	Weight Depth	Frequency Response
TWEETERS	**5TV-HF** Economy tweeter with extended-range response	2″ 6W	3-20kHz 1kHz	1 oz. 11,500 G	5 oz. 1¼″	
	DOME-87H Deluxe tweeter with professional linearity and high power capability	1½″ 50W	1.5-20kHz 1kHz	6½ oz. 13,000 G	1 lb., 5 oz. 2⅜″	
MIDRANGE	**9TV-LG** Midrange with linear response extending to 20kHz	3½″ 16W	1-20kHz 300 Hz	2 oz. 11,500 G	9 oz. 2⅛″	
	15/11TV-2XM Bi-radial midrange with flat response, high power capability	6x4″ 24W	300-6,000 Hz 100 Hz	5 oz. 12,000 G	1 lb., 1 oz. 3⅛″	
WOOFERS	**21TV-EW** Compact low-resonance woofer	8″ 40W	35-2,000 Hz 27 Hz	6½ oz. 5,500 G	1 lb., 3 oz. 3½″	
	25TV-EW Moderately-priced low-resonance woofer with excellent response, good power capability	10″ 70W	30-1,500 Hz 23 Hz	6½ oz. 5,500 G	1 lb., 15 oz. 4″	
	30WK Deluxe woofer with ultra-low resonance, high-power capability, extremely linear response	12″ 100W	30-500 Hz 20 Hz	26 oz. 11,000 G	5 lbs., 5 oz. 6″	

BAFF-L-KITS™*

A unique concept in speaker system design. Speakers and crossover networks are "pre-packaged" on rigid black chip-board. Speakers and crossover networks are chosen for maximum compatibility. Holes are pre-cut; mid-range and tweeters are individually baffled. Wiring is already done and grille-cloth supplied. While ideal for the home hobbyist, SEAS BAFF-L-KITS are also ideal for manufacturers who prefer to save labor with ready-made systems, custom dealers, etc.

Model	Power Rating	Response with Infinite Baffle Volume of . . .	Dimensions Weight	Speaker Complement and Crossover	Crossover Frequency
81K Ideal 2-way system where space or economy are important. Exceptional sound at a low price	20W	55-20,000 Hz ½ cubic foot	19¼″Hx8¼″W x4¼″D 4½ lbs.	Woofer: 17TV-W (6½″) Tweeter: 9TV-HFT Crossover: H801 2-way	4,000 Hz
84K Performance equal to systems many times its moderate price. Features unusually linear response, good power capability in a full 3-way system	50W	43-20,000 Hz 1 cubic foot	22½″Hx9½″W x4½″D 8 lbs.	Woofer: 28/17TV-GW (11x7″) Midrange: 3TV-LG Tweeter: 5TV-HF Crossover: H805 3-way	1,500 Hz 4,000 Hz
85K Compares favorably with the finest systems on the market. Ultra-linear, full-range response, wide dispersion, high power capability, yet may be mounted in bookshelf-sized enclosure	100W	25-20,000 Hz 3 cubic feet	27½″Hx21½″W x6″D 28 lbs.	Woofer: 30WK (12″) Midrange: Two 15/11TV-LG-M Tweeter: Three 9TV-LG Crossover: H806 3-way	300 Hz 2,800 Hz

CROSSOVER NETWORKS

Sound design and no compromise in construction make these networks ideal for all types of 2- and 3-way systems. Heavy coils and quality capacitors insure excellent performance.

H801 H803 H805

H801	Two-way circuit with crossover frequency of 4,000 Hz	H803	Three-way circuit with crossover frequencies of 700 and 3,000 Hz
H805	Three-way circuit with crossover frequencies of 1,500 and 4,000 Hz	H806†	Three-way circuit with crossover frequencies of 300 and 2,800 Hz

*Unless otherwise specified, all speakers have 8-ohm impedance.
† not shown

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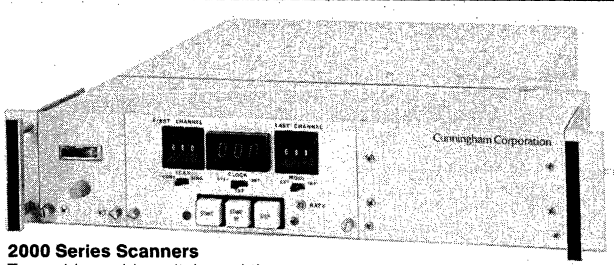
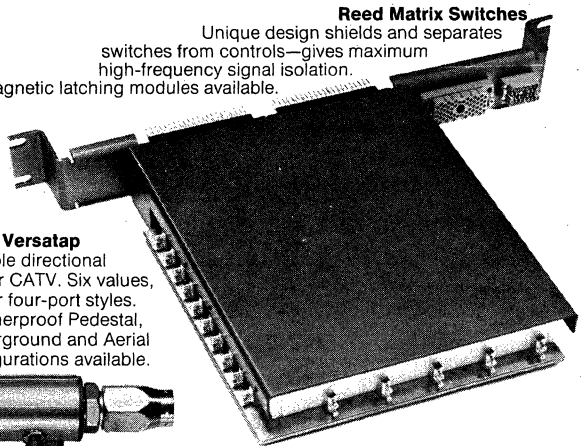
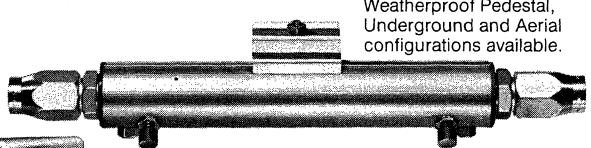


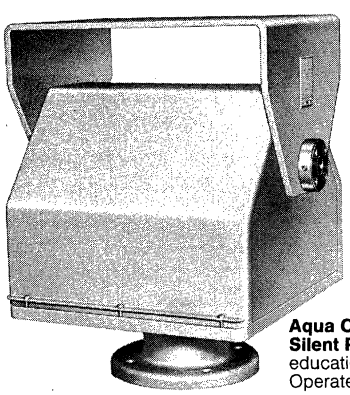
2000 Series Scanners
Two addressable switch modules (crossbar and reed) plus scanner control. Purchase complete or as separate units.

Reed Matrix Switches
Unique design shields and separates switches from controls—gives maximum high-frequency signal isolation. Magnetic latching modules available.

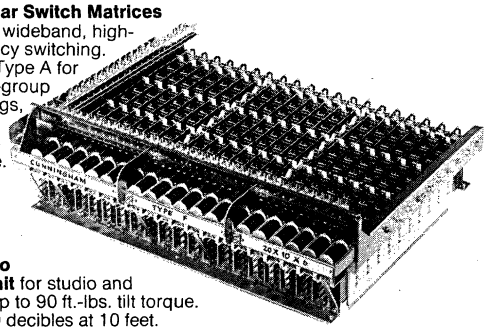


Aqua Versatap
Reliable directional tap for CATV. Six values, two or four-port styles. Weatherproof Pedestal, Underground and Aerial configurations available.





Crossbar Switch Matrices
Ideal for wideband, high-frequency switching. Type A for group-to-group switchings, Type F for group-to-one.



Aqua CCTV Studio Silent Pan/Tilt Unit for studio and educational use. Up to 90 ft.-lbs. tilt torque. Operates below 30 decibles at 10 feet.

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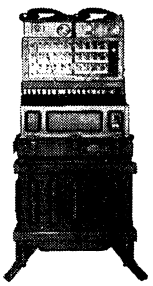
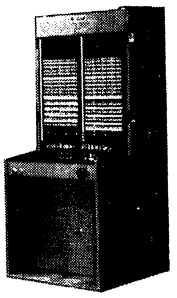
TELEPHONE SWITCHBOARDS, CENTRAL OFFICE EQUIPMENT AND HANDSETS

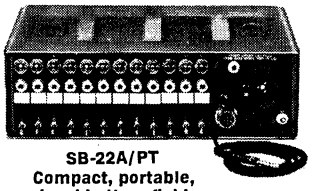
We are prime producers of manual and dial military switchboards, central office equipment and versatile handsets for many applications. Telephone facilities from 12 to 1,000 lines can be provided, for up to 160 manual or dial trunks, with our various equipments. Adaptations of standard equipment can be made to specifications.



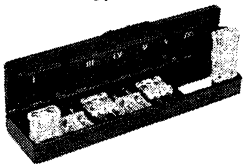
SB-86/P
Portable, local battery, field type manual switchboard.



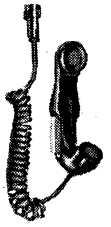
Complete, transportable manual telephone central office.



SB-22A/PT
Compact, portable, local battery field type switchboard.



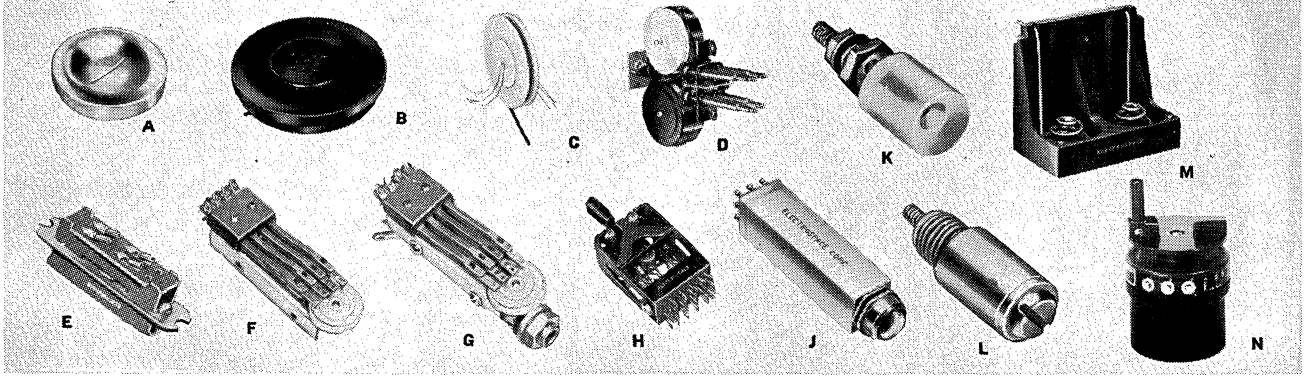
SB-993
Manual telephone switchboard for stacking conference calls.



H-33F/PT
Waterproof handset supplied with U-161/U connector.

TYPICAL TELEPHONE COMPONENTS

Widest Choice Available of Components, Elements and Accessories To Meet All Requirements.



(A) B3001P-1 MICROPHONE ELEMENT. Carbon capsule. Impedance: 40 ohms nominal. Frequency Response: 300-4000 Hz. Temperature Range: —40°F. to +150°F. Adaptable to standard WECO handsets. Made to MIL-M-11095A.

(B) C3001P-10 EARPHONE ELEMENT. Magnetic type. Impedance: 300 ohms nominal. Frequency Response: 300-4000 Hz. Temperature Range: —40°F. to +150°F. Reliable mechanical and acoustical stability. Adaptable to standard WECO handsets. Made to MIL-H-11134D.

(C) D3014-362 REEL & CABLE ASSEMBLY, RETRACTABLE. Accepts various cord types and sizes. Extends cord up to 4 ft. Provides neat, convenient cord storage. Readily applicable for use in telecommunication systems, test equipment, and others.

(D) D3014-318 TELEPHONE SWITCHBOARD MODULE. Shows typical application of Reel & Cable Assembly (—362) for field or stationary switchboards.

(E) B3001-18 BAR SWITCH. Double pole. 1 amp. 30V D.C. contact rating. Instantaneous actuation with nominal pressure at any point on bar. Operating life tested in excess of 500,000 cycles.

(F) C3014-105 THUMBWHEEL SWITCH. Flat, horizontal construction saves valuable panel space. One-finger operation. Permits multi-position, multi-circuit control. Heavy duty contacts mounted on leaf springs.

(G) D3014-76 THUMBWHEEL SWITCH & JACK ASSEMBLY. Shows typical application of switch (—105) with switchboard plug-in jack.

(H) D3014-320 LEVER SWITCH. Exceptionally rugged construction provides greatest operation dependability. Positive detent action. Return spring design reduces contact bounce and chatter. Three-position, multi-circuit contacts available.

(J) C3014-77 SIGNAL INDICATING RELAY. Requires only ¾" dia. panel space. Gives positive indication of relay operation. Combines signal-relay operation in one package. Operable from either of two individual coils.

(K) D3014-38 HOLE-IN-HEAD BINDING POST. Saves space. Provides easy, convenient, positive connection. Wire inserted at front of post instead of side. "PUSH-INSERT-RELEASE" — wire positively locked in place.

(L) B3014-39 CIRCUIT PROTECTOR. Reusable protective device for communication systems. Shorts the circuit to be protected against high voltage surges. Factory adjustable to break-down voltage required.

(M) B3014-54 BATTERY BLOCK. Provides convenient storage and method for connecting two "D" size cells into circuit.

(N) G-42A/PT HAND RINGING GENERATOR. Used for ringing field telephones. Centrifugally operated switch operates at a crank speed of about 140 rpm. The generator delivers 100 volts at 20 cycles at a crank speed of 200 rpm.

DETAILED SPECS AND MODIFICATIONS AVAILABLE. WRITE OR CALL FOR LITERATURE.

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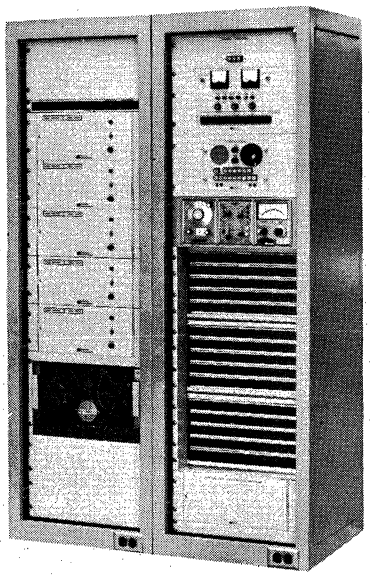
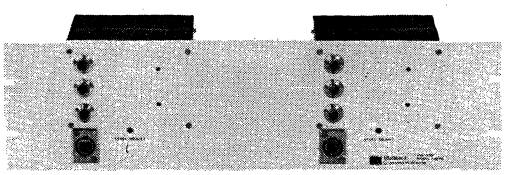
Multitech Communications

Multitech Communications (a Multitech Company) is concerned with the development and production of total communications systems including Telephone and Telegraph Switching Systems, Audio Monitoring Systems, Signaling Systems, Alarm Systems and Computer Peripheral Equipment Interface Systems.

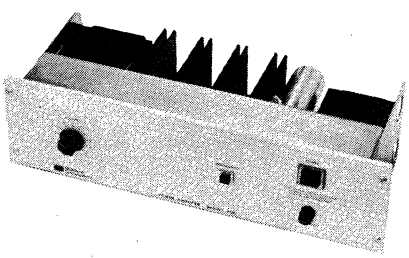
Products manufactured by Multitech Communications include: Line and Port Finders, Line Concentrators, Modems, Data Sets, Acoustic Couplers, Individual Jackfields, Terminal Blocks and Patch Cords, Multitech Communications is also a major supplier of Patch Panels to the military and communications industry.



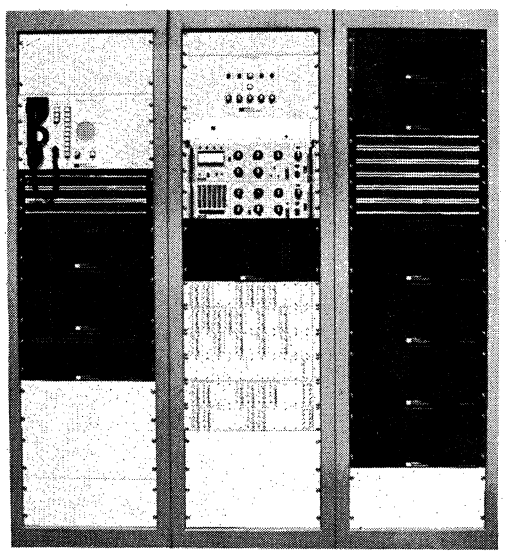
Model 7409 is a Voice Paging and Intercom System, which provides 33 intercom stations each having access to six networks, PABX, time announciator, and five 50 watt paging amplifiers.



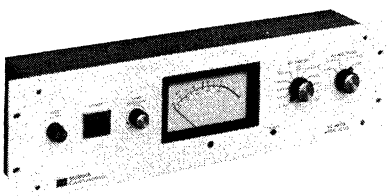
Model 750 Dual Audio Preamplifier utilizes integrated circuits and glass epoxy printed circuit boards for high reliability. H.D. & I.M. distortion are less than 2%. S/N ration is greater than 120 db. Dual rack mounted unit is shown.



Model 700 Audio Power Amplifier is an all solid-state silicon design intended for commercial and industrial paging and music systems. It features THD of less than 1% and IMD of less than 0.3% over its frequency range of 20-20,000 Hz at full output of 50 watts RMS. Unit is UL approved and has built-in output short circuit protection. Other solid-state designs up to 120 watts RMS with automatic gain changing to compensate for ambient noise condition are available. Inquiries for specific applications are invited. O.E.M. inquiries are welcome.



Model 7410 is an all Solid State System with Internal Processor and Core Memory used to switch Engineering Service Circuits between 2 Satellite Earth Ground Stations. TTY line Concentrator and FSK Modems are provided.



Model 522R VU Meter consists of one 4½-in. VU meter indicators mounted on a single 5¼-in. high panel. The panel mounting is for EIA standard 19-in. rack. Each VU meter has an input impedance greater than 10,000 ohms and a source impedance of 150 ohms. The VU meter circuit uses all silicon solid-state semiconductors for extremely long life. Model 522R features a calibration control and an input expander. The expander being at —20 VU, then proceeds to +40 VU in 2 VU steps. The last step on the multiplier is an OFF position. The VU meters may be recalibrated to operate off a 600 ohm source by changing one resistance value.

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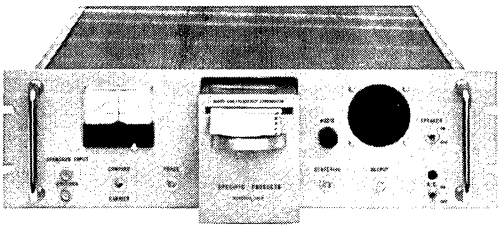
STANDARD TIME & FREQUENCY RECEIVERS

TIME & FREQUENCY STANDARDIZATION TO THE NATIONAL BUREAU OF STANDARDS

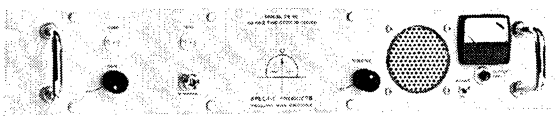


MODEL 650
60 KC PHASE COMPARATOR RECEIVER

Calibrates any local standard up to 5 - 10^{10} within a short period.

The Model 650 is the first low cost VLF Phase Comparison Receiver designed to permit phase comparison measurements between a local oscillator and the National Bureau of Standards transmitted 60 Kc/s from WWVB, Fort Collins, Colorado. The receiver is a straight-forward Tuned Radio Frequency receiver and can be used in any location in the United States with highly satisfactory results. Can be operated by any technician.

PRICE: $830.00



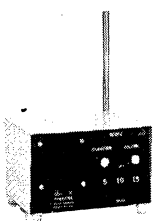
MODEL CS-60
60 KHZ TIME CODE RECEIVER

HIGH POWER • LOW CURRENT

A new, low current drain time code receiver, so sensitive that it will receive NBS signals from 2,000 or more miles away. Original and unique circuitry developed at the Seismological Laboratory in Pasadena, California. The unit will receive Radio Station WWVB signals, considered to be the most accurate time signals available. Intermediate frequency is 2kHz. It is designed for long term, remote, unattended operation as it requires power of only + 12 vdc ± 1 vdc at 1.5 ma without audio (35 ma with audio).

PRICE: MODEL CS-60A $595.00

Battery powered portable field unit available.

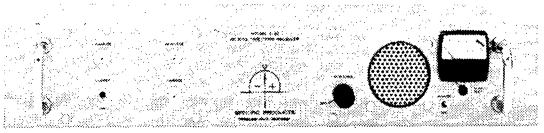


TYMASTER
Ten-36 Model

Low Cost • Portable

For navigation, astronomy, automotive rallies and all other activities where accurate time is a must. Operating on frequencies of 5, 10 and 15 MHz, this new unit will receive time signals from WWV and WWVH. Crystal controlled and push button selection. Hundreds of hours of operation on 8-"C" cell batteries. Size 5½"D x 6"W x 4"H. Panel is white on black with case in bright red or commercial grey.

Price: $92.50 each.



MODEL T-60 60 KHZ TIME CODE RECEIVER

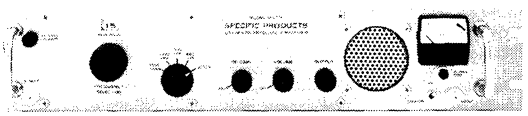
• Round The Clock Binary Time Code Broadcasts from WWVB • Most Accurate Time Signal Available • Can Be Recorded Continuously

Radio Station WWVB is broadcasting complete time information using a level shift carrier time code (10 db level changes). This code, which is binary coded decimal (BCD) is broadcast continuously and is synchronized with the 60 khz carrier signal. The Schmitt BCD output can be completely automated for continuous monitoring of extremely accurate real time and time interval information.

PRICE: MODEL T-60A $495.00

3½" x 19" rack panel with 5" depth behind panel. Includes 117v, 50 to 400 cps supply, or an external 12 to 16 volts may be used.

Battery powered portable field unit available.



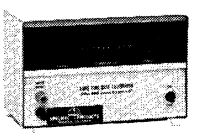
MODEL WVTR WWV RECEIVERS MARK II
All Silicon Transistor

COMPLETE MODULAR CONSTRUCTION • CERAMIC FILTERS DOUBLE SHIFT SUPERHETERODYNE • 1 μV SENSITIVITY

Crystal controlled front end receivers for 2.5, 5, 10, 15, 20 and 25 MHz frequencies. 2nd I.F. frequency for high selectivity. Has built-in filter for ticks and tones. Receiver has carrier level "S" meter, speaker and output jack on front panel. Audio output available on rear.

PRICE: $680.00 with AC Power Supply

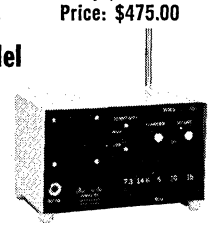
Battery powered portable field unit available.



MODEL 630
60 KHz TIME BASE CALIBRATOR

A solid state receiver designed to receive NBS station WWVB offering low cost, calibration of 1 MHz time bases to WWVB, a time code output, long time constant AGC, recorder output and ferrite antenna. A 60 KHz crystal oscillator is locked to the WWVB signal and the oscillator frequency is then converted to 100 KHz and compared against the externally supplied 1 MHz signal by a unique digital comparator. Weight: 4 pounds for the unit and 3 pounds for the antenna, the Model 630 is easily portable. Size of the unit is 5"H x 8"W x 6"D. **Price: $475.00**

TYMASTER Ten-36 Sr. Model



Similar in operational features to the Ten-36 TYMASTER, except offering five operating frequencies: 7.3, 14.6, 5, 10 and 15. Light weight, compact and easily portable.

Price: $145.00

Send for complete specifications. Prices and specifications subject to change without notice. F.O.B. Monrovia, California. Net 30 days.

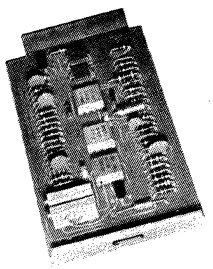
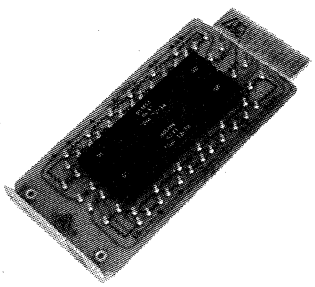
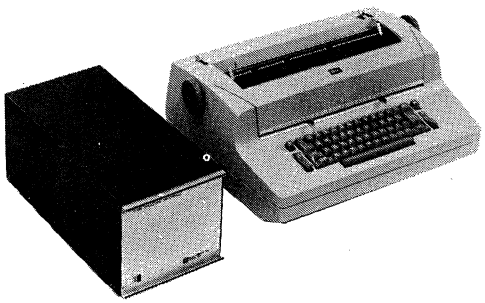
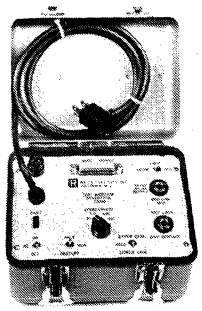
SPECIFIC PRODUCTS

A Division of The Dr. Henry L. Richter Corp. 1237 So. Shamrock Ave./Monrovia, California 91016/Phone: (213) 359-6636

RE-EL CIRCUITS INC.

P.O. BOX 167, TOTOWA, NEW JERSEY 07511 / TELEPHONE (201) 271-1800

PRODUCTS FOR COMMUNICATION

INTERFACE

IBM SELECTRIC* INTERFACE C181

The C181 Selectric* Interface is a completely solid state device which performs all the necessary code translation, level interface and control functions necessary to interconnect either an IBM Model 731 or 735 "Correspondence" coded Input/Output writer to a computer I/O buss or simular data input/output device.

FEATURES:

- Low Cost
- Solid state, modular construction
- ASCII input and output codes
- Direct connection to computer I/O buss
- No additional circuitry required
- Stand alone or rack mount
- Selectric* magnets protected against burnout

APPLICATIONS:

- Minicomputer I/O device
- C.R.T. hard copy printout
- Data logging
- Information Retrieval Systems
- Automatic Test Systems
- Industrial Control

* IBM Registered Trademark

PASSIVE NETWORKS

C-301 — FIXED PAD

Dual fixed 600 ohm Attenuator. Choice of 7 or 16 DB or combination of both. **$15.00**

C-302 — SINGLE ADJUSTABLE PAD

Same specifications as C-303 with exception that this board contains only one strappable pad. **$21.00**

C-303 — DUAL ATTENUATOR

The C-303 dual attenuator contains two independent adjustable 600 ohm pads. The adjustment is via soldered straps and is in increments of .25 DB. **$40.00**

FEATURES/SPECIFICATIONS:

- Low cost — Easily adjusted
- High density — 2 pads per board
- Interchangeable with RE-EL circuits C-311 line amplifier
- 600 ohm balanced "O" pads
- 31.75 DB maximum attenuation
- Card size 2.6" x 5.6" x .5"
- .05% precision resistors

CONDITIONERS

C-311 — LINE AMPLIFIER

The C-311 is a voice frequency Line Amplifier designed for use in high grade data communication circuits. Its excellent amplitude and delay distortion characteristics, low harmonic distortion, low noise output and 32 DB gain are necessary for operation of reliable data transmission. **$67.00**

FEATURES:

- Small in size 5.5" x 2.6" x 0.5"
- 20 turn gain adjustment
- Plug in mount on ½" centers

SPECIFICATIONS:

- 600 ohm balanced input/out
- Frequency response ±.5 DB from 300 HZ to 4K HZ
- Delay response less than 50 microseconds 500 HZ to 3K HZ
- Maximum output +12DBM
- Harmonic distortion less than 1% at rated output
- Noise less than 65 DBM

C-312 — 1 WATT POWER AMPLIFIER

The C-312 is a voice frequency power amplifier which delievers one (1) watt into an 8 ohm speaker load. The unit is ideal for line monitoring applications. Gain adjustments are made by either an internal 20 turn potentionmeter or with an external "volume" control potentiometer. **$45.00**

FEATURES:

- Small in size 5.5" x 2.6" x 1.0"
- 20 turn internal gain adjustment
- Plug-in mount on 1" centers

SPECIFICATIONS:

- OUTPUT — 1 watt into 8 ohms
- INPUT — 10K ohms
- FREQUENCY — 20 HZ to 15K HZ
- REQUIRES — 12 to 24 VDC

C-314 — SUMMING AMPLIFIER

The C-314 Summing Amplifier contains three (3) balanced and isolated inputs and one (1) balanced isolated output. Strappable pads on all of the inputs allow precise control over the relative levels of the various signals. The combined signal gain can be adjusted with the master level control. **$300.00**

FEATURES:

- Completely solid state
- Three balanced isolated inputs
- One balanced isolated output
- Independent level adjustments on all inputs and outputs
- Level adjustment in .25 DB steps to 31.75

C-315 — DISTRIBUTION AMPLIFIER

The C-315 Distribution Amplifier contains one balanced isolated input and three balanced isolated outputs. Strappable pads provide independent output level control for each output. **$250.00**

FEATURES:

- Completely solid state
- Three balanced isolated outputs
- One balanced isolated input
- Independent level adjustments on all outputs

SIGNALLING

C-323 — CLUTCH PULSE GENERATOR FORM A OUTPUT

The C-323 Clutch Pulse Generator is designed for use where pulses are required for controlling clutch lines such as those that would be used on tape readers. The mercury wetted output relay allows its use on low to medium speed data systems. **$76.50**

FEATURES:

- Individually adjustable speeds (20 turn pot)
- External control lead. Ground turns output off.
- Small in size 2.6"x5.5"x0.5" (less switch handle)

SPECIFICATIONS:

- Speed range — 60 milliseconds to 750 milliseconds
- Pulse width — adjustable from 10 to 60 MS
- Accuracy — Less than 1% error
- Temperature stability — less than 1% drift from 20°C to 65°C
- Requires 12V DC 20 MA
- Output contacts rated at 100VA

C-323A — CLUTCH PULSE GENERATOR FORM C OUTPUT (WITH SPEED SWITCH)

Same as C323 but has Form C relay output and speed selector switch on front handle. **$88.00**

SWITCHING

C-331 — LOOP SWITCH

The C-331 is a switching module designed for looping or bussing back a four wire V.F. line. The loop back can be strap selected to contain attenuation for level compensation if desired.

FEATURES:

- Sealed Reed switching contacts
- Plug in relays
- Small in size 2.6" x 5.5" x 0.5"
- Plug in mounting ½" centers
- Precision attenuator resistors (1%)
- Relays available in 12, 24 and 48 VDC coils
- Coil arc suppression diodes standard

C-332 — SWITCHING RELAY

The C-332 is a switching Relay board containing a four (4) pole double throw Reed relay with suppression diodes. It can be utilized for line transfer or any requirement for switching four (4) wires from one point to another. **$63.00**

FEATURES:

- Small size 2.6" x 5.5" x 0.5"
- Sealed Reed switches throughout, plug in
- Coil voltages available from 12 to 48 VDC
- Coil suppression diodes standard

C-33 — SWITCHING: MATRIX BOARDS

Numerous switching functions are available from single function relay boards thru complex XY selection units which are modularly expandable to fit your exact needs. **Custom, Per RFQ**

CONTROL/SUPERVISION

C-341 — ORDER WIRE

The C-341 order wire is designed to allow voice access to a V.F. circuit. The C-341 provides talk battery to the mouthpiece of a handset or headset (not supplied). The C-341 is isolated from the line via transformers and presents a high impedance load to the line it bridges. Talk/listen directions are controlled by relays provided on the unit. **$60.00**

FEATURES:

- Isolated input/output
- Adjustable talk level
- Control relays for talk/listen direction on four wire lines
- Powered from 12, 24 or 48 VDC
- Small in size, plug in card 2.6" x 5.5 " 0.5"

C-343 — TOGGLE SWITCHBOARD

Toggle Switch board provides a simple modular method for placing control switches into circuits. Five (5) SPDT toggle switches are mounted on the front handle and are wired to the printed circuit board. **$33.00**

FEATURES:

- Small in size 2.6" x 5.5" x 0.5"
- High quality miniature switches

ALARMS

C-351 — SIGNAL FAULT ALARM

THE SIGNAL FAULT ALARM C-351 is a low cost Data-Telegraph monitoring unit designed for Signal speeds up to 200 bauds. The C-351 gives alarm outputs for pre-set signal distortion and open line. **$42.00**

FEATURES:

- All solid state construction
- Small in size 2.6" x 5.6"
- Powered by a single 12 volt supply
- True open line alarm (zero (0) volts)
- Alarm outputs supply ground for up to 200 volts and 2 amperes
- Single adjustments for marking & spacing thresholds
- Open line adjustment range (non-interacting with distortion adjustments) from 30 milliseconds to over 3 seconds
- 2% +45% distortion range

C-351A — SFA WITH ISOLATED INPUT

Same as 351 but has fully isolated low impedance input. **$52.00**

C-352 — CARRIER DETECT

The C-352 Carrier Detector is designed for detecting the presence of a voice frequency level. The threshold, level point at which the presence of signal is detected, is adjustable by means of a 20 turn potentiometer on the unit. **$52.00**

FEATURES:

- Small size 2.6" x 5.5" x 0.5"
- Completely solid state
- High impedance input greater than 10K ohms
- Threshold adjustable from −30 to +10 DBM
- Alarm output, logic, relay or SCR

C-353 — DUAL CARRIER DETECT

The C-353 is a dual level detector designed to detect equipment failures. The C-353 operates on the voice frequency range. The high impedance detectors are bridged across the input and output of a unit and will give an alarm output upon failure of the equipment in between. **$95.00**

FEATURES:

- Adjustable input/output detector thresholds
- Alarm output — 12 volts at 20 MA
- Lamp driver output on each detector shows presence of signal
- Small in size 5.3" x 5.5" x 0.5"
- Plug-in printed circuit board
- Range −30 to +10 DBM
- Input impedance greater than 10K ohms

C-354 — HI/LOW CARRIER DETECT

The C-354 hi/low detector is designed to present an output alarm when a voice frequency level falls above or below a pre-set level spread. Ideal for use in maintaining proper operating parameters of voice frequency systems. **$105.00**

FEATURES:

- Separate hi-low thresholds
- Threshold spread adjustable from 4 DB
- Alarm output — dry contact Form "A" relay
- Small in size 5.3" x 5.5" x 0.5"
- Plug-in printed circuit board
- Range upper limit −30 to +10 DBM lower limit 4 to 20 DB below upper limit
- High input impedance greater than 10K ohms

INTERFACE

C-361 — 2/4 WIRE TTY HYBRID

The C-361 2/4 Wire Hybrid was designed for use where conversion between two (2) wire and four (4) wire teletype transmission is required. **$41.00**

FEATURES:

- All solid state
- 20 or 60 MA in/out — up to 120 VDC
- Small in size 2.6" x 5.5" x 0.5"

C-362 — EIA TO TTY CONVERTOR WITH 2/4 WIRE HYBRID

The C-362 is a EIA to TTY convertor. This unit converts standard EIA levels to 20 or 60 MA keyed teletype signals. Two way conversion i.e., EIA to TTY and TTY to EIA is provided along with a hybrid strapping option allowing 2 to 4 wire conversion. **$41.00**

FEATURES:

- All solid state
- Plug-in printed circuit board mounts on ½" centers. Size 2.6" x 5.5" x 0.5"
- Accepts neutral or polar TTY input
- Strap option for 20 or 60 MA operation

C-363 — E/A TO HIGH LEVEL CONVERTER (LOOP REGULATOR)

The C-363 unit operates in the same manner as the C-362. It is also equipped for several plug-able options for various input-/output modes. Among these are loop current regulators, solid state isolators, keyed regulator and solid state polar regulated or unregulated unit. **$165.00**

FEATURES:

- All solid state
- Contains 2/4 wire hybrid
- Plug-in printed circuit board 4.5" x 12.0 x 1.5"
- Strapping options for 20 or 60 MA operation

TEST EQUIPMENT

C-391A — TEST MESSAGE GENERATOR BAUDOT $459.50

C-391B — TEST MESSAGE GENERATOR ASCII BAUDOT $561.50

C-391C — TEST MESSAGE GENERATOR ASCII / SPEED TO 4800 $582.00

C-391 — TELETYPE TEST MESSAGE GENERATOR

The C-391 Teletype Test Message Generator is a completely self contained portable transmitter which supplies a low distortion Baudot coded test message for machine or line evaluation. Dual output circuits are supplied; a solid state, polarity insensitive neutral loop keyer, and a keyed 60 milliampere current regulated output. Standard models provide four switch selected speeds. Options include speeds, codes and output levels other than the standard combinations.

FEATURES:

- PORTABLE — Rugged carrying case, 5" x 6" x 6"
- VERSATILE — Baudot and/or ASCII codes
- SWITCH SELECTED SPEEDS
- DUAL OUTPUT — Dry and 60 MA regulated

OPTIONS AVAILABLE:

- XTAL Control • EIA Output
- Speeds to 9,600 Band
- Distortion Insertion • Clutch Leads
- Switch Selected Single or Dual Character
- Custom Messages

SPECIFICATIONS:

- MESSAGE — "The quick brown fox . . . .
- MESSAGE LENGTH — 64 ASCII or Baudot characters
- ALL SOLID STATE
- KEYING CIRCUITS — Dry solid state 100 MA 200 V MAX — Auto Loop Regulated, 60 MA into 250 ohm MAX, short circuit proof—EIA output levels on ASCII coded models.
- SPEEDS — C391A — 45, 50, 56.8, 75 Baud
  — C391B — 75, 110, 135, 150 Baud
  — C391C — 150, 300, 600, 1200, 2400, 4800 Baud
- CODES — C391A — Baudot
  C391B — ASCII or Baudot
  C391C — ASCII

SUB-SYSTEMS

C-411 — REGENERATIVE SELECTOR MAGNET DRIVER

C-411 is a combination unit containing a signal regenerator as well as a selector magnet driver. It can accept a distorted input signal, re-construct a distortionless signal which in turn drives the selector magnet driver. The output of the selector magnet driver delivers an undistorted 60 MA keyed signal to the teleprinter. The complete unit can be mounted in the electrical service unit of a standard M-28 Teletype* or any other mounting desired. Plug-in replacement for existing drivers. **$98.00**

FEATURES:

- Distortion correction marking or spacing up up to 49%
- Small in size 4.5" x 3.0" x 3.75"
- Powered by 115V 60 HZ
- Input — polar or neutral 20 to 60 MA up to 120 VDC

C-414 — CRYSTAL CONTROLLED REGENERATOR

C-414 takes a distorted input signal, reconstructs it and transmits this now distortion free signal. Timing is crystal controlled thereby virtually eliminating speed distortion of the regenerated signal. **$140.00**

FEATURES:

- Solid state
- Crystal controlled time base
- Code selection 2 to 13 bits
- Less than 2% distortion output at 500 Baud
- Synchronous or Asynchronous operation
- False start protection
- Input distortion can approach 50%

* Teletype Corp.

C-421 — CLUTCH POLL SYSTEM.

A unique polling system for controlling two or more transmitter clutches for a single transmission line. The C-421 polls each station in sequence and allows transmission to take place in sequence. A modular expandable building block allows for an unlimited number of transmitter stations to be utilized. **$700.00**

FEATURES:

- Utilizes solid state control circuits with Reed relay outputs
- Small in size. Each module for two stations is 2.6" x 5.5" x 0.5"
- Clutch control for up to 120 VDC
- Automatic restart at position #1

AVAILABLE in the C-400 Series are the following additional systems:

Full Message withhold Systems
Electronic Selectors
Switching Systems

ANALOG DIGITAL DATA SYSTEMS, INC.

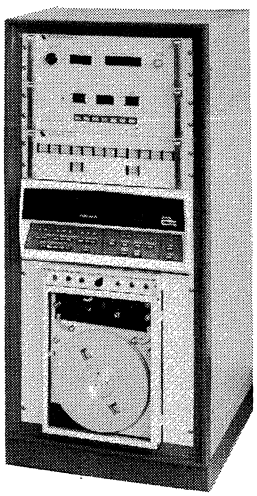
830 LINDEN AVENUE • ROCHESTER, N. Y. 14625 • PHONE 716 - 381-2370

DATA ACQUISITION SYSTEMS

DATALOGGING SYSTEMS FROM STOCK UNITS. ASSEMBLED TO CUSTOM REQUIREMENTS

The Dataloggers accept multiple analog signals, from physical transducers, such as thermocouples, strain gauges, and similar devices. These are scanned by a multiplexer and programmer, individually conditioned to the appropriate voltage level; digitized, converted to computer compatible format and recorded.

SIGNAL
↓
SCANNER
↓
A/D CONVERTER
↓
AMPLIFIER (OPTIONAL)
↓
SERIALIZER
↓
RECORDER
↓
TAPE



SERIES M

This datalogger is available with either 10, 100 or 1000 channel multiplexer capability, digitizing and recording in computer compatible magnetic tape. The tape format can be either straight binary or binary coded decimal, 7 or 9 tracks and 200, 556 or 800 b.p.i. The system speed can be from manual push button to 1000 characters/second asychronous or up to 5000 characters/second in the slew mode.

SERIES P

This datalogger is available as the above, but the output is recorded in computer compatible paper tape, such as ASC11. The system speed is 20 characters/second as standard and up to 120 characters/second as options.

SERIES T

This datalogger is available as the above, but with teletype output. The teletype gives both punched paper tape output in the ASC11 code and also a line printer. The teletype includes a keyboard for manual input data and can be used for computer input. Speed is controlled by the teletype at 10 characters/second.

SERIES K

This datalogger is available as above, but with output onto magnetic tape cassettes. The format is compatible with teletype and the cassettes can be read out onto teletype machine or over a datalink to a shared time computer.

SERIES C

This datalogger is available as above, but controlled from a small computer, which can perform on line computation and read out onto all forms of output devices, such as magnetic tape, paper tape, and teletype. Memory is 4096 words and can be expanded as required.

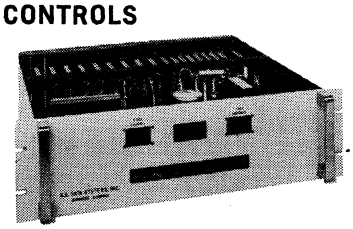
SWITCHING SYSTEMS

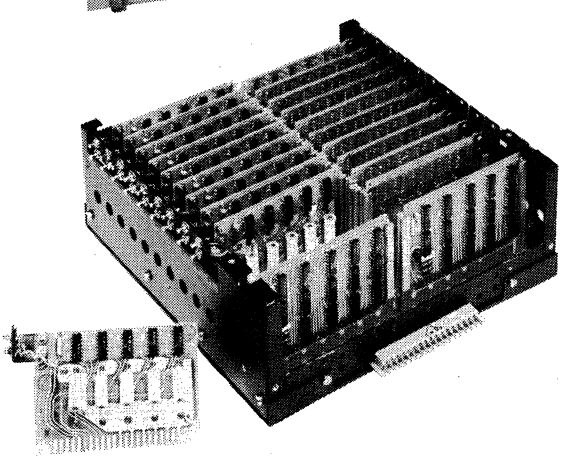
SCANNERS AND MULTIPLEXERS

Where a large number of analog signals are to be measured they can be scanned or multiplexed into one common output device, such as Digital Voltmeter. A.D.D.S. supply a complete range of units, including switches for low level signals, such as thermocouples, 4 wire strain gain, bridge measurements, high frequency coaxial switching, guarded switching and many others from stock and will build to special requirements.

The units are designed with a unique modular construction enabling the basic unit to be expanded in groups of 10 channels by an extensive selection of switching modules.

SCANNER CONTROLS





Model 126 — 100 Channel Control to accept 100 switches of 1, 2, 3 or 4 poles in modules of 10 channels.

Model 127 — 1000 Channel Control to accept 1000 switches of 1, 2, 3 or 4 poles in modules of 10 channels.

Model 501 — 1000 Channel Control to accept 1000 single pole switches in compact modules of 50 channels.

Model 125 — Duo Control to accept 50 channels of analog switches and 50 channels of programming by plug-in pin boards.

Model 082 — 1024 Channel Binary Control to accept 1024 switches of 1, 2, 3 or 4 poles in modules of 8 channels.

REED RELAY MATRICES

For switching multiple path signals, using reed relays for signal switching and TTL compatible logic for controls.

Each path can be selected in nanoseconds from X, Y and select pulses which latch the control logic and the reed relay switch.

The switched path simulates a 50 ohm impedance coaxial line, terminated in 50 ohm connectors to give minimum signal distortion and crosstalk at frequencies exceeding 10 MHz.

Options include electrical readout of crosspoint selected.

TYPICAL APPLICATIONS

Controlled switching in automatic testing of integrated circuits, printed circuit modules, logic modules.

Routing of R.F. signals, telemetry signals.
Programming video signals.
Computer interface to automatic equipment.

Model 056-003 — 10 x 10 x 1 Matrix with Coax signal connectors.

Model 056-103 — 10 x 10 x 1 Matrix with Coax signal connectors and electrical readout of crosspoint selected.

Model 056-006 — 10 x 10 x 2 Matrix.

Model 056-106 — 10 x 10 x 2 Matrix with crosspoint readout.

Model 056-009 — 10 x 10 x 3 Matrix.

Model 056-109 — 10 x 10 x 3 Matrix with crosspoint readout.

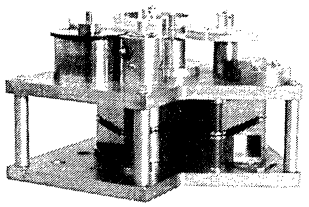
ALMOND INSTRUMENTS COMPANY, INC.

1060 E. CYPRESS STREET • COVINA, CALIFORNIA 91722 • TELEPHONE (213) 967-4151

TAPE RECORDING SIGNAL CONDITIONING AMPLIFIER COMPONENT

ALMOND INSTRUMENTS COMPANY, INC., REPRESENTS 20 YEARS OF EXPERIENCE IN THE RECORDER INSTRUMENTATION AND ELECTRONICS FIELD, BOTH COMMERCIAL AND SPACE APPLICATIONS. WRITE FOR DATA ON THE INSTRUMENTS SHOWN — LET US QUOTE ON YOUR SPECIFIC REQUIREMENTS FOR MODIFIED UNITS OR SPECIAL INSTRUMENTATION.

TAPE DECK — MODEL DMTD-4648



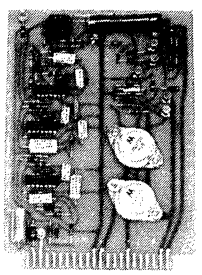
Precision dual deck. One-inch tape. Less than 0.5% p-p flutter. Speeds programmable 30 to 1 ratio. Speed range 0.05 minimum. 60 ips maximum. Developed for special airborne and shipboard applications. Other models available for reel to reel applications.

UNIT SIZE

L	W	H
9.00	8.00	9.00

PHASE LOCK AMPLIFIER

COMPANION EQUIPMENT



CARD SIZE

Length	6.5
Width	4.5
Height	0.8 max.
Weight	4.5 oz.

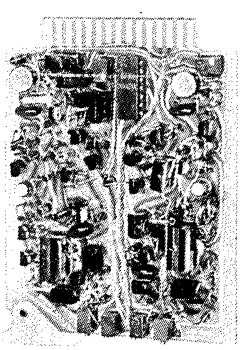
SIGNAL ELECTRONICS ASSEMBLY ULTRA MINIATURE — MODEL SC-1000

Complete 7-track record and reproduce electronics for manned space application. Plug-in combined record/reproduce amplifiers allow any combination of direct, FM or digital recording on any track. Seven channels of record/reproduce is less than 165 cubic inches.

UNIT SIZE

Length	Width	Height	Weight
4.87	3.30	2.03	1.45 lbs.

DUAL RECORD REPRODUCE AMPLIFIER PLUG-IN CARD ASSEMBLIES MODEL DA-110



CARD SIZE

Length	Width	Height	Weight
3.87	2.87	.55	3 oz.

STANDARD PC CARD PLUG-IN RECORD AND REPRODUCE ELECTRONICS FOR INSTRUMENTATION TAPE RECORDER USE

Dual (2-Channel) FM Record Amplifier with Head Drivers

1. 6 speed electrically selectable.
2. Full scale input sensitivity — 1 to 5 volts adjustable.

Dual-Speed FM Reproduce Amplifier

1. Includes 30 db/octave active low pass filters.
2. Either speed electrically selectable.
3. Output — Standard 0 to 5 volts.

Dual (2-Channel) Direct Record Amplifier with Head Drivers

Available per IRIG standards through intermediate band.

Direct Reproduce Amplifier

For use with above record amplifiers.

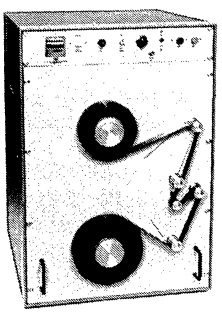
Digital Record Amplifier

Available as single or dual channel, depending on specific requirements.

Digital Reproduce Amplifier

Companion to above record amplifier.

TAPE WINDER — MODEL ATL-900



The AIC Tape Winder has been specifically designed for the purpose of transferring ¼″ or ½″ or 1″ magnetic tape from reel to reel under controlled speed and tension conditions.

Model ATL900 Tape Winder is equipped with two separate DC torque motors and individual servo amplifiers for each motor. Front panel controls are provided to select a wind or rewind mode and allow the tension and speeds to be adjusted independently.

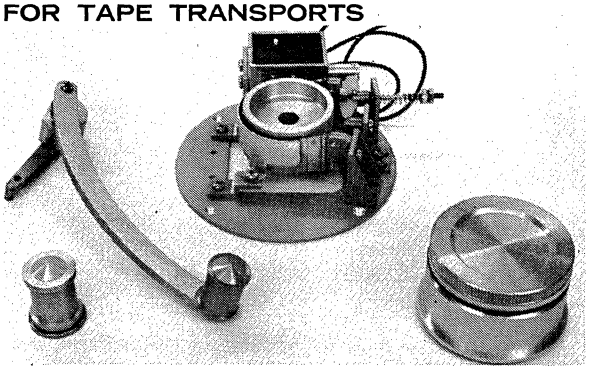
Take-up motor speed control is provided on the front panel to adjust the average wind-rewind speed. The speed range is adjustable from 30 to 120 ips.

Tape Winder is equipped with preset footage counter to automatically wind the precise tape length. Hubs are available for IRIG, IBM and special order requirements. 115V, 50-60 Hz input.

UNIT SIZE

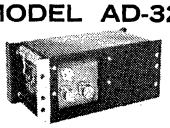
Length	21.67
Width	19.75
Height	20.00

PRECISION ROTARY COMPONENTS FOR TAPE TRANSPORTS



Hubs and brake assemblies for PMI motor, Dupont Kapton® drive belts, precision guide roller asemblies, reel hubs — all standard NAB and IBM sizes available.

POWER SUPPLIES LOW MAGNETIC RADIATION MODEL AD-3220



SIZE (LESS FLANGES)

Length	Width	Height	Weight
7.5	4.0	4.0	8 lbs.

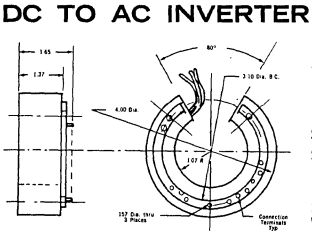
AC TO DC MODULAR POWER SUPPLY

Input:	115/230V, 60 Hz per MIL-STD-761 (Shipboard Power)
Output:	28 Vdc at 6 amperes
Regulation:	±0.5%
Ripple:	Less than 10 mv p-p

Overload Protected

Featuring extremely low magnetic radiation for magnetic recorder applications. Meets shipboard and airborne requirements.

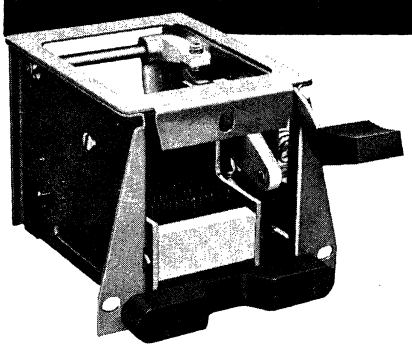
DC TO AC INVERTER — MODEL 2PI-2230



Converts nominal 28 Vdc power to 2-phase square wave AC output. Standard 400 Hz frequency. Multiple frequency electrically selectable capability. Electrically selectable direction capability for motor reversal application.

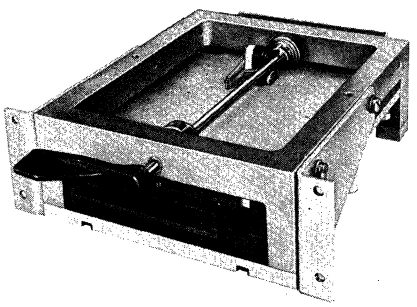
Size O.D. 4.00, I.D. 2.16, H 1.65, Wt., 5 oz.

AMP gives you the and Data Entry



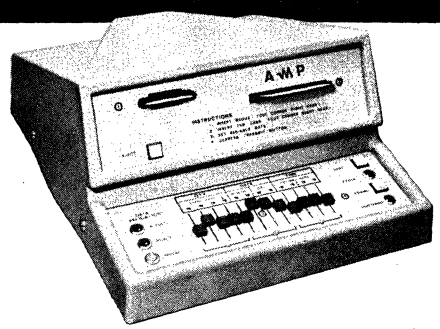
BADGE-READER (61/161/261)

- low cost matrix badge card reader
- small size makes it especially adaptable to applications with limited space
- reads 10 columns of a 15-column card, 15 columns of a 20-column card or 17 columns of a 22-column card
- available cross matrix for numeric data, matrix alpha-numeric, or telephone dial code



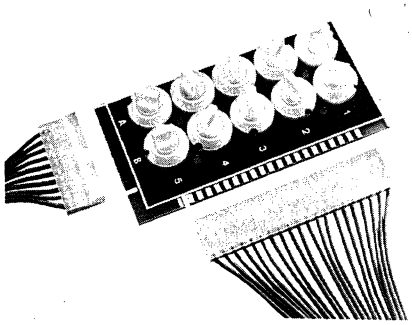
TAB-CARD READER (Model 2981)

- reads punched holes in standard tabulating card
- small-panel space, low height
- bussed-column, matrix and diode isolated specials available
- motor-operated and 22-column versions also standard
- reliable wipe and back wipe contact operation



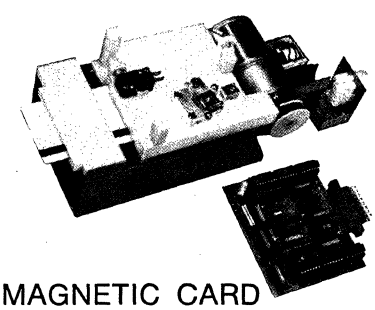
DATA COLLECTION TERMINAL

- enters data from badge, tab card, slide switch and semi-fixed information
- applications such as job cost control, inventory control and library systems
- simplified for optimum man-machine interface
- ASCI-II or teletype interface for plug-to-plug compatibility



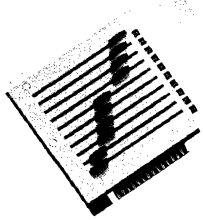
MATRIX ROTARY SWITCH

- direct visual display
- positive detent action
- wide selection of sizes
- economy achieved by integral interwiring



MAGNETIC CARD READER

- uses standard ATA/IATA credit card, other versions on request
- high data density, tested to 1000 flux changes per inch, IATA is 440 flux changes per inch
- low voltage operation, 12 volt DC motor
- same head can be used to either read or write data

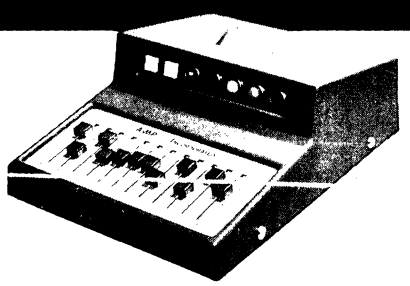


MATRIX SLIDE SWITCH (With visual display.)

- standard sizes—5-slide by 10-positions, also 5 x 16, 10 x 10 and 10 x 16. Special sizes available on request
- positive detent positioning
- small, compact—takes up minimal space
- ⅛″ high characters

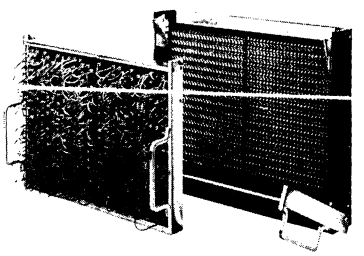
most in Programming Devices

. . . Everything you need for computer input, process control, machine control, test programming, production control, status indication and access control.



INQUIRY TERMINAL

- used to enter variable data, and semi-fixed data; three responses displayed
- automatically dials computer and displays responses
- applications—credit validation, check cashing, stock status
- low cost touch tone interface uses dial-up type direct access arrangement

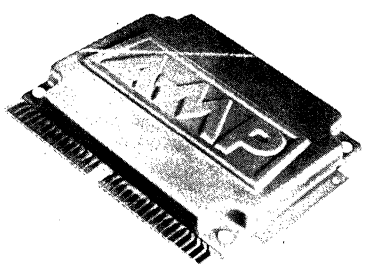


STANDARD PATCHCORD PROGRAMMING SYSTEMS

- choice of sizes—240, 480, 816, 1224, 1632, 1768, 3264 and 4896 holes
- versatile rear bay wiring
- post patch capability
- double wiping action for reliability
- variety of patchcords and accessories

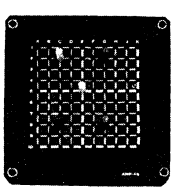
COAXIAL PATCHCORD PROGRAMMING SYSTEMS

- .375 x .270 spacing
- three standard sizes—506, 1012 and 2024
- low crosstalk—60db to 100 MHz
- individual coaxial contacts



ELECTRO-MECHANICAL SCANNER (Model 1522)

- low-cost, simple operation scanner for serializing data
- scans 15, 18, or 22 columns of data in same unit
- low radiated and conducted noise due to new drive design
- self-cleaning contacts



PINBOARDS

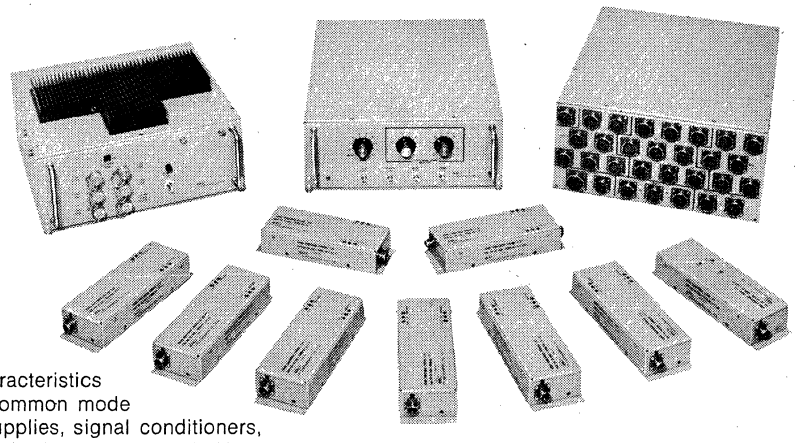
- available in many standard sizes. Special designs on request
- low cost color coded shorting pins
- machine applied terminations
- silk screened or engraved to customer requirements
- diode pins available

For further information write
Industrial Division, AMP Incorporated, Harrisburg, Pa. 17105.

AMP
INCORPORATED

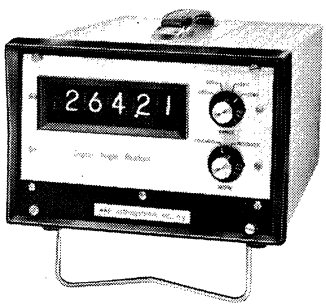
Analog to Digital Converters

Multiplexed Analog to Digital Conversion System



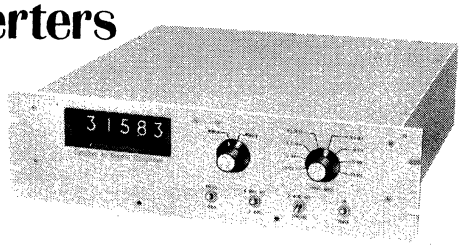
Astrosystems solid state Multiplexed Conversion System is a 50 channel data acquisition system which converts synchro and linear AC inputs to a serial PCM output for data recording and/or telemetering. The basic unit provides a resolution and accuracy of 15 binary bits (.003%). Signal conditioning modules are provided for all inputs, with typical characteristics of 13 megohms input impedance and 80 db common mode rejection. The basic system includes power supplies, signal conditioners, multiplexer, converter and PCM code conversion. Write for Data File No. 109.

Digital Angle Readout



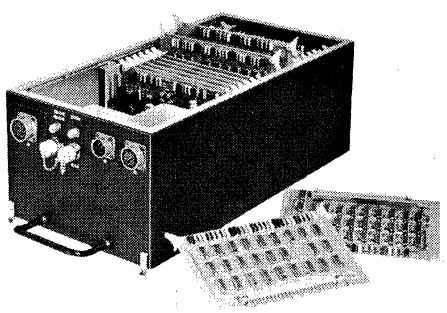
Astrosystems Digital Angle Readout is a simple, reliable and accurate device for converting synchro and resolver input angles to a direct in-line decimal display and electrical digital format. Guaranteed accuracy is 0.01° *peak* error from all causes. The standard model accepts either synchro or resolver inputs at 11.8, 26 or 90 volts line-to-line. Both the visual and electrical outputs continuously track the synchro input. Write for Data File No. 110.

Synchro to Digital Converters



Astrosystems high accuracy Synchro to Digital Converters convert angle inputs from synchros to an equivalent binary or BCD output. Resolutions from 12 to 18 binary bits are available. Accuracy is ±1 bit total peak error including digitizing errors. Converter operation is ratiometric using toroidal transformers which make the units insensitive to transformation ratio and phase shift variations as well as harmonic distortion and noise. Write for Data File No. 101.

Multiplexed Synchro to Digital Converters



Multiplexed Synchro to Digital Converters feature a high accuracy ultra-reliable method of converting multiple synchro and resolver inputs to parallel or serial digital outputs. The converters are completely solid state and have a basic accuracy of 16 binary bits (20 seconds of arc). The units are insensitive to wide variations in input voltage and frequency. Write for Data File No. 109.

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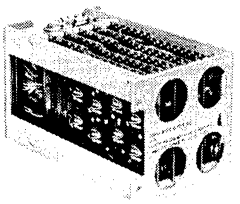
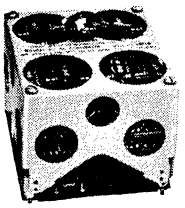
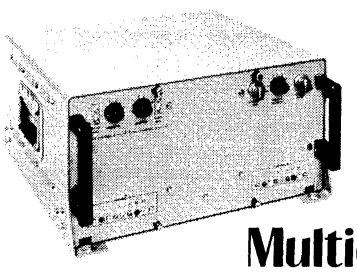
Digital to Analog Converters

Airborne Digital to Analog Converters

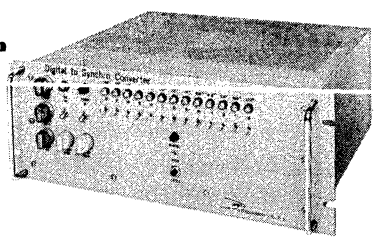




Airborne solid state Digital to Analog Converters feature high reliability, high density packaging and low power consumption. Units are available to provide synchro, resolver or AC output signals to a resolution and accuracy of 16 binary bits. A full range of standard card and circuit designs are available to enable quick delivery of special units. Converters meet the requirements of MIL-E-5400 for airborne equipment. Write for Data File No. 103.



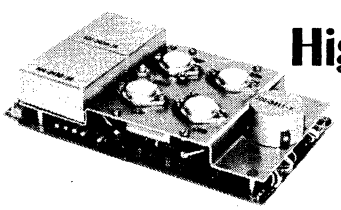
High Power Digital to Synchro Converter



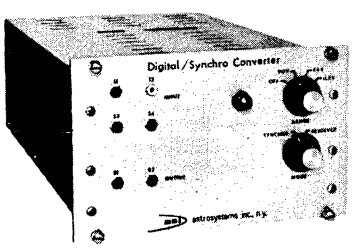
A high powered unit with an output capacity of 3 amperes/leg, this converter is capable of driving 12 size 23 torque receivers on a continuous basis. It converts a 13-bit digital input word into a 3-wire synchro output, performing a minimum of 120 conversions per second. Ruggedized, all solid state construction provides maximum reliability by eliminating all rotating components and associated gearing. Write for Data File No. 128.

Multichannel Digital to Analog Converters

Multichannel solid state Digital to Analog Converters provide AC and/or DC voltage output signals proportionate to a digital input. Units feature 15 bits resolution and accuracy. The DC as well as the AC outputs are floating and completely isolated from each other as well as from the digital inputs. Standard interfaces are available to match most computer and peripheral equipment interfaces.
Write for Data File No. 102.



High Power Digital to Synchro Converter on-a-Card



A unique, one-card package capable of driving high levels, such as torque receivers, in parallel, with 12-bit resolution. Accepts 12-bit binary information and converts to 3-wire synchro information. Smaller, lighter and less expensive than equivalent conventional units, it can be mounted into existing systems without special interfaces. Write for Data File No. 126.

Digital to Synchro Converters

Digital to Synchro Converters accept and register digital angles in binary or BCD code and convert these inputs to an equivalent synchro or resolver output. Standard models are available to operate as synchro transmitters (CX) or synchro control transformers (CT). Accuracy and resolution to 18 bits is obtained through the use of tapped high precision toroidal transformers to derive the required output voltages. Write for Data File No. 102.

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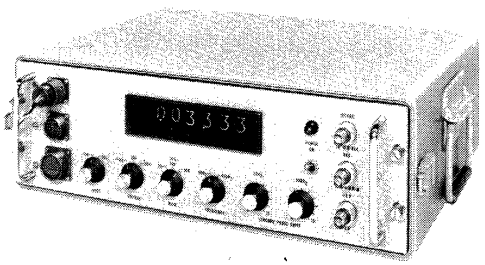
Special Purpose Converters

Digital Angle Indicator

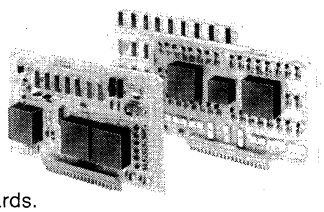
A solid state all electronic device for measuring and displaying angle inputs from remote synchro or resolver inputs. Large inch-high characters on NIXIE* tube readout provide higher visibility and readability than servo drum dials. Accepts synchro or resolver inputs at 11.8, 26 or 90 volts line-to-line. Four decade BCD digital output is available for driving off-line equipment without adding decoder. Write for Data File No. 115.

Multispeed Converters



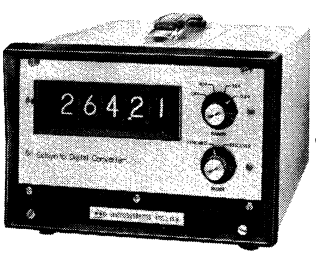
Ruggedized, portable, all solid state units that convert multi-speed or single speed synchro or resolver inputs into six-digit decimal visual displays and BCD (8-4-2-1) electrical outputs. Accept 1x, 36x or 1x and 36x inputs. Accuracy and resolution to 001° Voltage inputs 11.8 volts, 26 volt or 90 volt line-to-line. All synchro conversions performed on ratiometric basis using high precision tapped toroidal transformers as the basic measuring element. Write for Data File No. 201.

Commercial Units

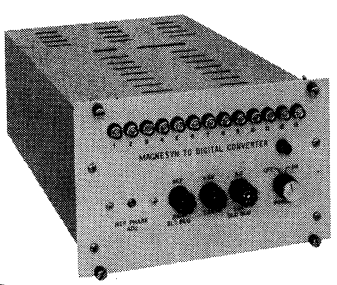


These miniaturized, light weight, high accuracy solid state converters on cards, both Synchro-to-Digital and Digital-to-Synchro, are contained on standard 5 x 8 inch printed circuit cards. Considerably smaller, less expensive and lighter in weight than equivalent conventional units, they fit into standard mounting racks and can be incorporated into existing systems without special interfaces. Ideally suited for incorporation into large process control and computer command systems.
Write for Data File Nos. 125 and 126.

Selsyn to Digital Converter



The Selsyn to Digital Converter accepts 3-wire selsyn inputs at 11.8, 26 or 90 volts and converts them to a digital output. Single speed accuracies available range from 1.° to .001° in order-of-magnitude steps. It is available as a case-mounted unit, a standard ½ rack unit, or on standard cards for integration into existing systems.
Write for Data File No. 110.



Magnesyn to Digital Converter

The Magnesyn to Digital Converter converts magnesyn inputs representing rotary motion into a 12-bit digital output on a continuous non-return-to-zero basis. Conversion is performed utilizing precision tapped toroidal transformers as the basic measuring element of the system. An equivalent servo loop is used where initial coincidence between the analog input angle and the digital output occurs when an AC signal is nulled. Write for Data File No. 129.

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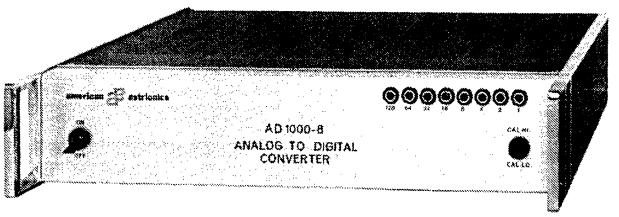
american astrionics, inc.

HIGH SPEED
A/D CONVERTERS



Model	Max. Sample Rate	Bits	Aperture Time	Max. Slew Rate mv/ns	Accuracy @ Analog F.S. Input* MHz	Accuracy Over Temp. °C	Accuracy % ±½ LSB	Price
AD 1000-6	10 MHz	6	100 ps	> 80	5	0-50	0.8	$5,950
AD 1000-7	10 MHz	7	100 ps	> 80	5	0-50	0.6	6,350
AD 1000-8	10 MHz	8	100 ps	> 80	5	0-50	0.4	6,950
AD 2500-4	25 MHz	4	100 ps	> 80	5	0-50	2.0	4,925
AD 3000-6	30 MHz	6	50 ps	> 200	10	20-40	1.0	11,200
AD 3000-7	30 MHz	7	50 ps	> 200	10	20-40	0.8	13,900

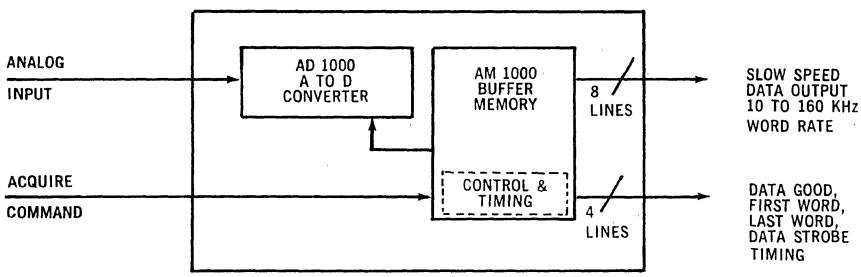
Panel Height — 3½ inches

Price includes power supply

Input multiplexer available

*Remains operational with analog input signals of over 100 MHz.

HIGH SPEED DATA ACQUISITION SYSTEM



The Data Acquisition System consists of an AD 1000-6, 7, or 8 Analog-to-Digital Converter and an AM 1000-8 Buffer Memory of selected capacity. They are supplied as a factory interfaced combination.

AM 1000-8 BUFFER MEMORY

The American Astrionics AM 1000-8 High Speed Buffer Memory provides MOS-LSI storage for high word rate data — such as the output from the AD 1000 A/D converter. The memory accepts 8-bit words and stores them as a data block. The stored data is then recirculated at a slower rate, available for transfer to peripheral storage or processing.

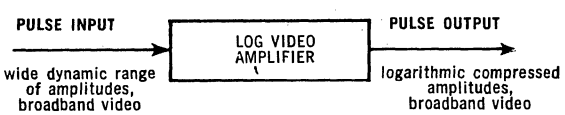
SPECIFICATIONS

Input Word Rate .....10 MHz
Input Data Lines .....8 individual lines
Output Word Rate .....10 KHz; 20 KHz; 40 KHz; 80 KHz; or 160 KHz output rates are available as standard items. Other rates are optional.
Bits per Word .....8 bits
Temperature Range ....0 to 50°C
Interfaces .....All TTL

Contact factory for other combinations of speed/capacity.

LOGARITHMIC VIDEO AMPLIFIERS

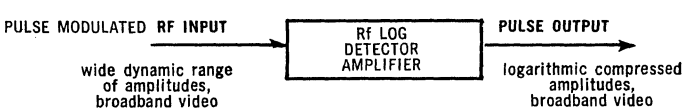
AL SERIES (UNIPOLAR)
ABL SERIES (BIPOLAR)



Dynamic Range .....Up to 80 db
Video Bandwidth ....Up to 144 MHz
Log Linearity .....±1 db to ±1.5 db to a true log curve over temp. Special linearity optional
Tracking .....Multiple unit tracking to ±½ db
Small size—Mil temperature operation—low power.

RF LOG DETECTOR AMPLIFIERS

ADL SERIES



From Rf to log video in one small package

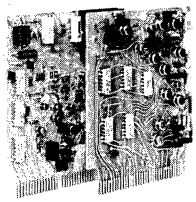
Input Rf Pass Bands .....Octave and Multi-Octave
Rf Dynamic Range .....Up to 50 db
Video Bandwidth .....Up to 70 MHz
Log Linearity .....±1.5 db over temp. Special linearity optional

CONTACT AMERICAN ASTRIONICS FOR —

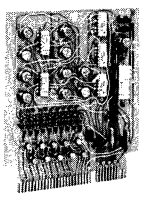
MULTIPLEXERS — *For multichannel input*
D TO A CONVERTERS — *Super high speed*
TAPE RECORDERS — *High speed, high density*
INTEGRATED HIGH SPEED SYSTEMS

american astrionics, inc.
Subsidiary of **TECHNICOLOR, INC.**
855 North Cahuenga Blvd., Hollywood, Calif. 90038
Phone (213) 466-9741 TELEX 674764

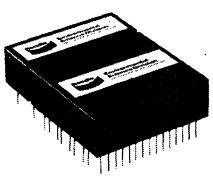
Analog / Digital / Analog Converters and Systems



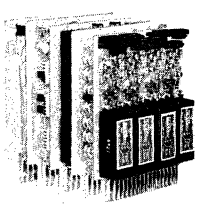
AD4100/5100



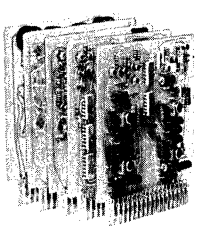
MX4100/5100



S/D - D/S UNITS



SD1200/2200



DS1100/2100

Modular Components and Systems to Commercial or Mil Specs (Ground based, shipboard or airborne packages.)

FUNCTION	MODEL	INPUT	SAMPLING-ENCODING RATE (MAX.)	RESOLUTION/ ACCURACY	GENERAL
A/D - Binary (BCD Optional)	AD4100/5100	Single (or multiplexed) unipolar or bipolar voltage, 0 to 5V. Includes sample and hold.	1,000 (10,000 optional)	8 - 13 bits/ ±0.025%	Binary, offset binary or sign and magnitude. Absolute or ratio encoding. External or internal reference.
Multiplexer-Analog	MX4100/5100	High or low level, single ended or differential. Includes guard circuits. >100 megohms (FET) inputs. AC or DC signals.	>10,000	±0.025%	Binary address random sampling, any number of channels. High common mode rejection, low cross talk.
D/A - Bipolar (Four quadrant multiplier)	DA1000/2000	External AC or DC reference of ±5V peak to operational amplifier. (Internal DC reference available.)	25,000	12 bits	AC or DC output equals input X binary multiplier (to ±5V) from operational amplifier (±5 ma. max.)
S/D - Shaft Angle (Tracking-modular unit)	SD740	Single channel, synchro or resolver, to 1000°/ sec or higher.	Continuous	14 bits/ ±4 min.	Binary output. Package similar to DS710.
S/D - Shaft Angle (Sampling-multiplexed)	SD1200/2200	Multiple synchros or resolvers, single or dual speed, any number of inputs.	800	13 bits/ ±6 min.	Binary, BCD, or combined dual-speed codes.
S/D - Sin/Cos (Sampling)	SD1300/2300	Multiple synchros or resolvers, single or dual speed, any number of inputs.	400	13 bits/ ±6 min.	Binary, encodes ratio of Sin/ Ref and Cos/Ref.
D/S - Miniature (Modular unit)	DS710	Binary angle code plus AC reference (400 or 60 Hz).		14 bits/ ±4 min.	Output 400 Hz - 11.8V, or 60 Hz - 90V. Drives CT type synchros.
D/S - Sin/Cos	See DS1100/2100	Binary Sin/Cos codes, plus AC reference.	25,000	12 bits	Same options as DS1100/ 2100.
D/S - Shaft Angle Transmitter (CX)	DS1100/2100	Binary angle code plus AC reference (50-400 Hz). Single or dual speed types.	25,000	12 bits/ 0.1°	Output 11.8/90V rms, isolated three wire, current limited to 400/50 ma. rms, short/open circuit proof.
D/S - Control Transformer (CT)	See DS1100/2100	Binary angle code and single speed synchro signals.	25,000	12 bits/ 0.1°	Output single AC signal to drive servo amplifier.
D/S - Control Differential (CDX)	See DS1100/2100	Binary angle code and single speed synchro signals.	25,000	12 bits/ 0.1°	Output 11.8/90V rms, isolated three wire, current limited to 400/50 ma. rms, short/open circuit proof.

THE BENDIX CORPORATION
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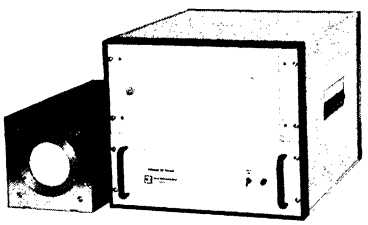
Bendix Environmental Science Division

BETA

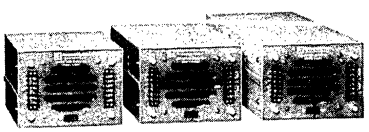
PRECISION CRT DISPLAYS and DISPLAY SYSTEM MODULES

PRECISION X-Y CRT DISPLAYS FOR FILM RECORDING AND FILM READING



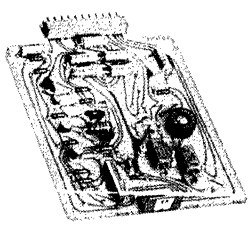
	PD900	PD950	PD1200	PD1400
CRT Diameter	5 inches	5 inches	5 inches	7 inches
Resolvable Elements/Diameter	1700	2100	3400	6300
Maximum Spot Size	0.0025	0.002	0.00125	0.001
Settling Time	10 usec	10 usec	20 usec	20 usec
Small Signal Bandwidth	1 mhz	1 mhz	1 mhz	1 mhz

±35 VOLT DEFLECTION AMPLIFIERS



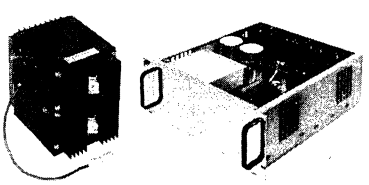
The models DA223, DA224 and DA225 are dc-coupled, all-silicon, solid-state modular packages capable of supplying up to ±2.0, ±4.0 and ±6.0 amperes of deflection current respectiveiy to each axis of a directly-coupled deflection yoke. A unique method of damping optimizes the amplifier for the particular yoke being used by means of an adjustable potentiometer. The amplifiers also feature extremely fast settling time and high bandwidth. The user has the choice of operating the amplifiers Class A for achieving nonlinearities of ±0.02% maximum or Class AB for minimum power consumption.

MODULAR CRT BUILDING BLOCK COMPONENTS



Individual, compatible plug-in circuits such as: DF2050 Dynamic Focus Generator; DF347 Dynamic Focus Amplifier; LC2656/2676 Precision Linearity Correction Circuit; VA2076 Video Amplifier (10 mhz); VA2075 Gamma-Corrected Video Amplifier (10 mhz); VA2077 Video Amplifier (30 mhz); SG1190 Sawtooth Generator; PP529 Phosphor Protection Circuit; DA341 Deflection Amplifier (±200 ma); DA1340 Deflection Amplifier (±0.75 amperes); EDA800 Electrostatic Deflection Amplifier (350 volts plate-to-plate positive or negative); EDA1504 Electrostatic Deflection Amplifier (500 volts plate-to-plate positive or negative); FR1882 Static Focus Regulator; BA1714 Blanking Amplifier. All Beta circuitry features silicon semiconductors and temperature stable metal-film resistors throughout.

HIGH & LOW VOLTAGE CRT POWER SUPPLIES



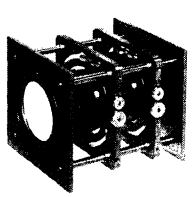
SERIES HV provides regulated high voltage outputs for CRT electrodes — anode, focus grid, G2 and filament.

Model No.	Anode Output Range
HV7	2-7 kv
HV25	10-25 kv

SERIES PAK provides regulated low voltage outputs for Beta modules — ±35 volts, ±20 volts, G1 and filament.

Model No.	±35 volt (deflection) Output
PAK16	16 amperes

PRECISION TUBE AND COIL MOUNTS



Flexible combinations of standard assemblies for the precision mounting and alignment of CRT's, yokes and coils: CRTM Basic CRT Mount includes removable bezel, rods and neck end clamps; DSTM Dual Gun Recording Storage Tube Mount, includes rods and neck clamps both ends; MCM Micropositioner Coil Mount allows 6 independent motions and positive lock; FYM Fixed Yoke Mount for application where micropositioning is not required; FYMS Fixed Yoke Mount for servo-type mounted yokes; CCM Centering and/or Alignment Coil Mount; MS983 Magnetic Shield Enclosure.

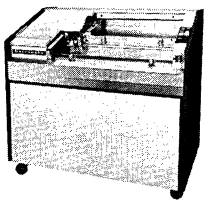
Beta Instrument Corp. 20 OSSIPEE ROAD, NEWTON UPPER FALLS MASSACHUSETTS 02164 TEL. 617/969-6510

Burroughs

Computer System Components

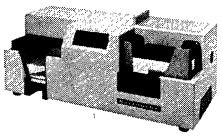
PUNCHED CARD READER

This reliable, high speed Burroughs reader handles short cards as well as standard 80-column cards. Features photoelectric reading and positive strobing of each card column. The unit shown reads 1400 cards per minute. 475 and 800 cpm models are also available.



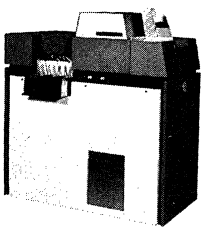
LOW-COST CARD READER

Operates at 300 cpm flow mode and 200 demand mode. Same reliable photoelectric reading principle as higher speed units. It reads standard 80-column cards with strobe output for each card column.



CARD PUNCH

300 card per minute punch features magnetic core buffer, solid-state echo check punching verification, low maintenance. The unit may be loaded or unloaded while operating; can idle indefinitely without card damage. 3 program-selected stackers.

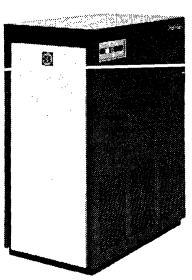


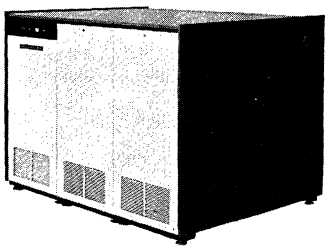
DATA COLLECTION & INQUIRY TERMINALS

Burroughs low-cost TU Series have a 10-key numeric keyboard, 4 function keys, 3 data communications control keys, and a 48-character alphanumeric printer that operates at a speed of 15 characters per second. Printing is done on a continuous paper strip or individual unit documents. Units operate at 150 bits per second over switched, leased or direct line connections. Other models available with a punched card reader capable of reading standard 20-80-column cards, 22-column plastic badges, and 15-column plastic credit cards at 15 characters per second.

SYSTEMS MEMORY DISK FILE

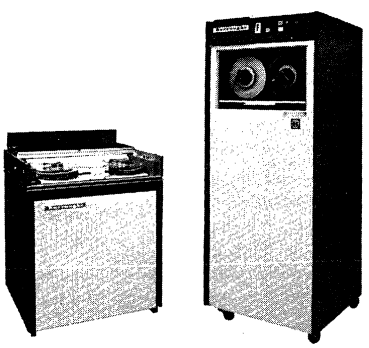
High speed, magnetic disk files used for systems software, users' programs, and general data storage. A Systems Memory module has a capacity of 16 million bits. They feature one fixed read/write head per track of information on the disk face. Average access time is 17 milliseconds and average data transfer rate is about 300,000 bytes per second.





HEAD-PER-TRACK DISK FILES

Very high speed, large capacity, on-line information storage and retrieval systems that provide outstanding flexibility, programing ease, and reliability. Each track of each disk surface has an individual, fixed read/write head operated by full electronic switching. Models are available with a 320 million bit capacity at 35 ms average access time, and a 240 million bit capacity at 20 ms average access time. Average data transfer rates can exceed 4 million bits per second.



MAGNETIC TAPE TRANSPORTS AND CLUSTERS

Free-standing Units. Several models are offered to meet various tape speed requirements. Bi-directional units operate up to 120 inches per second. All models feature gentle tape handling, end-of-tape sensing, fast start/stop, remote and local control, easy threading, and dust-free operation. Packing densities up to 800 bits per inch; transfer rates up to 72 KC per second.

4-Station "Cluster" Units. Unique Burroughs design permits four tape drives to share common electronics and cabinetry. Compact, economical, and easy to use. Uses 7 or 9 channel tapes or both. Packing densities up to 1600 bits per inch; transfer rates up to 36 KC per second.

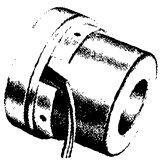
Burroughs

OEM Sales, 1649 Wilshire Blvd., Los Angeles 90017
Call (213) 483-4520, TWX: 910-321-2494

CRT DISPLAY SYSTEMS
DISPLAY DEVICES

CELCO ALPHA-NUMERIC DISPLAYS INFORMATION RETRIEVAL

DEFLECTION YOKES

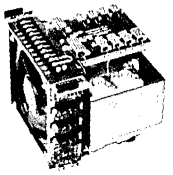


Best resolution, speed, sensitivity. Low residual and LI².

FOCUS COILS

Static and Dynamic for sharp, round, small spots.

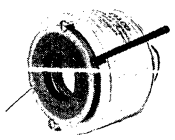
DEFLECTION DRIVERS



Up to 120 V p-p, 16 A. Wide Bandwidth.

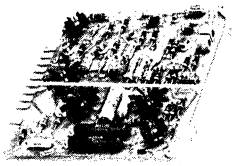
VIDICON CAMERAS COMPUTERS WRITING READING

CORRECTIVE FIELDS



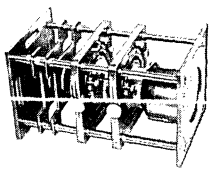
Coils for centering, correction of astigmatism, pincushioning.

CIRCUIT CARDS



Plug-in cards provide primary and secondary beam control circuits.

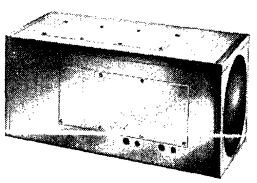
LOW COST POSITIONERS



Low cost coil and tube positioners. Positive spatial control.

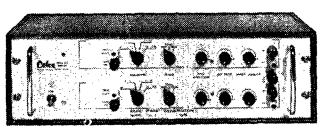
ELECTROSTATIC PRINTING SCAN CONVERTERS BRIGHT DISPLAYS

MAGNETIC SHIELDS



Positive exclusion of all stray magnetic fields.

RAMP GENERATORS

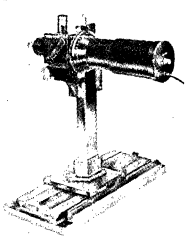


Dual X-Y ramps, 10 μsec to 100 msec. Variable rasters.

IMAGE ORTHICON CAMERAS ELECTRON BEAM MACHINES

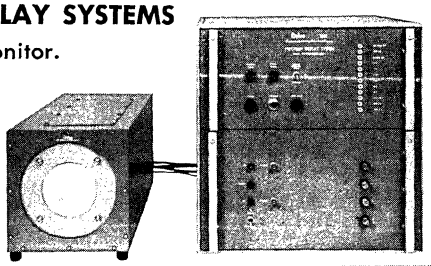
CRT SPOT ANALYZER

Determine CRT spot characteristics, phosphor noise, etc., on tube face.



COMPLETE DISPLAY SYSTEMS

Hi-Resolution X-Y monitor. Linear to 0.1%, fast, flexible.



RASTER DISPLAYS LINE SCANS SPIRAL SCANS MONITORS CELCO

CONSTANTINE ENGINEERING LABORATORIES COMPANY

Celco

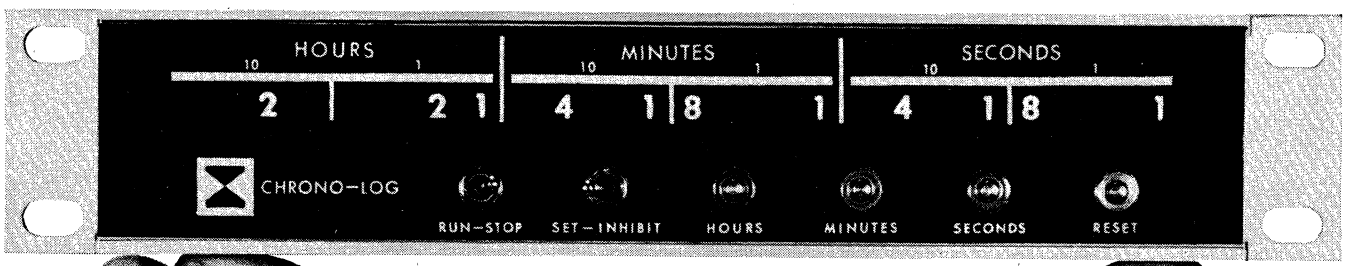
MAHWAH, N.J. 07430
201-327-1123
TWX 710-988-1018

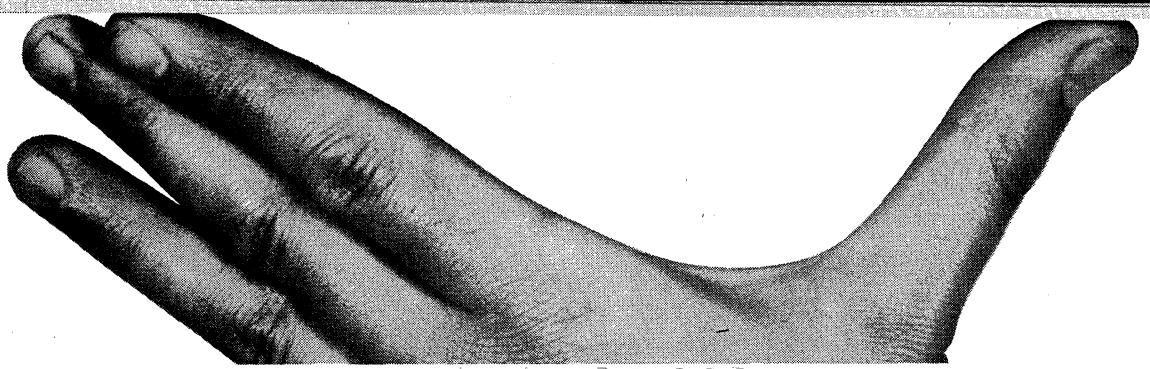
UPLAND, CAL. 91786
714-982-0215
TWX 910-581-3401

Whatever your requirements for

TIME CODE EQUIPMENT...

Look to Chrono-log





Series 30,000

INTEGRATED CIRCUIT CLOCK/CALENDARS

Meet specific system needs at off-the-shelf prices

Applications
Wherever a digital output of real or elapsed time is required such as data logging, data transmission, data processing, time display, telemetry and digital printout systems.

Versatility, at low cost
Over 7,000 standard configurations available to meet specific system requirements at off-the-shelf prices which are less than the prices of electromechanical clocks. Use of common interface wiring and logic levels save you the costs of making engineering and documentation changes from one application to the next. Options include:

- BCD or NIXIE-type front panel displays
- Outputs of hours, minutes and seconds or other time ranges
- Day-of-the-year or month-and-day calendars
- Parallel and/or serial outputs
- Commercial or military temperature ranges
- A variety of internal or external time bases
- Various power supply inputs

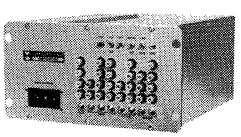
System compatibility
Use of TTL monolithic units, DTL and TTL circuits provide the optimum characteristics for clock applications, permitting simple interface with the most popular integrated circuit families. Chrono-log clock circuits are extremely reliable and provide excellent noise immunity.

Small size
Measures only 1¾ in. high, 9½ in. wide (half rack), and 8¾ in. deep.

For complete details request Bulletin 30,000.

OTHER CHRONO-LOG TIME CODE EQUIPMENT:

Time Code Generators—for recording, telemetry, range timing and other real time systems using IRIG, NASA, Vela or other time code formats. Both parallel outputs and serial modulated carrier outputs are provided for analog magnetic tape recording systems. Ask for Bulletin 4,000.



Low Power Time Code Generators—for field and airborne systems. Operate up to 60 hours from internal standby batteries. Internal oscillator has stability of 2 parts in 10^9 per day. Ask for Bulletin 26,000.

Time Code Readers—accept serial time code input in forward or reverse direction, fast or slow speed. Available for a variety of time codes or in universal multi-code models. Displays time reading and produces parallel and serial outputs of time for data processors, graphic recorders and other data devices. Ask for Bulletin 5,000.

Automatic Tape Search Control—controls tape drive to search for data at high speed and play back selected portions of recording. Provides front panel selection of start and stop times. Eliminates manual searching and playback. Ask for Bulletin 8,000.

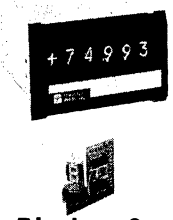
Whatever your requirements for time code equipment, look to Chrono-log to fulfill them. For more information, contact your local Chrono-log field engineer or write us directly.

CHRONO-LOG CORPORATION

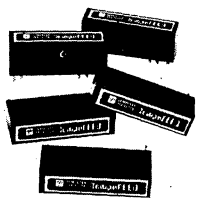
2583 West Chester Pike, Broomall, Pa. 19008. (215) 356-6771

Our Products Perform...

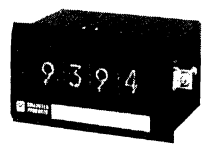
We guarantee it!



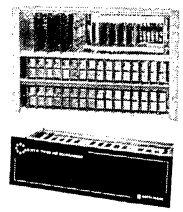
Displays & Counters



CompuREED™



Digital Panel Meters



Real-Time Peripherals

DISPLAYS AND COUNTERS

From custom engineered up/down counters to standard off-the-shelf decimal display modules, Computer Products offers counting and display equipment to meet your requirements. The DM500 and 600 Series are self-contained plug-in decimal display modules using either gas-discharge or 7 segment type indicator tubes. All have combinations of decoder/drivers, decade counters or storage registers. BEZELS AND MOUNTING CHASSIS AVAILABLE. Single quantity prices for DM500 and 600 Series as low as **$25.90 per decade.** Custom engineered up/down counter systems quoted on request

CompuREED™ RELAYS AND SCANNERS

The CR300 Series Relays are the newest development in low-level analog switching. The series includes 12 models available in one, two or three pole, form "A", switching configurations with dry or mercury-wetted switches. The RTP7480 REED Scanner operates at rates up to 200 SPS and uses the CR300 reeds to provide economical high-accuracy sampling of analog signals in the f.s. ranges of ±5 millivolts to ±10 volts with programmable gain control. The reed switches provide extremely low (<0.1 microvolt) thermal offset. CR300 Series prices are typically **$14.00.** A typical price for RTP7480 Scanner is **$40.00/channel.**

DIGITAL PANEL METERS

The DP400 Series measures DC voltage accurately (.05% ±½ count for 2000 and 4000 count models. .02% ±1 count for 10,000 count models) with up to 10,000 count resolution. It offers 11 voltage ranges (200mV, 400mV, 1V, 2V, 4V, 10V, 20V, 40V, 100V, 200V, and 400V). Temp. coefficient is .005%/°F(2000 and 4000) and .003%/°F(10,000). Single quantity prices start as low as **$189.00. Guaranteed shipment within 15 to 30 days.**

REAL-TIME PERIPHERALS

The RTP7400 Series offers the only standard product approach to real-time systems implementation available. These off-the-shelf products include: Low-Level Analog Input Systems (Solid state and REED), High-Level Analog Input Systems, D/A Analog Output Systems, Sample and Hold Analog Output Systems, Digital I/O's and Operator I/O's. ALL RTP7400 products are plug-in compatible with ALL the popular MINI COMPUTERS. The customer selects the computer of his choice. Extremely competitive prices plus dollar volume discounts offered. Let us configure your system with RTP.

D-TO-A CONVERTERS

The DA035 Series provides 8, 10 or 12-bit binary or 12-bit BCD resolution, with or without input data storage, on a P.C. card measuring 2.75" by 5.25". Inputs are TTL/DTL compatible. There are 40 models with six full-scale analog output ranges up to ±10 volts and ±10ma available. Settling time from 10 to 50 microseconds. Incremental conversion rates up to 200KHz. Accuracy ±0.05%, ±½LSB. Single quantity prices as low as **$69.00.**

A-TO-D CONVERTERS

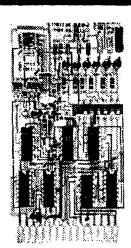
The AD300 Series offers 14 standard models providing binary or BCD output code with 8, 10 or 12-bit binary resolution or 12-bit BCD resolution. Bipolar, input of +4V to −4V or +10V to −10V are standard input configurations. 10KC conversion rates are standard, 20KC available. Accuracy is ±0.025%, ±½LSB. The AD 300 Series are mounted on three plug-in P.C. boards measuring 2.75" x 5.25" x 1.0". Single quantity price for 12-bit binary 10KC, only **$189.00.**

CompuLogIC T.M.

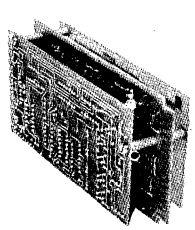
The CL800 Series comprises a complete family of plug-in logic circuit modules using monolithic DTL integrated circuits. The series consists of positive logic, NAND based circuits with each circuit card containing two hermetically sealed, 14-pin, dual in-line, ceramic packages. Each circuit module measures only 1.25" x 2.5" and mates with standard 30-pin, 15-position, card-edge connectors with 0.156" spacing. The basic series consists of 18 separate circuit module types containing both high and low-speed models. A typical price for CompuLogIC™ is **$10.00.**

DC POWER SUPPLIES

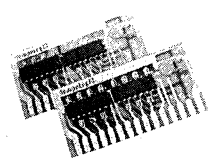
The PM400, 500, 600 and 700 Series Regulated DC Power Supplies offer output voltages from 3.6 to 180VDC —single and dual. Power up to 15 Watts. The PM500 Series are the famous encapsulated PC mount modules. The PM800 Series are encapsulated Unregulated DC Power Supplies offering output voltages from 5 to 45VDC. 220V/50Hz operation available on all Computer Products power supplies. Mounting sockets available for PM500 and 800 Series. Single quantity prices for PM500 Series as low as **$19.95.**



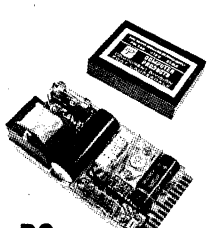
D/A Converters



A/D Converters



CompuLogIC™



DC Power Supplies

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FORT LAUDERDALE

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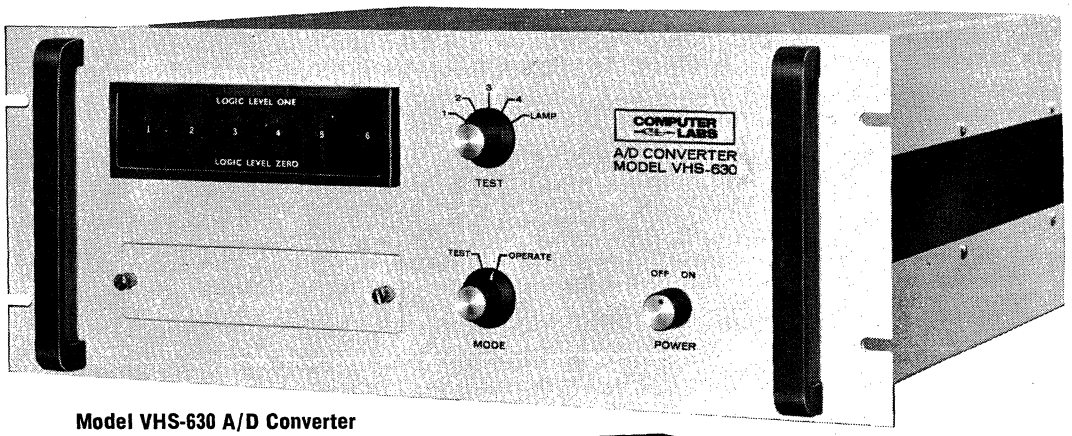
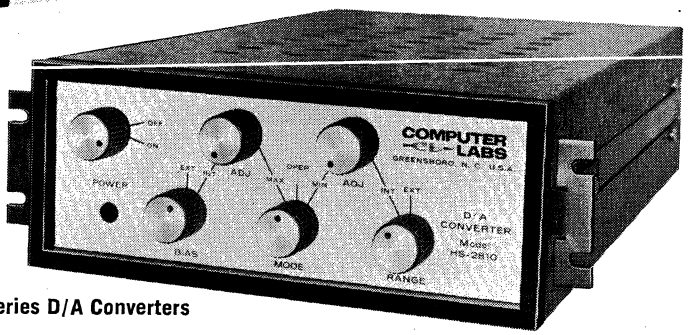
World's fastest

High-Speed Analog Multiplexers



Model VHS-630 A/D Converter

HS Series A/D Converters



HS-2000 Series D/A Converters

data acquisition products

Transient; high-speed; narrow; or "one chance."
It doesn't matter what you call your measurement problem. And it doesn't matter whether your data are radar, color TV, communications, medical measurements, nuclear phenomena, chemical reactions, or any of dozens of others. Data acquisition becomes an important question demanding sophisticated answers.
Computer Labs has those answers in . . .

High Speed Analog Multiplexers

The Computer Labs Model MUX-810 Multiplexer will connect eight analog inputs to a single output at a rate of 6.6 million connections every second. Channels can be connected sequentially, with any number in the sequence; random access; or manually, with a front panel push button. *Equivalent "ON" resistance is 0.2 ohm, making the Model MUX-810 an ideal choice for switching 100-ohm lines.* The $2,400 price includes one-year warranty and manual.

Model VHS-630 A/D Converter

The Model VHS-630 is the answer to those problems requiring medium resolution and extremely high data rates. The unit is capable of six-bit resolution at any random or periodic word rate from dc through 30 MHz. *Aperture time is less than 75 picoseconds;* transient response is 15 nanoseconds; and overvoltage recovery is 30 nanoseconds. The analog input has several no-cost options, and digital data outputs are MECL-compatible. The $13,200 price includes built-in test circuits, a one-year warranty, and complete instruction manual.

HS Series A/D Converters

All Computer Labs HS Series A/D Converters have sample-and-hold, internal test circuits, and power supplies. *No external test equipment required.* Random or periodic word rates available from 4 bits at 6 MHz and 25 MHz through 9 bits at 1 MHz and 5 MHz. Digital output TTL compatible. Unipolar or bipolar input; 50, 75, or 93 ohms impedance; and regular binary or 2's Complement outputs are no-cost options. Prices range from $3,200 (4 bits at 6 MHz) through $9,660 (9 bits at 5 MHz) and include a one-year warranty and manual.

HS-2000 Series D/A Converters

Computer Labs HS-2000 Series D/A Converters convert parallel binary words into analog voltages accurate to within ±2 mv. *No strobe signal required.* Output settles to within 0.1% of input in less than 90 nanoseconds. External bias and reference signals can be applied from dc to 25 MHz, making units useful also as programmable attenuators, function generators, or modulators. The price range of $1,480 (4 bits input at 25 MHz) through $1,760 (9 bits input at 10 MHz) includes a one-year warranty and manual.

And Continuing New Developments . . .

The *LAB 210* (picture unavailable at press time) is a 10-bit, 2MHz A/D. With options, it is *also* a D/A, a 100-word memory, or a transient detector capable of reading the maximum or minimum value of a pulse. Other features include push button ranging; decimal front panel display; built-in test circuits; and both binary and BCD data outputs. Call for more details and a complete spec sheet.

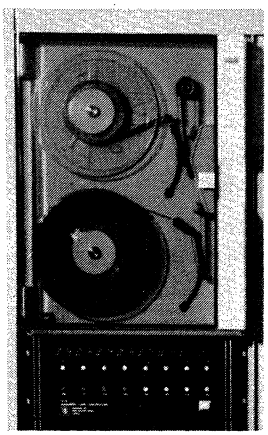
See our OP AMPS in section 1100

COMPUTER LABS
for tomorrow's technology today

1109 South Chapman St. / Greensboro, N. C. 27403 / (919) 292-6427

the specialized capabilities of DATACOM, INC.

Industry Compatible
MAGNETIC TAPE PERIPHERALS



Datacom provides Magnetic Tape Systems that are plug compatible with most small and medium computers. Datacom Units include Software, Cables, and Connectors. IBM Compatible Formats are standard.

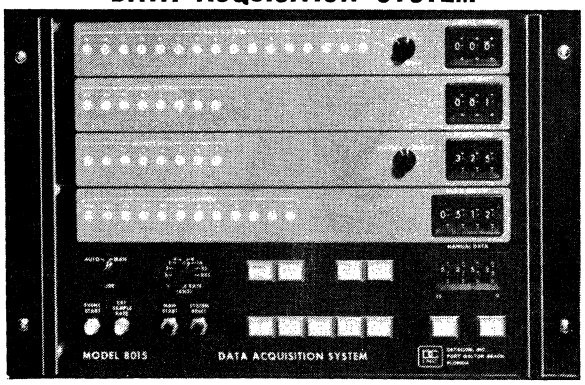
Datacom's Versatile Tape Controller can grow with your need for additional tape units. The basic Controller can control one or two tape drives, either 7 or 9 track. By adding optional cards, the system is expandable to encompass the following features:

- **Controls as many as eight tape drives**
- **Permits mixing of seven and nine track drives**
- **Permits mixing of various tape drive speeds and densities**

DMA Transfers are standard.

Future computer peripherals will include discs and line printers with similar flexibility. Consider Datacom for your peripherals.

Sophisticated DATA ACQUISITION Instruments
MODEL 8015
DATA ACQUISITION SYSTEM



The Model 8015 is a self-contained, versatile instrument with modular design. It offers a wide choice of input and output peripherals.

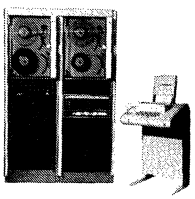
The Model 8015 consists of an analog multiplexer, an analog-to-digital converter, a shared digital input bus, a memory and a number of I/O peripheral interfaces.

It offers the researcher or investigator very high speed sampling rates, over 47 KHz, and extremely high digital through-put rates, over 80 KHz when used with appropriate output magnetic tape recorder. Tape units are available from 10ips to 150ips.

Modular design allows choice of several other peripherals to meet particular requirements.

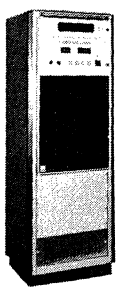
Optional digital multiplex also allows acquisition of digital data.

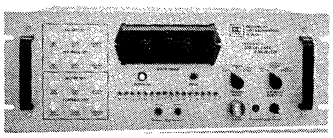
Specialized
DIGITAL DATA SYSTEMS and PRODUCTS



- **MAGNETIC TAPE VERIFIERS** — Datacom can combine its standard products with its computer science capability to provide systems to verify recorded data.

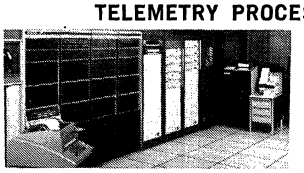
- **RADAR REFLECTION RECORDER**—Designed specifically to automate the data reduction process of target reflectivity and antenna pattern measurements. System is used in combination with standard range pattern measuring systems.





- **DIGITAL SIGNAL PROCESSOR**—The system is used to convert NRZ-C Data to a signal suitable for recording on Analog Instrumentation Recorders. Packing densities in excess of 10 K bits per inch are obtainable.

Expert Digital
SYSTEMS ENGINEERING
capability. Typical Projects Include:
PMC PLAYBACK AND OTHER TELEMETRY PROCESSING STATIONS



Courtesy of U.S. Air Force—
Sponsor: ADTC (A DTVM)
Eglin AFB, Fla. 32542

Datacom combines its products and capabilities to produce sophisticated computer controlled telemetry data processing stations. Data can be recorded or directly enter into major computer centers via Datacom's Inter-Computer-Link.

MAGNETIC TAPE SUBSYSTEMS

Datacom offers complete magnetic tape systems for most small and medium computers. In addition Datacom provides:

- **IRIG timing equipment**
- **Logic modules**
- **Special PC Card manufacture**
- **Process control systems**
- **Special systems**

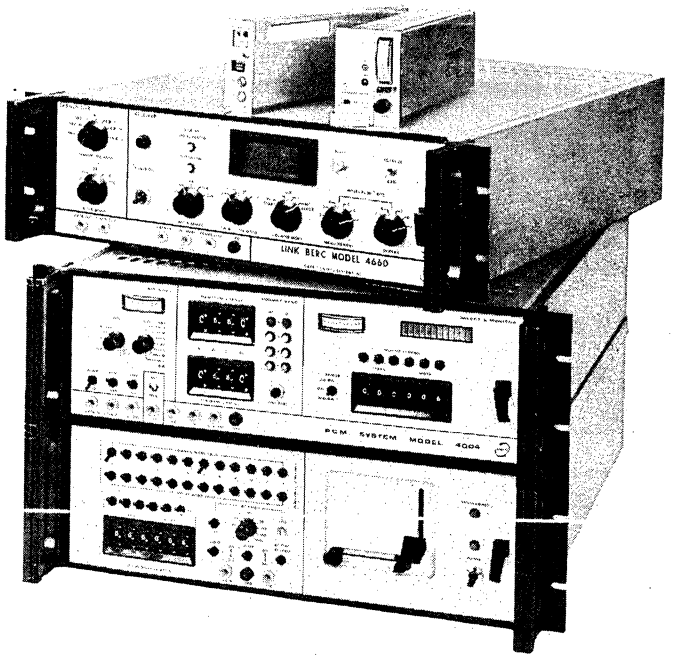
DC INC.

DATACOM, INC.

P.O. Box 278 • 40 Lincoln Drive • Fort Walton Beach, Florida 32548 • (904) 242-3113 • TWX 510-730-7693

Creative instrumentation and systems for...

data acquisition, data reduction and data communications



For over 13 years, DCS has been the acknowledged leader in the design of instrumentation and systems for data acquisition, reduction and transmission testing. The products described are but a sampling of the range of instruments available from DCS.

Computer Controlled and Manually Operated PCM Decommutation Equipment

Highlighting this line of equipment is the Model 4770 PCM Bit Synchronizer that incorporates the unique data "talk-back" bus developed recently by DCS. The unit is compatible with standard IRIG bit rates as well as the more sophisticated 10 megabit rates encountered in communication networks. The well-known manually operated Model 4004 PCM Decommutator provides a complete decommutation subsystem capability that directly interfaces with a variety of computer processors.

Bit-Error Rate Calculator

The Model 4660 (Link-Bit Error Rate Calculator) provides a new method for testing in seconds digital telemetry and communications links that are made up of synchronizers, modems, magnetic tape recorders, microwave transmitters, receivers, etc. Previously the testing of the performance of digital hardware and systems took minutes and even hours. The Link Berc not only reduces operational cost, but also operates over the widest frequency range of any similar digital test monitoring instrument on the market.

In addition to LINK-BERC DCS offers a full line of Data Communication Modules... these include bit synchronizers, PSK demodulators, DM demodulators, etc.

FM Demodulators

DCS has designed a new family of FM Demodulators that provide high quality and performance to suit a variety of needs. Price and performance are geared to the needs of the industrial and processing fields as well as the highly sophisticated aerospace market. Through extensive use of new solid state and integrated circuit technology, improved performance, smaller size and lower cost are offered compared to modules they replace. The Models GFD-15, GFD-16, and GFD-17 are designed for playback and demodulation of multiplexed and wide-band FM recorded data. The Model GFD-15 incorporates a unique computer addressable data sampling output for stripping data out of an FM signal multiplex under the command of a computer.

Signal Conditioning Modules

Signal Conditioning Instrumentation is generally divided into three groupings . . . FM Encoding Devices; Data Conditioning Modules; and related Calibration Equipment. All of the instruments feature the extensive use of integrated circuits and innovative DCS circuitry to provide new features at lower cost compared to other competitive modules.

FM Encoding . . . Three basic FM Encoding modules are available to suit every requirement. The Model GOV-4 is an inexpensive unit suitable for high-level input applications. A more sophisticated companion unit, the Model GOV-5 finds great utility in applications where medium-to-high voltage levels are present and where the user requires a built-in calibration network. The Model GOM-5 is the ultimate state-of-the-art device and boasts a variable gain amplifier/VCO combination.

Data Conditioning Modules . . . The SCU Series has wide application in the fields of SONAR, Engine Testing, and Vibration Measuring Systems. The units feature extremely quiet preamplifiers, pre-spectral shaping filters, and automatic gain ranging. The filters provide shaping of frequency and phase characteristics to allow the acquisition of psuedo-random data in the presence of noise, test stand resonances, air perturbations, etc.

Calibration Systems . . . Standard IRIG Calibration Sets (the SCF Series) enable rapid checks of all constant and proportional bandwidth channels. Users need only purchase the channels they currently require . . . and expand to a full system as their needs increase. VCO and Discriminator "Auto-Cal" systems are also available for the large data acquisition and reduction installations.

For detailed information on the broad range of instrumentation available at DCS request your catalog Now!

DCS **DATA·CONTROL SYSTEMS, INC.**
Commerce Drive, Danbury, Connecticut 06810
Tel. (203) 743-9241 ■ TWX: 710-456-0376

DATOS DATA HANDLING EQUIPMENT *from Data Graphics Corporation*

DATOS 301/302

Data Acquisition/Transfer Systems

- Highly versatile, programmable data traffic control instruments — accepts data from digital instruments, keyboards, etc; format data in EBCDIC, ASCII, EIA, or other code; present data sequentially to recorder or terminal device
- Available with up to 30 digits memory entry, or for time-multiplexed input up to 60 digits
- 200-point program board, includes constant data and remote command channels
- DATOS 301 for output to mechanical switch devices as keypunch, paper tape punch, Flexowriter, teletypewriters, typewriters
- DATOS 302 for output to incremental magnetic tape recorders, phone modems, computer I/O lines, CRT terminals
- Free-standing or rack-mount models available

DATOS 303/304

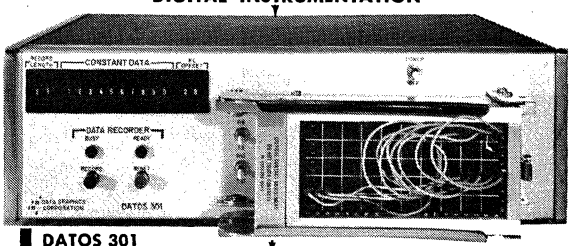
Data Transfer Systems

- Economical, flexible, programmable data transfer units for laboratory or similar applications using medium format lengths and where frequent format changes are not required
- Memory captures up to 30 digits, or time multiplexed input to 36 digits
- 120-pin back panel programmable connector
- DATOS 303 for output to keypunch, paper tape punch, Flexowriter, teletype, etc.
  DATOS 304 for output to phone modems, incremental mag. tape recorders, CRT terminals
- Free-standing or rack-mount models available

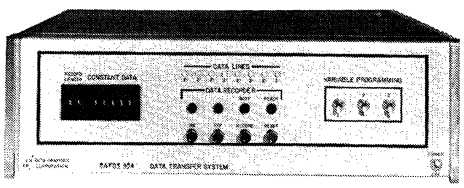
DATOS 305 *Data Coupler*

- Multiplexed input, programmable coupler ideal for repetitive recordings with limited format variations
- Output to keypunch, paper tape punch, teletypewriter, etc.
- Back panel program connector for input up to 20 digits
- Free-standing or half-rack models available

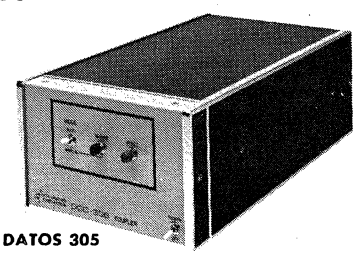
DIGITAL INSTRUMENTATION



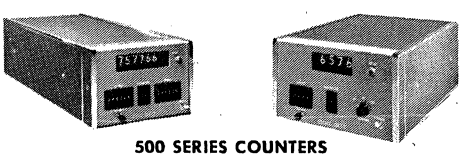
DATOS 301
RECORDING DEVICE OR TIME SHARE RECORDER



DATOS 304



DATOS 305



500 SERIES COUNTERS

BI-DIRECTIONAL COUNTER

DGC-500 Series *Event Counters*

- BCD-output totalizing unidirectional counters for use with DATOS systems, as record counters and/or monitors, clocks, scanner controllers, etc. Nixie display
- DGC-500: 4-digit totalizing counter
- DGC-501: 4-digit counter with 4-digit thumbwheel switch offset control and 1-digit input multiplier
- DGC-502: same as 501 plus independent 2-digit counter, 2-digit offset control, 2-digit preset detector
- DGC-503: 6-digit counter, 6-digit thumbwheel offset control, 6-digit preset detector, 2-digit input multiplier

DGC-100 & 200 Series

Bi-Directional Counters

- Three package configurations, rack mount, mini console, OEM.
- Interfaces to any encoder or pulse source
- Widest range of options available: Offset, Sign, Preset, Variable Resolution, Remote Resolution, Remote Display, Others
- Grid Line Recognition
- Absolute/Incremental Controls

For complete information on specifications, options, interface assistance, pricing and delivery, phone or write:

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CORPORATION

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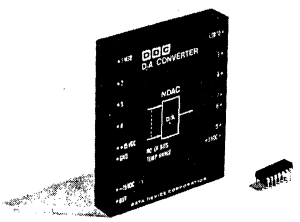
DATA DEVICES from DDC

THESE ARE SOME OF OUR STANDARD DATA CONVERSION PRODUCTS:



SINGLE MODULE CONVERTERS:

DIGITAL-TO-ANALOG

- Resolution to 13 bits
- Accuracies to ±0.012%
- Settling times to 50 nS
- Output currents to 100 mA
- Binary or BCD inputs
- Also multiplying AC and universal reference models

ANALOG-TO-DIGITAL

- Resolution of 11 binary bits or 3 BCD decades + sign
- Accuracies to 0.025%
- Bit rates to 1 bit/μs (Also 8-channel MULTIPLEXER and differential input SAMPLE and HOLD modules)

SYNCHRO/RESOLVER-TO-DIGITAL

- 14 bit resolution
- ±4′ ±0.9 LSB accuracy
- Compatible with most standard synchros and resolvers

DIGITAL-TO-SYNCHRO/RESOLVER

- 14 bit resolution
- ±4′ accuracy
- Compatible with most standard synchros and resolvers

SOLID STATE CONTROL TRANSFORMERS AND CONTROL DIFFERENTIAL TRANSMITTERS

- 14 bit resolution
- ±4.5′ accuracy

MULTI-MODULE CONVERTERS:

VIDEO ANALOG-TO-DIGITAL

- 8 bits
- 6.67 MHz word rate
- 300 pS aperture time
- 10 MΩ input impedance

HIGH SPEED ANALOG-TO-DIGITAL

- 4 bits
- 16 MHz word rate
- 200 pS aperture time
- 10^{11} Ω input impedance

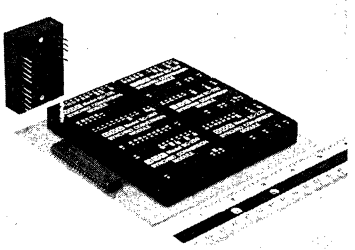
(Also video signal SAMPLE and HOLD and TRACK and HOLD modules)

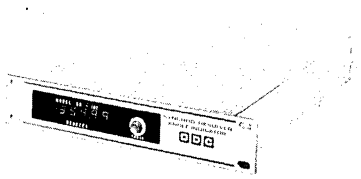
AVIONICS SERIES SYNCHRO/RESOLVER-TO-DIGITAL, DIGITAL-TO-SYNCHRO/RESOLVER

- Resolution to 16 bits
- Accuracies to ±1′
- Compatible with all standard synchros and resolvers

MULTIPLEXED SYNCHRO/RESOLVER-TO-DIGITAL

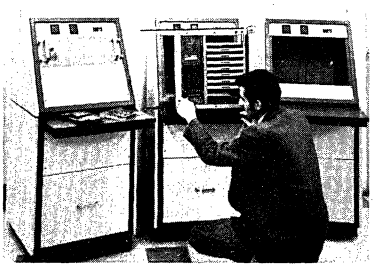
- 13 bit binary or 16 bit BCD resolution
- ±5.3′ binary or ±0.1° BCD accuracy
- 150 μS/channel conversion time
- Accepts all conventional synchros and resolvers





SYNCHRO/RESOLVER ANGLE INDICATORS:

- 5 digit LED display and BCD output
- ±0.03° max. worst case error
- Wideband: 47-1,000 Hz
- All solid state; no drift
- Half-rack wide, 1¾″ high



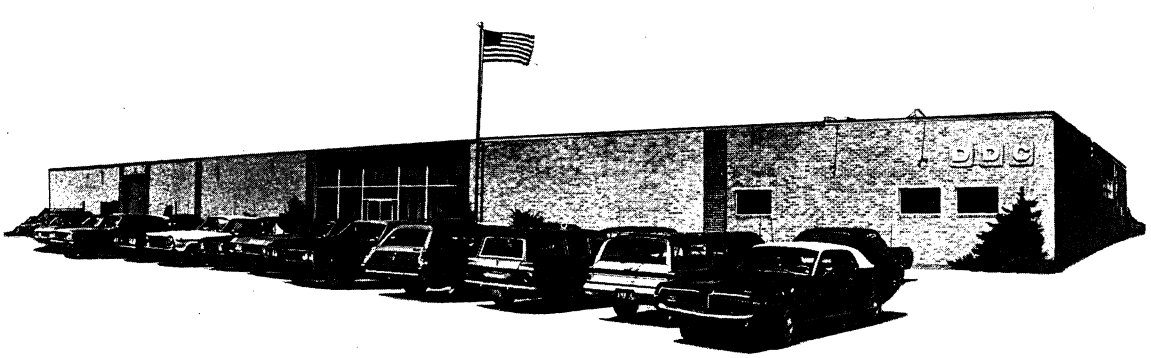
SYSTEMS:

We can fill all of your interface requirements including complete systems. In our large, modern facility, DDC enjoys a unique combination of engineering talent and systems experience.

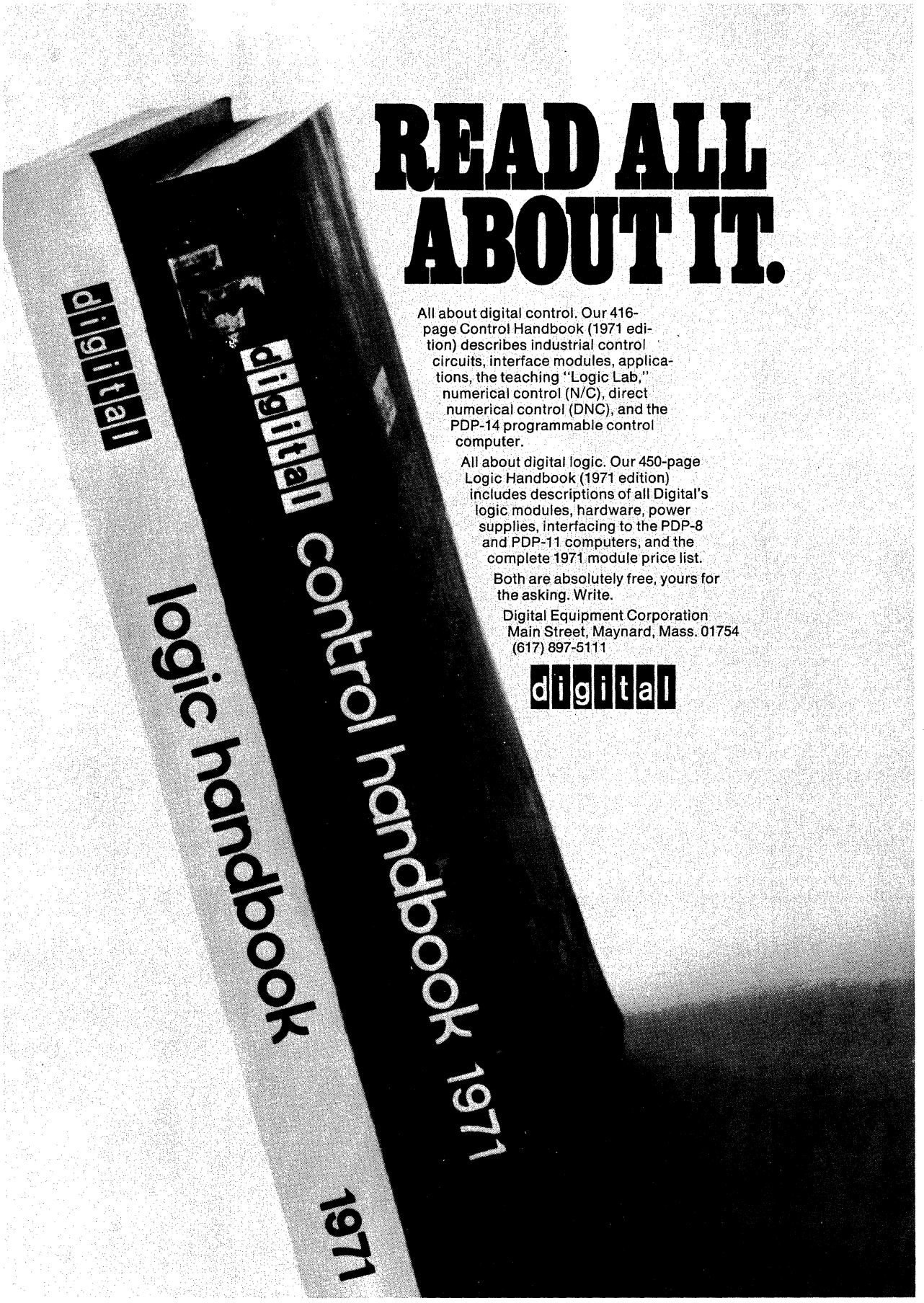
OTHER PRODUCTS:

Our other products include synchro load drivers, high frequency line drivers, discrete and hybrid wideband fast slewing and fast settling amplifiers, ladder networks, and power supplies. ALSO SEE VOLUME II, SECTION 1100.

ALL DDC PRODUCTS ARE AVAILABLE TO MEET MILITARY SPECIFICATIONS



DDC 100 Tec Street, Hicksville, N.Y. 11801 • TWX 510-221-1874 • PHONE 516-433-5330



READ ALL ABOUT IT.

All about digital control. Our 416-page Control Handbook (1971 edition) describes industrial control circuits, interface modules, applications, the teaching "Logic Lab," numerical control (N/C), direct numerical control (DNC), and the PDP-14 programmable control computer.

All about digital logic. Our 450-page Logic Handbook (1971 edition) includes descriptions of all Digital's logic modules, hardware, power supplies, interfacing to the PDP-8 and PDP-11 computers, and the complete 1971 module price list.

Both are absolutely free, yours for the asking. Write.

Digital Equipment Corporation
Main Street, Maynard, Mass. 01754
(617) 897-5111

digital

DIGITRON Corporation

2544 W. Main Street • Norristown, Pa. 19401 • Telephone (215) 277-5800

DIGITAL PRINTERS

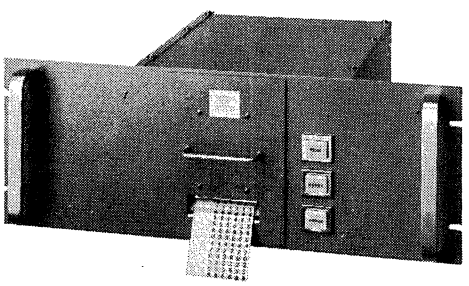
2000 SERIES

• 4 to 20 columns • 60 lines per minute • BCD parallel entry 8421, 4221, or 2421 • Modular construction • All solid state circuitry • Available options include: clock printout, log indexing, floating point, memory, 150 lines per minute

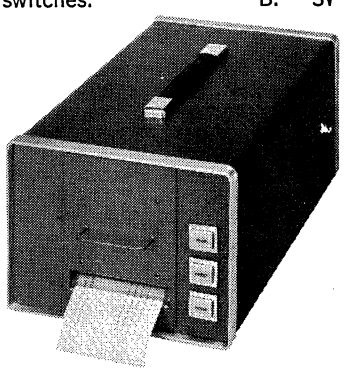
Digitron Printers are specifically designed for the facility requiring a low-cost digital printer for recording from all types of digital instruments and systems. They are complete units with power supply and all electronics, ready for recording.

SPECIFICATIONS

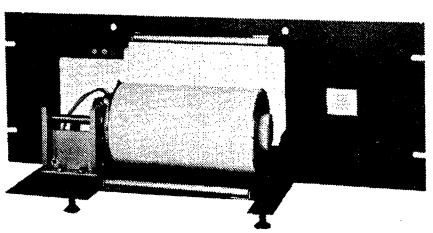
1. PRINT RATE
   Model 2014, 2020 ..... 60 Lines Per Minute
   Model 2014H, 2020H .....150 Lines Per Minute
2. NUMBER OF COLUMNS
   Basic Model 2014, 2014H ..... 4 to 14 Columns
   Basic Model 2020, 2020H .....10 to 20 Columns
3. PAPER
   Length approximately 250'. Model 2014 uses 4" width. Model 2020 uses 6" width.
4. MOUNTING
   Rack Mounting, standard: 7"H x 19"W x 15"D, or Portable case with handle: 7¼"H x 10"W x 16¼"D.
5. POWER
   115 Volts ±10 Volts, 50 to 400 Hz, fused at ½A.slo-blo.
6. FRONT PANEL CONTROLS
   Power-on switch and indicator light; Print switch, Reset switch; Hours advance, minutes advance switches.
7. DATA INPUT (LOGIC LEVELS)
   A. Standard: "1" = +2.4 to +30 VDC; 100K ohms input impedance.
   "0" = +0.4 ±0.4V; 1.5ma sink (std. DTL load).
   B. Alternate: "1" = −3V to −30VDC; 100K ohms input impedance.
   "0" = −0.4 ±0.4V; 100K ohms input impedance.
8. PRINT COMMAND
   A. Contact closure to ground.
   B. −3V to −30VDC (see 7B). Sustain for 1 millisecond.
   C. +3V to +30VDC (see 7A). Sustain for 1 millisecond.
9. CONTROL SIGNAL
   Busy during print cycle: Approx. 0.8 seconds.
   A. +3.5VDC gate during cycle. Normal reference ground.
   B. −3V to −30VDC during cycle. User supplies Ext. Vcc.



RACK MOUNT



PORTABLE



PAPER TAKEUP

3000 SERIES

• 4 to 21 columns • 180 lines per minute • BCD parallel entry • Floating point • Red and black printing • 16 characters per column • Plug-in integrated circuits • 115/230 volts or 12 volt battery operation • Available options include: clock, logging index, inverted logic levels, memory • Printers can be supplied with or without power supply • OEM and special versions available on request

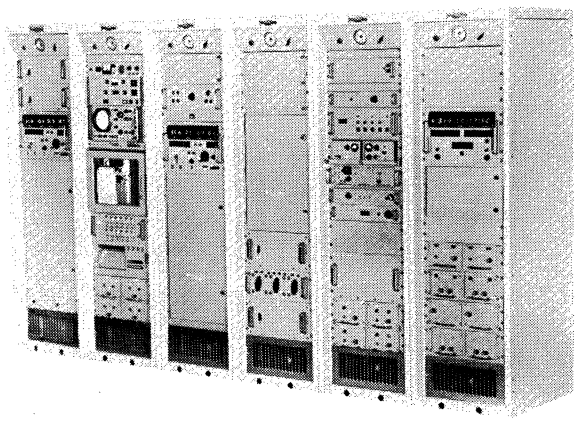
SPECIFICATIONS

1. PRINT RATE
   180 lines per minute.
2. NUMBER OF COLUMNS
   4 to 21 columns.
3. FORMAT
   5 lines per inch vertical spacing.
   7 characters per inch horizontal pitch.
4. PAPER
   3½" wide tape x approximately 250' length; fan-fold and ribbonless printing optional.
5. MOUNTING
   Rack Mounting, standard: 5¼"H x 8½"W x 15"D; or portable case with handle: 5¼"H x 8½"W x 15"D.
6. POWER
   115/230VAC, 48 to 63 Hz, or 12VDC battery.
7. CONSTRUCTION
   Modular, all integrated circuits are socket-mounted, printer is field expandable to 21 columns by adding IC's.
8. FRONT PANEL CONTROLS
   Power-on, Print, and Paper feed.
9. DATA INPUT (LOGIC LEVELS)
   A. Standard: "1" = +2.4V to +5.5VDC, "0" = +0.4V ±0.4V.
   B. Inverted: "0" = +2.4V to +5.5VDC, "1" = +0.4V ±0.4V.
10. PRINT COMMAND
    +2.4V to +5.5VDC, continues to print if level is maintained.

GEO SPACE SYSTEMS, INC.

DIGITAL SYSTEMS AND TIMING EQUIPMENT

COMPLETE TIMING SYSTEMS



APOLLO TIMING SYSTEM

The most sophisticated central timing systems built by Geo Space Systems, Inc. were installed onboard the National Aeronautics and Space Administration's new Apollo instrumentation ships. The system generates time codes and a variety of standard and nonstandard reference frequencies and distributes them to range instrumentation equipment located throughout the ships. It provides time signals that are synchronized within one ten thousandth of a second with the Naval Observatory.

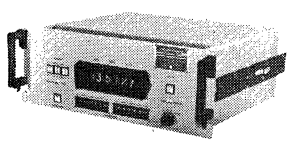
Outputs, derived from precise rubidium and crystal frequency standards by redundant master time-of-year clocks and time signal generators, include standard NASA and IRIG time codes, serial binary time-of-year and time-of-day, serial binary-coded-group time-of-year and paralleled BCD time-of-day. Elapsed time clocks are incorporated for complete pre, or post event timing, and feature manual or automatic initiation. All frequencies and time codes are channelled through a system patch panel for programmable distribution. A time scaler produces time and event markers for use with event recorders and plotting boards.

The system's time comparison equipment includes a WWV receiver, a VLF receiver, chart recorders and an oscilloscope featuring a plug-in unit to make it readily available for use in synchronizing, timing procedures and troubleshooting. VLF doppler effect is corrected by a ships motion compensator.

The utmost in operational dependability has been incorporated into this system, exemplified by: The crystal frequency standard, phase-locked to the rubidium frequency standard to within ±0.2 degrees, is automatically switched in place of the rubidium standard if the rubidium standard output drops to half amplitude or if there is a dropout of a whole cycle. A monitoring circuit accomplishes similar switching between master time-of-year clocks. Synchronous, non-transient switching between time signal generator outputs is provided by the transfer switch unit.

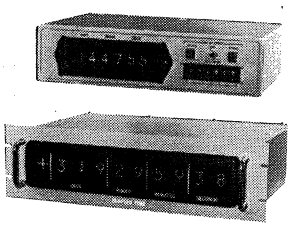
Redundancy also exists in the system master power supplies. An internal battery pack is also automatically selected in the event of main power failure. System battery chargers keep the stand-by pack ready at all times.

DIGITAL EQUIPMENTS AND SYSTEMS



TIME CODE GENERATORS

This line of advance-design equipments begins with the GTG-1000, developed to meet the most stringent time correlated instrumentation requirements; and extends to the GTG-3000, designed for applications requiring a reliable, low-cost time signal source of ±1 second accuracy.

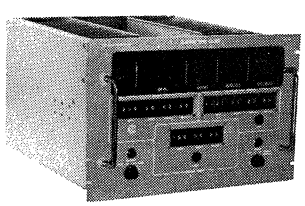


REMOTE DISPLAYS

Digital display indicators are available individually, or as companions to GSS time code generators. Simple time-of-year, time-of-day, and elapsed time indicators are featured, as well as models which incorporate selected time of event output. They are available in individual cabinets finished to customer specifications, or as rack mounted units.

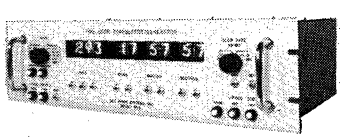
AIRBORNE TIME CODE GENERATOR

Model 8156, qualified for airborne use, is 5.6 x 6.6 x 3.5 inches and weighs only 3.2 pounds. It generates modified IRIG B time code with frequency stability of 1 x 10^{-6} and drift rate parts of 10^{8} per week provided by an internal temperature-compensated crystal oscillator. Time is preset by a 20-bit parallel BCD time-of-day input and an external switch or relay closure. An internal nickel-cadmium battery provides backup power during input power dropouts.



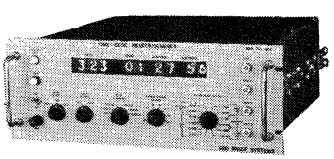
ELAPSED TIME CLOCKS & COUNT-DOWN GENERATORS

Capable of countdown and countup, with controls for hold count and count adjust, these units can be started automatically at a preset time-of-year, by an external start pulse, or manually by a front panel pushbutton. Preset time-of-year and preset initial elapsed time value (plus or minus) are set in by convenient front panel thumbwheel switches.



RANGE TIME CODE TRANSLATOR/GENERATOR

This RTC T/G is capable of functioning either as a subcentral timing system or an independent timing generator. Using dual-in-line integrated logic, the Model 8174 generates all the necessary timing signals and pulse rates for use in radar systems and computers. This includes NASA BCD and serial codes as well as binary time-of-year in tenths of seconds. Solid state components and technology are used throughout.



TIME CODE READER SCANNER

The GSS Time Code Reader/Scanner, Model 8108, provides reliable phase-coherent serial and parallel outputs when reading noisy time code signals with non-coherent carriers. An acquisition/lock feature assures coherent time outputs for up to 32 frames of signal dropout once sync is initially acquired. The standard unit handles the NASA 36-bit time code at the standard 1 kHz rate and four non-coherent carrier rates. Other codes and rates are optionally available.

Followng the introduction of silicon integrated circuit micrologic modules, Geo Space Systems, Inc. redesigned its line of standard building block module cards and incorporated them into a new family of timing system equipments. The company meets the needs of government and industry from a simple clock to a dual or triple-redundant, highly sophisticated digital system.

In the data display field, a team of engineering specialists is available to analyze customer needs and custom tailor our standard system configurations to their specific needs.

GEO SPACE SYSTEMS, INC.
4715 GEORGE ROAD, P. O. BOX 23117
TAMPA, FLORIDA 33622
PHONE: 813/884-0492

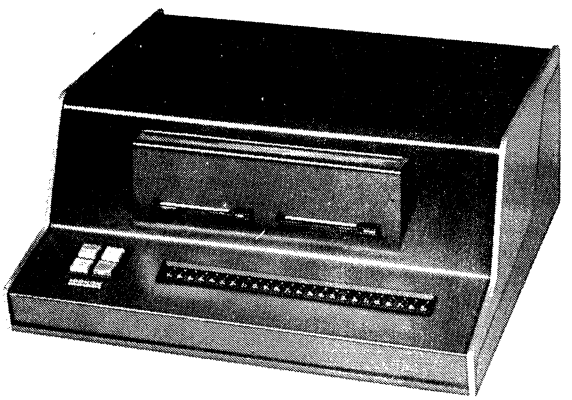
HICKOK DATA COLLECTION TERMINALS

Hickok offers a broad line of modular data collection terminals designed to interface directly with your processor, concentrator or data set.

Input is from card readers, badge readers or variable data switches, and the output is in ASCII, with optional substitution of a parity bit for the eighth ASCII bit.

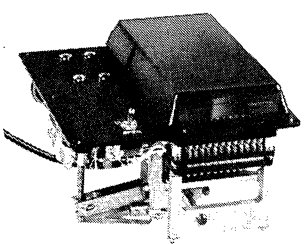
The parallel interface is open collector, bit parallel, and the serial interface is at EIA-RS-232 or MIL-STD-188 levels, bit serial, synchronous or asynchronous. Provision has been made for generation of a horizontal parity character as well as for the inclusion of parity checks on incoming control characters.

Indicators have been provided to indicate terminal status and successful/unsuccessful transmission. Automatic dial-up, automatic retransmission, and time-outs are available as options.



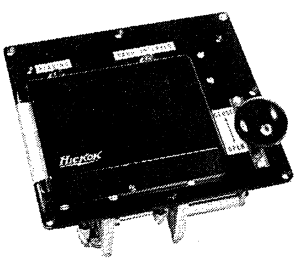
HICKOK STATIC CARD READERS

INDUSTRIAL READERS



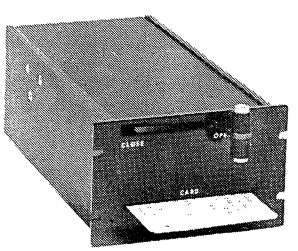
Model 540M

- 50 to 540 contacts
- Form A or Form B
- 10 amperes capacity; 3 amperes hot
- More than 100,000 operations
- Manual or motor operated
- Prices from $100
- OEM quantity discounts



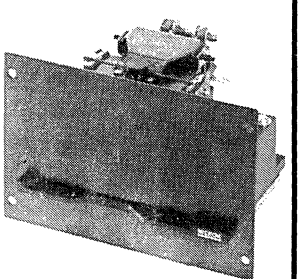
Model 324H

TAB PRODUCTS



Model 960SL

- Tab card, credit card, badge readers
- Form A contacts
- 500 milliamperes capacity; 100 milliamperes hot
- More than 1,000,000 operations
- Manual or motor operated
- Prices from $100
- OEM quantity discounts



Model 264S

See page 487 for Hickok instruments. For complete details on above products, contact:

HICKOK

THE HICKOK ELECTRICAL INSTRUMENT CO.
10514 DUPONT AVENUE • CLEVELAND, OHIO 44108
(216) 541-8060

A/D CONVERTERS

8-BIT — $99 — Model 519

- **Completely Self-Contained**
- **8 Bits**

The Model 519 is a compact 8-bit A/D converter. It is completely self contained and requires only power (±15, 5V) for operation. Conversion time is 200μS or less. The unit uses an internal D/A converter to generate a ramp. When the value of the ramp is equal to the input signal the D/A stops; the digital output will be proportional to the analog voltage. Clock, logic references, etc., are all built-in.

10-BIT — $195 — Model 501

- **Completely Self-Contained**
- **10 Bits**

The Model 501 is a completely self-contained 10-bit A/D converter. The unit converts the full 10 bits in less than 50μS. Input signal range is from 0 to +10V. However, through an external trimming resistor, it may be adjusted to a range of ±5V. The unit contains its own references, its own clock, and all the digital logic required for operation. It is powered by ±15V @ 30mA and +5V @ 300mA.

NEW

A/D 525

The 525 Series uses the successive approximation technique to do the analog to digital conversion. Conversion times of up to 1μS per bit and up to 12 bit accuracy are available.

3 DECADES BCD — $175 — Model 510BCD

The Model 510BCD is a 3 decade BCD A/D converter. The unit is similar in technique to the 519. It features an overall conversion time of 1mS with an accuracy of .1% ±½LSB.

MODEL	519	510 BCD	501
Bits	8	3 Decades BCD	10
Type	Ramp	Ramp	Dual Speed Ramp
Accuracy	All Units .1% ±½ LSB		
Input Range	0 to +10V	*	*
Adjustable to	±5V	NA	±5V
Input Impedance	10K MIN	*	*
Conversion Time	200μS	1mS	50μS
Output Code	Binary	3 Decades BCD	Binary
"0"	0.5V	*	*
"1"	2.5V	*	*
Accuracy vs Temp	75PPM/°C	*	*
Operating Range	0°C to +70°C	*	*
Power Supply	±15V @ 30mA +5V @ 90mA	±15V @ 40mA +5V @ 150mA	±15V @ 50mA +5V @ 300mA
Price (1-9)	$99	$175	$195
Mating Socket	C519	C510	C501
Socket Price—	All sockets $9.50		

*Same as column on left

SAMPLE HOLD/ PEAK DETECTORS

INFINITE HOLD— PEAK DETECTOR/ SAMPLE HOLD — $235 — Model 750

The hybrid analog/digital techniques used in the Model 750 produce the unique feature of no decay (droop) of the stored value, regardless of the duration of the holding period. Upon command, the circuit is reset to zero volts and begins monitoring the analog input. Although the input and output are both analog voltages, the signal is internally held in digital form. Selection of peak detection or sample-hold is done through external pin interconnections.

ECONOMY TRACK/HOLD — $95 — Model 720

- **High Input Z**
- **Low Drift**

The 720 is a general purpose track-hold circuit which uses an internal high quality polystyrene capacitor to hold the signal. The unit features high input impedance—20k ohms paralleled by 10pF capacitance. Important specifications are: accuracy—.05%; decay—1mV/mS; acquisition time—20μS; aperture time—50nS; drift—20uV/°C; power supplies—±15V; signal range—±10V. Price (1-9)—$95.

MODEL	750	720
Input-Output Range	0 to +10V	±10V
Decay	None	1mV/mS
Linearity[1]	±.2%	.05%
Tracking Rate[2]	.25V/μS	5V/μS
Input Z	10k ohm	20k
Ouput Current	10mA	10mA
Supply Voltages	±15V, +5V	±15V
Operating Temp.	0°C to +70°C	0°C to +70°C
Price (1-9)	$235	$95
Mating Socket	C750 $5.50	C107 $5.50

[1] % of full scale [2] In S-H, acquisition time is 40μS. 25kHz max. sampling rate.

HYBRID SYSTEMS CORP., 95 Terrace Hall Ave., Burlington, Mass. 01803 • Tel: 617-272-1524 • TWX: 702-332-7584

D/A CONVERTERS

ECONOMY 8-BIT — $29

Model 329

- **DIP Compatable**
- **Low Cost**
- **Ready to Use**

The 329 is an extremely low cost, small size 8-bit D/A converter which requires only power for operation. The unit is self contained and includes an internal reference and output amplifier. It was designed for DIP compatability. The dimensions are 1.1" x 1.7" x .385".

GENERAL PURPOSE — $57

Models 325-BP-8 and 325-BP-10

- **Everything Built-In**
- **Bipolar Out**
- **8 and 10 Bits**

These units are low cost general purpose voltage output D/A converters. They are completely self contained with internal references and an output amplifier. The 325-BP-8 has 8 bits of resolution whereas the 325-BP-10 has 10 bits. Otherwise the units are identical. Their output voltage is bipolar (±5V, adjustable to ±10V). The units have a low profile suited for .5" center-to-center mounting.

FAST, ECONOMY — $69

Model 321

- **Built-In Reference**
- **Settles in 750nS**
- **10 Bits**

The Model 321 is a current output, fast settling, 750nS, 10-bit D/A converter. The full scale output current (+8.25mA) may be converted to a voltage of up to +1.75V by terminating the unit with a resistor to ground. No amplifier is required for operation. The Model 321 has a built-in reference and is relatively insensitive (.05%/%) to power supply voltage (+15V) fluctuations. It features a low profile, .385". The Model 321-BCD is available with 3 decades BCD coding.

MULTIPLYING — $125

Series 315 — **Model 315-10**

- **Digital X Analog**
- **4 Quadrants**
- **10, 11, 12 Bits**

The Series 315 are multiplying D/A converters available in 10, 11, and 12 bits. In these units, a reference is externally applied and can vary from -10V to +10V. The output is proportional to the product of this reference and the digital input. By simple pin interconnection these units may be used either in 2 quadrants with binary coding, or in 4 quadrants with 2's complement coding. They have a built-in reference so they may also be used as a conventional D/A converter.

FAST, MULTIPLYING — $125

Series 310 — **Model 310-10**

The Series 310 D/A converters are fast settling, current-output, multiplying types available in 10 and 11 bit versions. The external reference may vary from 0V to +10V. Accuracy, however, decreases somewhat for small references. The settling time of the unit for a 10V reference change is 5μS and for a digital change is 500nS. These units are particularly useful for CRT applications where high speed is important.

NEW ULTRA FAST SETTLING

Model 390

The Model 390 is an ultra fast settling current output D/A converter with a resolution of 10 bits. It settles to 0.05% in less than 75nS. Its output current (5mA F. S.) may be converted to a voltage of up to +1.75V by a single terminating resistor to ground.

SPECIFICATIONS

	GENERAL PURPOSE					MULTIPLYING		
	8-BIT	FAST ECONOMY		8, 10-BIT BIPOLAR	LOW DRIFT	ULTRA FAST	FAST	LOW DRIFT
MODEL	329	321	321-BCD	325-BP-	330-	390-10	310-	315-
Resolution—No. of Bits	8	10	12	8/10	10/11/12	10	10/11	10/11/12
Logic Code	Binary	Binary	3 Decades BCD	Offset Binary	Offset Binary	Binary	Binary	Binary or 2's Complement
Output Type	Voltage	Current	Current	Voltage	Voltage	Current	Current	Voltage
Full Scale Output	+10V	+8.25mA	+5mA	±5V	±5V	+5mA	+10mA	±10V
Built-In Reference	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Accepts External Reference	No	No	No	No	No	Yes	Yes	Yes
Reference Range—Min./Max	–	–	–	–	–	–	0 to +10V	AC or DC
Settling Time to 0.05% Digital Change	30μS	750nS	750nS	20μS	20μS	50 nS	500nS	30μS
Reference Change	–	–	–	–	–	5μS	5μS	30μS
Operating Temp.	All units—0°C to +70°C*							
Accuracy vs. Temp. (PPM/°C)	50	50	50	50	25	50	50	50
Power Supply Voltages	±15V	+15V	+15V	±15V	±15V	±15V	±15V	±15V
Price (1-9)	$29	$69	$85	$57/75	$99/115/125	$150	$125/150	$125/150/175
Socket	C329 $5.50	C320 $5.50	C350 $9.50	C325-BP $9.50	C330 $9.50	C310 $9.50	C310 $9.50	C315 $9.50

*Most units are available for wider temperature range operation. Consult factory.

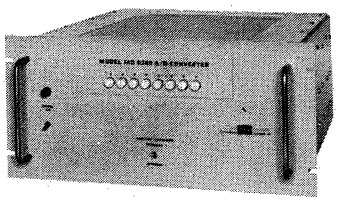
HYBRID SYSTEMS CORP., 95 Terrace Hall Ave., Burlington, Mass. 01803 • Tel: 617-272-1524 • TWX: 702-332-7584

INTER-COMPUTER ELECTRONICS INC. P.O. BOX 150, LANSDALE, PENNSYLVANIA 19446 • TELEPHONE (215) 855-0922
The Computer Subsidiary of AMERICAN ELECTRONIC LABORATORIES, INC.

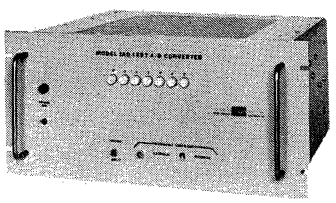
HIGH SPEED ANALOG-TO-DIGITAL CONVERTERS

OUTSTANDING FEATURES

- DATA CONVERSION RATES UP TO 320 MEGABITS
- APERTURE TIME ON THE ORDER OF TENTHS OF NANOSECONDS
- WORD SIZES RANGING FROM 4 TO 10 BITS



MODEL IAD0280



MODEL IAD1207

GENERAL DESCRIPTION

In the world today, where digital processing speeds are ever increasing, Inter-Computer Electronics, Inc. offers a complete line of Ultra High Speed Analog to Digital Converters.

With Inter-Computer's line of high speed converters, fast and accurate, digital signal processing can be used in areas where they were never before thought possible. To name just a few —

Radar — Normal and High Resolution
Television — Color and Black and White
X-ray Analyses
Multi-channel wideband communication systems

Inter-Computer Electronics' Analog-to-Digital converters come in two separate series. Series A incorporates new ultra high speed comparators, digital-to-analog converters, and wide bandwidth amplifiers all designed specifically by Inter-Computer Electronics. Series B utilizes more conventional integrated circuit components in conjunction with high speed circuitry to provide a basis for wide bandwidth signal processing at reasonable prices.

All analog-to-digital converters of Inter-Computer Electronics utilize a modular design. This design concept can accommodate a wide variety of word sizes, sampling speeds, and mechanical formats and is achieved with full consideration to the circuit layout problems that are essential to the accurate performance of high speed digital circuitry.

ELECTRICAL SPECIFICATIONS

INPUT VOLTAGE RANGE

0 to 5 volt full scale
Other fixed input ranges both bipolar and unipolar are available as options.

INPUT IMPEDANCE

Series A, 50 ohm or 91 ohm
Series B, 1000 ohm nominal
Special options are available to permit higher input impedance. These options are dependent on the maximum input frequency.

DIGITAL DATA OUTPUTS

Parallel Output
Logical "1" — 3.3v typical
2.4v minimum
Logical "0" — 0.4v maximum
0.2v typical

CODES AVAILABLE

Both Series A and B conversion systems can be supplied with the following codes: direct binary or BCD; for bipolar signals signed 2's complement and binary magnitude and sign.

END OF CONVERSION PULSE

Series A, end of conversion pulse is a logic "1" 10 nanoseconds wide available 5 nanoseconds after conversion is completed. Series B, end of conversion pulse is available 20 nanoseconds after conversion is completed.

EXTERNAL CONVERT COMMAND

For synchronous drive from an external signal source, Series A requires a pulse 5v ±0.5 with a maximum width of 5 nanoseconds into 91 ohm load. Series B requires 5v ±0.5v with a maximum width of 15 nanoseconds into 500 ohm load.

MECHANICAL

The standard converters are capable of mounting in a standard 19 inch RETMA rack.
Dimensions of the standard packages:
Front Panel Width — 19"
Height — 5¼" to 8¾"
Depth — 17"

HIGH SPEED ANALOG TO DIGITAL CONVERTERS

MODEL	MAXIMUM WORD CONVERSION SPEED	RESOLUTION	APERTURE TIME	% OF FULL SCALE ACCURACY (±½ LSB) @ 25°C
SERIES A				
IAD-1104	80 MHz	4 bits	0.5 nsec	±3%
IAD-2104	60 MHz	4 bits	0.5 nsec	±3%
IAD-3105	30 MHz	5 bits	0.6 nsec	±1.6%
IAD-5105	20 MHz	5 bits	0.7 nsec	±1.6%
IAD-1206	12 MHz	6 bits	1 nsec	±1%
SERIES B				
IAD-1208	10 MHz	8 bits	0.2 nsec	±0.2%
IAD-0280*	5 MHz	8 bits	0.6 nsec	±0.2%
IAD-2208	6 MHz	8 bits	0.5 nsec	±0.2%
IAD-1310	1 MHz	10 bits	0.3 nsec	±0.05%
IAD-1850*	1 MHz	8 bits	1 nsec	±0.2%
IAD-1309	1 MHz	9 bits	1 nsec	±0.1%
IAD-2312	500 KHz	12 bits	1 nsec	±0.25%

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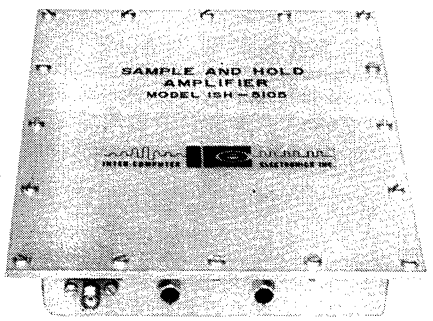
SAMPLE AND HOLD ISH-5105

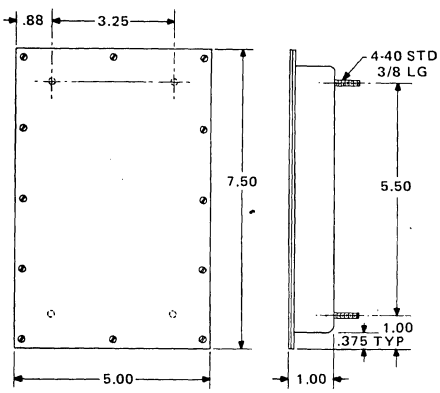


Inter-Computer Electronics, Inc. sample and hold amplifiers, contain an ultra fast analog switch, holding capacitors and input and output buffer amplifiers. This is a true sample and hold, and is used with Inter-Computer Electronics, Inc. high speed analog to digital encoders.

Upon external command, the analog switch is closed and the charging capacitors charged to final value. After this acquisition interval, the charging capacitor is disconnected from the input and holds the value until the next sample pulse.

The sample and hold amplifier has a wide range of applications with analog-to-digital converters, data acquisition systems and transient analysis.

The unit is packaged in a shielded case. Appropriate signal terminations, ground planes and layout insure accurate operation in the most severe signal environments.



* Time after convert command for the output to reach X% of final value
** Total rms time error from initiation of convert command

SPECIFICATIONS

	ISH-5105	ISH-2208	ISH-1409
ACQUISITION TIME*	25 nanoseconds	25 nanoseconds	25 nanoseconds
APERTURE TIME**	200 picoseconds	500 picoseconds	3 milliseconds
ACCURACY	1% of fs	0.4% of fs	0.1% of fs
INPUT RANGE	0 to +5 volts (bipolar option)	0 to +5 volts (bipolar option)	0 to +5 volts (bipolar option)
DROOP	5 mv/us	5 mv/us	5 mv/us
POWER SUPPLY REQUIREMENTS	+18V −175 ma −18V −120 ma + 5V 100 ma − 5V 15 ma	+18V −175 ma −18V −120 ma + 5V 100 ma − 5V 15 ma	+18V −175 ma −18V −120 ma + 5V 100 ma − 5V 15 ma
POWER SUPPLY STABILITY	0.1%	0.1%	0.1%
MAXIMUM REPETITION RATE	20 MHz	5 MHz	500 KHz
LINEARITY	1%	.4%	.1%
OUTPUT CURRENT I_o	10 ma	10 ma	10 ma
INPUT IMPEDANCE Z_i	50Ω	600Ω	1 KΩ
TRIGGER SIGNAL REQUIREMENTS			
Amp	+5V	+5V	+5V
Width	10 ns	50 ms	—
Max. Rise Time	3ns	10 ms	—
Max. Duty Cycle	50%	—	—
OPERATING TEMPERATURE	Range 0 - 50°C	Range 0 - 50°C	Range 0 - 50°C

D/A CONVERTER MODULES

PROGRAMMABLE D/A CONVERTER IDA-1310X

FAST SETTLING D/A MODULES

MODEL	IDA-1104	IDA-2104	IDA-3106	IDA-5108	IDA-1210	IDA-1310
Number of Bits	4	4	6	8	10	10
Settling Time (to stated accuracy)	10ns	20ns	30ns	50ns	120ns	1000ns
Accuracy (±0.5LSB)	±3%	±3%	±1%	±0.2%	±0.05%	±0.05%
Power Requirements	±15V @ 250ma	—	—	—	—	—

The same technology that provides the basis for the A-D converters is used in the design of a full line of digital-analog converters. These units are characterized by ultra-fast setting times. Each of the D/A's have the capability of varying the reference voltage.

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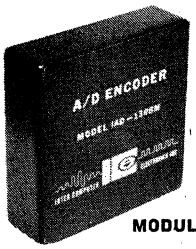
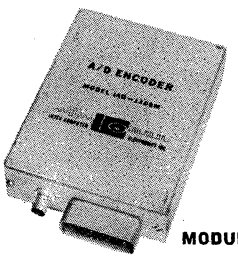
HIGH-SPEED ANALOG-TO-DIGITAL ENCODER MODULES

OUTSTANDING FEATURES

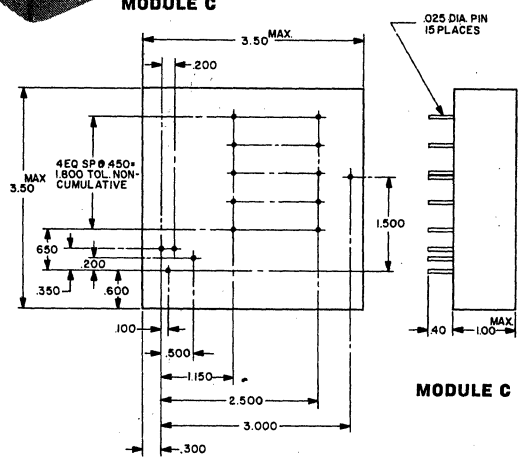
- FAST ENCODING TIMES — 120 NANOSECONDS/BIT
- RESOLUTION — 4 TO 10 BITS
- ECONOMICAL COST



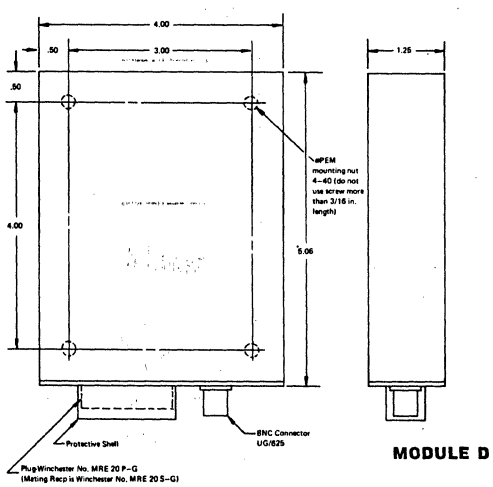
MODULE C



MODULE D



MODULE C



MODULE D

SERIES M MODULES

MODEL NUMBER	RESOLUTION	CONVERSION TIME	ACCURACY
IAD-1410M	10 bits	10 usec	±0.05% of full scale ±½LSB
IAD-1409M	9 bits	6 usec	±0.1% of full scale ±½LSB
IAD-1308M	8 bits	1 usec	±0.2% of full scale ±½LSB
IAD-5206M	6 bits	0.5 usec	±0.8% of full scale ±½LSB
IAD-2204M	4 bits	0.2 usec	±3% of full scale ±½LSB

The Series M high-speed analog-to-digital encoders offer new opportunities for high-speed digital signal processing. The modules in the M series employ an improved version of the successive approximation method of encoding. The modules are available in a format that permits mounting on a printed circuit card or in a shielded case suitable for system use. The design of these converters incorporates all mechanical features for reliable operation at ultra-high speed. Necessary signal terminations, ground planes, and case shieldings are provided.

The Series M modules are suitable for a wide variety of digital signal processing applications and data acquisition systems. The modular analog-to-digital converters are compatible with the memory cycle times of many new computers and solid state memories.

SPECIFICATIONS

ANALOG INPUT
0 to +5v full scale — Bipolar Option Available.

INPUT IMPEDANCE
1000 Ohms. Coax Cable should be terminated in the appropriate characteristic impedance for the length cable used.

DIGITAL OUTPUT
Parallel outputs, standard T^2L levels, each output to drive one T^2L load. Output coding is straight binary or 2's complement as required.

EXTERNAL ENCODE COMMAND
This line is activated by a logical one level, having a pulse width of 50 ns. and occurring after the data ready pulse.

DATA READY PULSE
This pulse is a logical one, 30 nanoseconds wide and occurs 1 microsecond after an encode command.

EXTERNAL ENCODE ENABLE
This line is normally at logical zero level for internal encoding and is held at the logical one level for external encoding.

SAMPLE PULSE
This pulse is a logical one, 50 ns. wide. It occurs following a data ready pulse when the unit is in the internal mode, and it occurs immediately following an external encode command when in the external encode mode.

INTERNAL ENCODE ENABLE
This line must be the complement of the external encode enable line and is normally at the logical one level for internal encoding and is held at the logical zero level for external encoding.

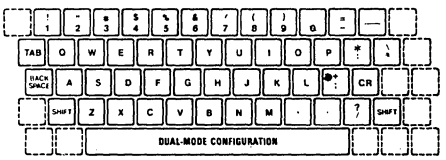
OPERATING TEMPERATURE
0°C to +70°C

POWER REQUIREMENTS
+ 5.0 volts ± 5% at .55A
+15.0 volts ±.2% at 150 MA
−15.0 volts ±.2% at 250 MA

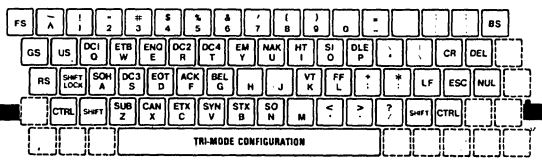
ITW LICON
DIVISION ILLINOIS TOOL WORKS INC.
6615 WEST IRVING PARK ROAD • CHICAGO, ILLINOIS 60634
Phone (312) 282-4040 • TWX: 910-221-0275

SERIES 550 Electronic Keyboard

COMPLETELY SOLID STATE



Model 550 ASCII Keyboard Arrays



SERIES 550 FEATURING:

- Magnetic Core Switching
- ASCII, EBCDIC, BCD or Special Encoding
- Simple Construction
- Unlimited Configurations— Design your own Keyboard layout
- Compatibility with 5 volt IC Logic
- Negative or Positive Logic Output
- Minimum Power Consumption (3.5 watts)
- Keys Bottom on Housing — Not P.C. Card

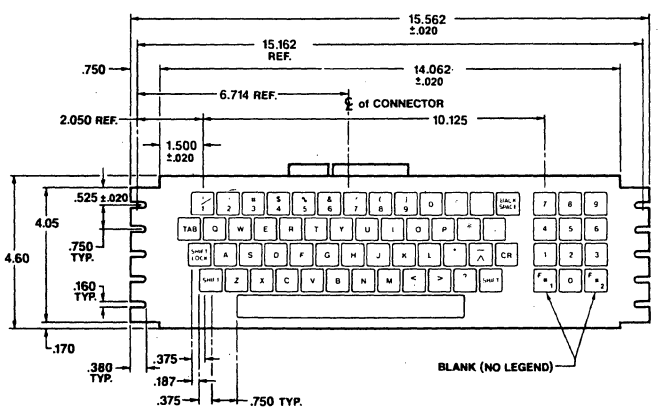
SERIES 550 ELIMINATES:

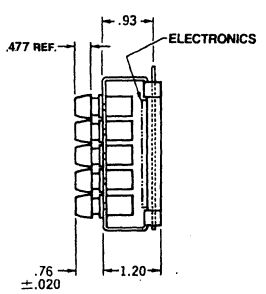
- Mechanical Linkage
- Delicate Chips
- Contact Bounce

SERIES 550 OPTIONS:

Strobe Output • Odd or Even Parity • Multi-Key Interlock • Two Key Rollover • Shift • Repeat Function • Shift Lock • Cabinet • Control Function Keys • N Key Rollover

SERIES 550 Specifications





INPUT POWER

+5 VDC, ±5% regulation
700 milliamps maximum

OUTPUT LEVELS

Logic "0": +2.4 VDC nominal @ 1.5 ma drive

Logic "1": +0.4 VDC maximum @ 16 ma minimum sinking current

WEIGHT

Without cabinet: 3.7 lbs. (approx.)
With cabinet: 11.5 lbs. (approx.)

Patents Pending

AMBIENT TEMPERATURE

Operating: 0°C to +75°C
Non-operating: −55°C to +85°C

MODES OF OPERATION

Mono-mode: no shift
Dual-mode: unshifted, shifted
Tri-mode: unshifted, shifted, control

CONNECTOR INTERFACE

Edge card accepts standard Cinch Jones connector or equivalent.

KEYSET CONFIGURATION

Keys mounted on ¾ inch centers with standard 3/8 - 3/16 - 3/8 inch typewriter offset between rows.

METRIC

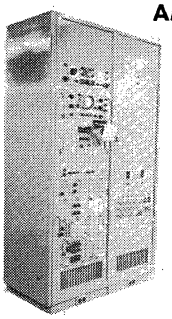
Systems Corporation

CUSTOM DIGITAL SYSTEMS FROM STANDARD SUBASSEMBLIES

TIMING EQUIPMENT

AMR TIMING SYSTEM

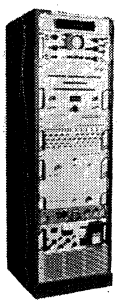
Model 8379



Timing System Model 8379 provides Atlantic Missile Range Time Codes B1, B2, C1, D1, and D5. The system features automatic or manual WWV synchronization, a WWV receiver, a synchronization oscilloscope, a waveform monitoring oscilloscope, a test point selector switch, and a versatile output patch panel. Models designed for ground station, airborne, or shipborne operation are available.

IRIG TIMING SYSTEM

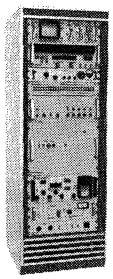
Model 8020



Timing System Model 8020 generates IRIG Codes A, B, C, and D. The system contains receivers for automatic or manual synchronization to WWV, VLF or LORAN "C". Other features are: a Decimal Time Display in Hours, Minutes, and Seconds, an oscillator stability of 1 part in 10^{10} per day, an oscilloscope for waveform monitoring and fine synchronization, and an output panel for patching time codes and pulse rates to any one of 10AC and 12DC line driver amplifiers.

CENTRAL TIMING SYSTEM

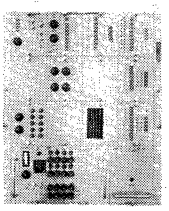
Model 8259



Model 8259 Central Timing System contains a Model 8259-1 Time Code Generator, an oscilloscope, a WWV receiver, a VLF receiver, and a precision frequency standard. The Model 8259 Central Timing System provides an IRIG "B" output with built-in provisions for synchronization to WWV. Stability of the internal frequency standard is 5×10^{-9} per day. A VLF receiver is included for calibrating the frequency standard.

AMR TIME CODE GENERATOR

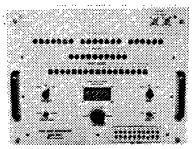
Model 8379-1



Time Code Generator Model 8379-1 is designed for mobile operation and is suitable for either airborne or shipborne use. Relay and neon output amplifiers are provided. The unit generates AMR Time Codes, Numbers B1, B2, C1, D1, and D5. Solid-state modularized construction permits expanding to additional codes by adding appropriate code generator modules.

IRIG TIME CODE GENERATOR

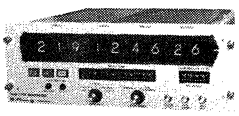
Model 8020-1



Model 8020-1 Time Code Generator simultaneously generates IRIG Codes A, B, C, and D synchronized to within 1 microsecond. Additional features include: Solid-state printed circuit card construction, taper-pin wiring, propagation delay correction to better than 1 microsecond, digital time retard and advance, parallel binary coded decimal Time-of-Day, and parallel straight binary Time-of-Day in millisecond increments. Other output formats and pulse rates are available on special order.

TIME CODE GENERATOR

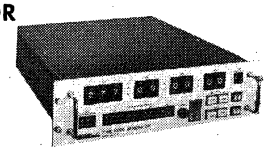
Model 8259-1



Model 8259-1 Time Code Generator provides both serial and parallel IRIG "B" outputs. The unit features a decimal display of days, hours, minutes, and seconds, semi-automatic WWV tick synchronization, propagation delay correction, 1×10^{-8} per day oscillator stability, and an optional two hour battery for continuous operation during power failures.

TIME CODE GENERATOR

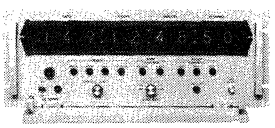
Model 8134



Model 8134 Time Code Generator is available in options capable of simultaneously generating up to five serial IRIG modulated time codes. Digital advance/retard allows manual fine synchronization. A front serviced projection display provides a decimal indicator of days, hours, minutes, and seconds. The unit contains an unusual self-check feature for operating 1000 times faster than normal. A lamp test feature is also provided.

TIME CODE GENERATOR

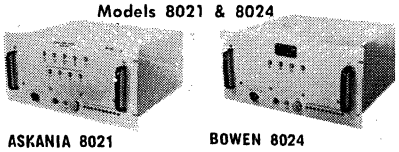
Model 8258



Model 8258 Time Code Generator provides four separate, isolated serial IRIG "B" outputs having individually adjustable levels. Parallel BCD outputs representing days, hours, minutes, seconds, and milliseconds, are also provided. The unit features a panel mounted days, hours, minutes, and seconds display plus digital advance/retard for fine synchronization.

CAMERA TIMING UNITS

Models 8021 & 8024

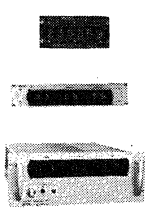


ASKANIA 8021 **BOWEN 8024**

The Askania and Bowen Camera Demodulators extract remote camera control and timing signals from the IRIG Time Code "B" signal. The units provide relay closures initiating shutter operation and high level neon outputs for film track timing. Three cameras may be started or stopped, remotely and independently, using three camera demodulators with channel selector switches set for three different IRIG "B" control function bit channels.

TIMING TERMINAL UNIT

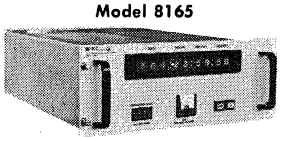
Model 8205



Timing Terminal Unit, Model 8205, accepts serial IRIG "B" and produces a decimal display of hours, minutes, and seconds. The unit is capable of driving as many as six remote time displays. Optional remote time displays are available in standard and miniature sizes.

TRANSLATOR GENERATOR

Model 8165



Model 8165 Time Code Translator accepts either IRIG "A" or "B" as an input and produces IRIG "A", "B", "C", "D", and "E" outputs. A typical application of the Model 8165 is the distribution of IRIG "A" by radio link to a number of remote sites each having an 8165 translator. A precision internal oscillator provides continuous output time codes even during loss of input signal. Re-synchronization occurs automatically when the input signal returns.

TAPE SEARCH

Model 8193

The Model 8193 is capable of reading either IRIG "A" or "B" serial time codes. It may be used either for Tape Search or as a general purpose display for serial IRIG "A" or "B". A contact closure is provided when the accumulated time matches the value preset by the operator on panel mounted decade thumb-wheel switches. The unit is capable of driving as many as six remote displays.

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FORT WALTON BEACH, FLORIDA
Tel: (904) 242-2111

METRIC

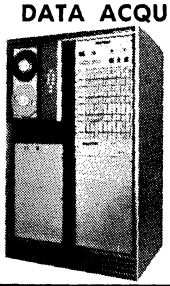
Systems Corporation

CUSTOM DIGITAL SYSTEMS FROM STANDARD SUBASSEMBLIES

DATA ACQUISITION SYSTEMS

DATA ACQUISITION SYSTEM

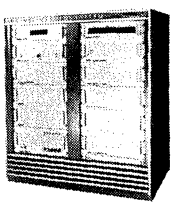
Model 8126



Model 8126 Data Acquisition System accepts analog data, digitizes this data, and records the digital data on ½ inch magnetic tape in an IBM compatible format. Front panel controls provide selection of tape speeds and tape packing density. An internal clock is provided for time tagging each frame of data. The maximum sampling rate of the Model 8126 Data Acquisition System is 45,000 samples per second.

SUB-MULTIPLEXING SYSTEM

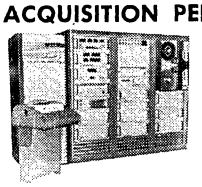
Model 8144



Model 8144 Sub-Multiplexing System scans 320 low-level input channels at a maximum rate of 200 steps per second. An internal IRIG "B" time code reader is provided for displaying the digitized input voltage of any selected input channel. The multiplexer is designed for low-level input signals in the range of 5 millivolts full scale and features a temperature drift of only 2 microvolts over a 25°C operating range.

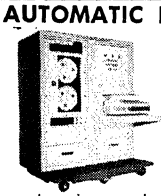
DATA ACQUISITION PERIPHERAL

Model 8226



Model 8226 is a computer controlled data acquisition system. The computer performs data analysis, converts to engineering units, and prints out operator instructions. Data is analyzed in real time and recorded for future analysis. The system processes 40 analog channels to .01% accuracy.

AUTOMATIC DIGITAL DATA LOGGER MODEL 8054

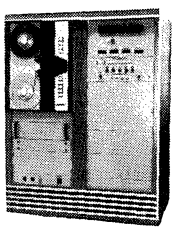


The Automatic Digital Data Logger, Model 8054, performs storage, conversion, parity generation, and logging of binary coded decimal (BCD) data generated by the AN/GJQ-9(V)2 Checkout Sequence Programming Set. The input data to this system is recorded on magnetic tape in an IBM compatible format.

The record length is variable and in the case of manual data, is controlled by manual operation of an "end of record" switch. Record length is limited only by the computer or the interface equipment.

MAGNETIC TAPE DIGITAL RECORDING SYSTEM

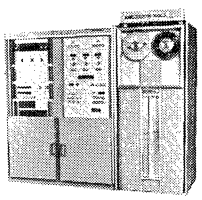
Model 8266



Model 8266 is basically a digital data formatter and recorder. The unit receives digital data words from several external devices at various data rates. The digital data is stored in a magnetic core memory and recorded on magnetic tape in IBM computer compatible format. The system contains a precision Time-of-Day clock for time tagging recorded data.

DATA ACQUISITION SYSTEM

Model 8176



System Components Include:
- Irig Time Code Generator
- Tape Search System
- Sample and Hold Amplifiers
- Analog Multiplexer
- Analog/Digital Converter
- Magnetic Core Memory
- Magnetic Tape Recorder

System Capabilities Include:
- Accept analog input signals
- Accept digital input words
- High speed A/D conversion
- Prepare tape in IBM format
- Time tag all input data
- Patch panel selects operating modes

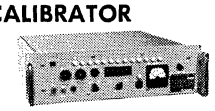
TEST EQUIPMENT

DIGITAL MOVING TARGET SIMULATOR

Model 8007M

Simulator Model 8007M is designed for use with "multiple time around" tracking radars. Late model radars, such as the AN/FPS-16 (V) radiate a number of transmitter pulses before the first distant echo is received. To simulate a distant target, the simulator must be capable of receiving several input pulses before producing the first delayed echo pulse. Conventional simulators are not capable of responding to an input pulse before the delay interval is completed. In Metric's Model 8007M Simulator, as many as eighteen (18) pulses may be propagating through the delay section simultaneously.

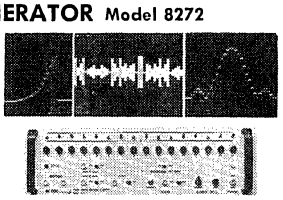
RADAR MOVING TARGET SIMULATOR/ CALIBRATOR



Model 8220

Series 8220 Radar Target Simulator has been designed for use either as a moving target video simulator or as a precise fixed range calibrator. The simulator is completely digital in operation, controlled by an internal precision VHF frequency standard. Range is preset by decimal thumbwheel switches. The instantaneous range value is available as a parallel binary output word and as an optional numerical display. Overall accuracy is ±3 feet in the internal PRF operating mode. The unit provides precise delay settings corresponding to radar ranges of 100 to 1,000,000 feet. Velocity may be varied from 0 to ±10,000 feet/second. The unit is designed to meet military specifications and has been designated SG903/APM-336V for government procurement purposes.

PROGRAMMABLE WAVEFORM GENERATOR Model 8272

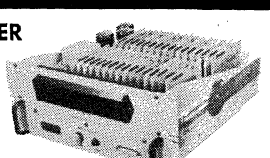


Model 8272 Programmable Waveform Generator output consists of sixteen individually controlled voltage segments which may be individually adjusted to produce any desired pattern. Stepping rate for the segments may be varied from 10 steps per second to one million steps per second or controlled by a pushbutton. The pattern may be reflected to produce a symmetrical 32-segment waveform.

BINARY/DECIMAL & DECIMAL/BINARY CONVERTERS

BINARY/DECIMAL CONVERTER

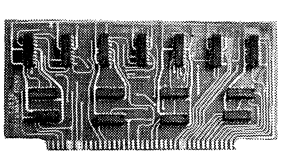
Model 8025



Model 8025 Binary-to-Decimal Converter is a high speed device for conversion of straight binary words up to 19-bits to their decimal equivalent and displaying the result. A typical application of the Model 8025 would be as a degrees, minutes, and seconds display for a straight binary shaft angle encoder. Any specified multiplication constant can be permanently wired into the converter making it possible to display the input binary word in any convenient unit such as hours, minutes, seconds, miles per hour, radians, degrees, minutes, seconds, etc.

DECIMAL-TO-BINARY CONVERTER CARD

Model Z-253



Model Z253 accepts three binary coded decimal digits on 12 lines and delivers a straight binary word on ten output lines. Decimal-to-Binary conversion is accomplished by a parallel logic matrix providing continuous output information. No external gating or control circuitry is required. The card operates from a single 5 volt power source and uses standard 0 and 5 volt integrated circuit logic levels.

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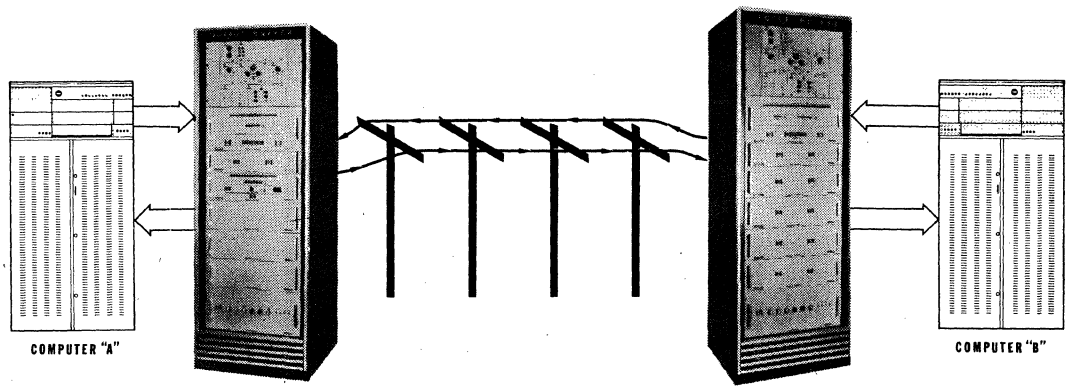
DIGITAL DATA COMMUNICATIONS EQUIPMENT

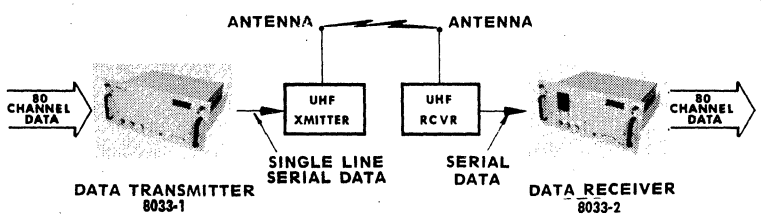
COMPUTER TO COMPUTER

The Model 8114 Data Transmitter (Output Buffer) and the Model 8114 Data Receiver (Input Buffer) form a complete two-way data transmission link between two digital computers. Data is transmitted at a rate of 2400 bits/second on Class 4B telephone lines. A single Model 8114 Transmitter/Receiver provides 4 separate channels each having a capability of transmitting 2400 bits per second. Two separate error detecting codes are employed to verify the quality of the data transfer.



POINT TO POINT

Model 8033 Data Distribution System transmits up to 80 channels of digital data from a centrally located transmitting station to any number of remotely located receiving stations. A complete Data Distribution System consists of a single 8033-1 Transmitter Unit located at the central transmitting station and an 8033-2 Receiving Unit located at each receiving station. The Transmitting Unit accepts up to 80 separate parallel input data lines and converts to a single serial output line suitable for transmission by a radio link. The Receiving Unit accepts the single line serial information and reconstructs the original 80 channel input data. Each of the 80 data channels may be operated at bit rates as high as 1000 bits per second producing a serial bit rate as high as 80,000 bits per second.



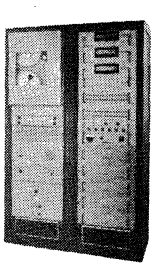
REMOTE LOCATION TO COMPUTER

HIGH DENSITY DATA TRANSMITTER

MODEL 8062

Model 8062 High Density Data Transmitter will accept serial Azimuth, Elevation and Range data words from a radar set. Timing pulses and a parallel time word are obtained from a time code generator.

The transmitter will accept 17 serial bits of Azimuth and Elevation data, a 20-bit Range word and two 36-bit auxiliary words which may be manually set in through the use of front panel switches.

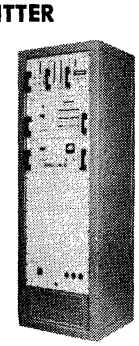


LOW DENSITY DATA TRANSMITTER

MODEL 8031

Model 8031 (CASY II) receives digital Radar Acquisition Data from a 7094 computer in the form of three 13-bit data words, 6 auxiliary bits and one sub-synch. The words are parallel dumped into a 45-bit input buffer register, transferred to a shift register and shifted out serially at 480-bits/10 frames per second rate.

The output bits modulate a 1920 CPS carrier to drive a standard 600 ohm telephone line. An internal test generator is provided which is capable of simulating computer commands.



MULTIPLE RADAR DATA TRANSMITTER

MODEL 8023

Model 8023

Real Time Data System, Model 8023, is the entire digital data link between 4 AN/FPS-16 radars and a Univac 1218 computer. Interrogate and Shift commands generated by the system are transmitted to the 4 radars. Incoming digital radar coordinate words are tagged with 9-bit identification and 23-bit time information, converted to Univac format, stored, and fed into the computer upon command.

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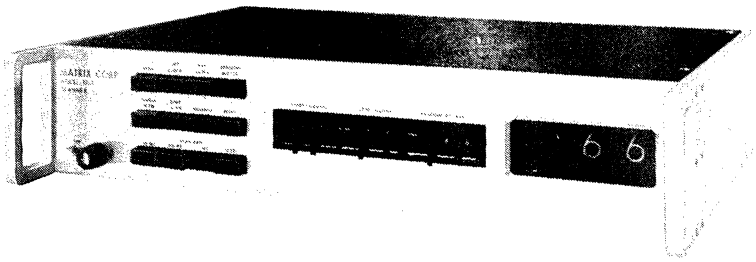
Tel: (904) 242-2111

Low Level Scanners by Matrix Corporation

MODEL 1701

- **Random access. Channels controlled by a BCD input to allow programming by external source such as computer.**
- **Sequential scanning with end point selection by front panel digital switches.**



GENERAL: The BCD input is compatible with standard TTL logic. The unit contains BCD output for use on auxiliary equipment. Switches are available in multiples of 10 up to 100 channels in a 3½" cabinet.

CAPACITY: 10 to 100 channels are available in the 3½" master. Slave units with 10 to 200 channels in 3½" cabinets allow expansion to 1000 channels.

SCAN RATE: The scan rate may be as fast as 5 msecs.

INPUT: 1. Level — Standard BCD TTL logic. True equals +5 volts and false equals 0 to +0.5 volts. Unused inputs must have a false level or be terminated in 500 ohms max. 2. BCD enable — A false signal must be applied to enable the input data.

CHANNEL READOUT: Neon numerical indicator lights are provided for a visual indication of the channel selected.

CONTACT RATINGS: 500 volts maximum between conductor and chassis, 350 volts maximum between conductors. Current should not exceed 100 ma for maximum life.

OPTIONS:

A. **Manual Digital Switch** — The switch can manually select any desired channel from the front panel.

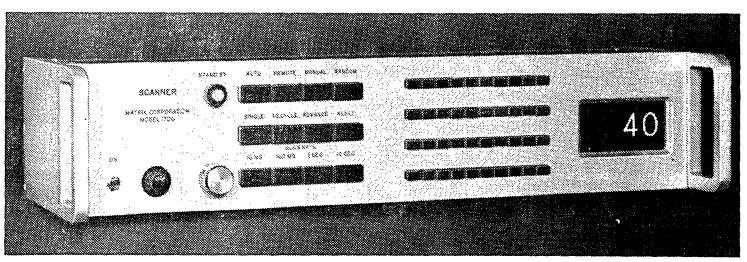
B. **Sequential Scan** — 1. Advance: Application of a true level will cause the scanner to advance one channel. 2. Reset: Application of a true level will hold the scanner in reset (000) position until true level is removed. Short or open circuit is "false." Positive 5V is true. Input impedance is 10K ohms. 3. Stop or Ctr. Disable: Application of a true level will disenable the advance input or stop any external clock inputs. A false level is required to allow sequential scanning.

C. **Sequential Scan with End Point Selection** — Two digital switches are provided on the front panel to manually select the start and the stop channel for sequential scanning.

D. **Int. Clock** — 1. Rate: Continuously variable from .01 to 10 seconds per channel. 2. Single/Recycle: A front panel switch allows a single scan of all switches or continuous scanning of all switches. 3. Internal/External: Front panel switch selects the internal clock or an external clock input. 4. Start Input: Application of true level at the start input will initiate a scan of all switches only when the scanner is in the 000 condition.

DIMENSIONS: 3½" high x 17" wide x 10" deep.

LITERATURE: Write for Bulletin RS-71.



MODEL 1700

- **40 channels . . . expandable to 1000**
- **Digital Channel display**
- **Complete remote programming**
- **3-wire reed relay switching**
- **Scan only channels selected**
- **No delay by-passing off channels**

APPLICATION: Can be used to sample directly the output from strain gages, thermocouples, pressure transducers or other low level sources requiring microvolt resolution. Each channel is composed of an input pair and shield which is sequentially sampled. Complete programming flexibility is provided by the push-button channel selectors which determine the channels to be sampled.

CAPACITY: 10 to 40 3-wire channels in the standard 3½ inch cabinet. (Multiples of 10). Slave units allow expansion to 1000 channels. Slave capacity is 10 to 80 3-wire channels per cabinet. Front panel push-buttons select channels to be scanned.

CHANNEL IDENTIFICATION: Front panel digital display, and BCD 1248 (0 = 0; 1 = +5V).

INPUT VOLTAGE RANGE: 500 volts maximum between conductor and chassis. 350 volts maximum between conductors. Current should not exceed 100 ma. for maximum life.

SCANNING SPEEDS: 10 milliseconds to 10 seconds per channel.

CONTROLS: Mode selector, scan rate selector, advance button, reset button, delayed pulse control.

DELAYED PULSE: A pulse which can be delayed from 4 milliseconds to 3 seconds following a channel advance, is provided. The pulse can be used to delay the start of counters, DVM's, printers or other external equipment. Pulse amplitude +5 volts min.

OPERATING MODES: **Internal** — Continuous scan, single scan, single step. **External** — Continuous scan, single scan, single step. A positive 5 volts pulse will start or advance the Scanner.

INHIBIT: A positive 5 volt level will inhibit the Scanner from advancing or starting.

THERMAL NOISE: 5 microvolts standard.

TEMPERATURE: **Operating** 0°C to +50°C, **Storage** — 55°C to +85°C.

POWER REQUIREMENTS: 117 V, 50-60 Hz, 20 watts.

CONNECTORS: All mating connectors provided.

DIMENSIONS: 3½" high, 17" wide, 12" deep.

LITERATURE: Write for Bulletin S1-67.

Matrix Corporation

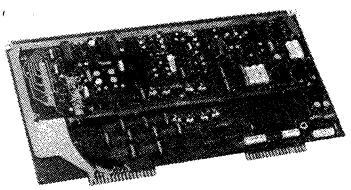
520 NORTH 11th AVENUE • BEECH GROVE, INDIANA 46107
TELEPHONE: Area Code (317) 786-4601

Multitech Automation Products

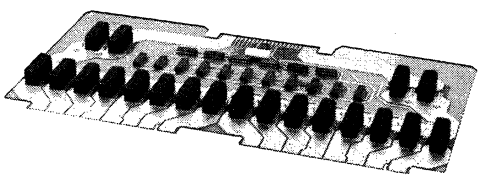
A Unique, Low Cost Approach To Low Level Industrial Data Acquisition Systems!

CHECK THESE OUTSTANDING M.A.P. FEATURES:

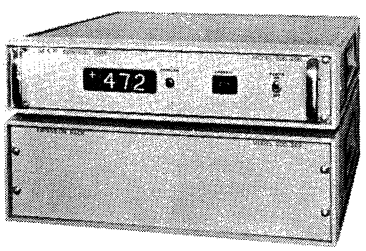
- ☐ Up to 50% Cost Reduction
- ☐ Honest 140 db Wideband CMR
- ☐ Useable, 1000 Volt Isolation
- ☐ Fully Guarded System
- ☐ Less than .2 Microvolts/°C Zero Stability
- ☐ Infinite Rejection of AC Line Noise
- ☐ 10-10,000 Channel/sec Scan Rates
- ☐ 5 Microvolts/Bit Resolution
- ☐ True Ratiometric Operation with Bridge Transducers



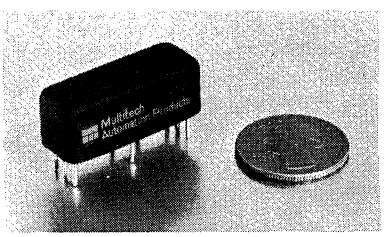
Model 316/and 3520 Integrating A/D Converters
10MV to 1000V F.S. input
Programmable gain select
1000 Megohm input impedance
Less than 1 nanoamp input current
12 or 15 bit binary output



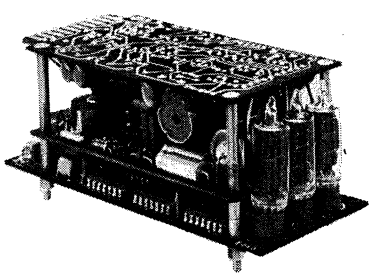
Model 1028 Low Level, 3 Wire Multiplexers
Low cost per channel
3 μVolt maximum channel-to-channel offset error
1000 V isolation between analog input and digital circuits
200 Channels/Second commutation rates
Sequential or Random access



200 System-A/D Converter/Channel
Low per channel cost
Expandable to 1000 Channels
1000 Volt Channel-to-Channel Isolation
10,000 Channels/Second (1000 Channels)
Computer compatible output



Model 180, 3 pole, single throw relay
1 Microvolt maximum thermal offset (100% duty cycle)
0.01 pF capacitance between contacts and coil
Integral magnetic/shielding for close packing
1 Billion operations in dry circuits



Models 2020, 3020 Digital Panel Meters
Smallest Front Panel area (1.9 x 2.2 for 3½ digit).
2½, 3 and 3½ Digits standard
Resolution to 100 μVolt
White light source for high visibility
High update rate of 10/second with no flicker
Gold contacts for high reliability

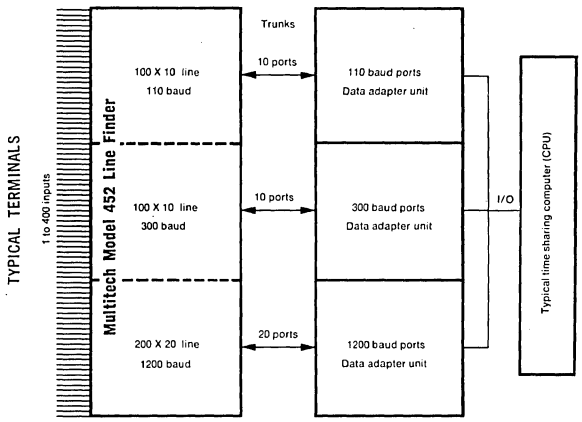
Multitech Automation Products has specialized in the design and manufacture of high reliability low level data acquisition and control systems and system modules capable of extracting laboratory quality data from heretofore impossible noisy industrial environments — and at low cost. We invite you to call or write for our informative technical booklet entitled, "MAP — A NEW ECONOMICAL, FLEXIBLE APPROACH TO ANALOG TO DIGITAL CONVERSION."

a MULTITECH company

Multitech Automation Products

583 Monterey Pass Road, Monterey Park
California 91754 Telephone: (213) 283-7773

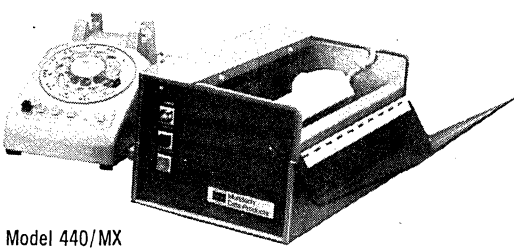
Multitech Data Products



Multitech Data Products (a Multitech Company) designs and manufactures digital data transmission and receiving equipment including Data/TTY, modems, data sets, acoustic couplers, high speed isolation keying distribution systems, input/output converters, switch selectors, electronic line finders, computer port finders, line concentrators, line matching and termination units.

MODEL 452 ELECTRONIC LINE FINDER (PORT FINDER)

Multitech Data Products model 452 Electronic Line Finder will hardwire switch **any** computer terminal, TTY, 2741, etc., that demands service, to an available port into the computer.
An electronic system rather than the usual relay system results in a reliability several orders of magnitude greater than all other systems. Relay and relay contact problems are entirely eliminated from control circuits. Standard configurations are 10 ports by 100 lines, 20 x 200, 10 x 200 and 20 x 100. Options are available.



Model 440/MX

ACOUSTIC COUPLERS

Will accommodate models 28, 33, 35 and 37 teletypewriters, IBM "Selectric," type 2741 Terminals and other equipment with EIA standard RS-232-B or C interface over standard telephone lines.

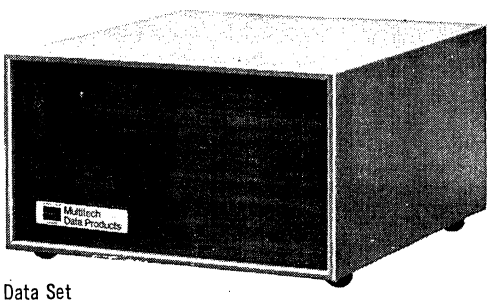
Certain models will interface with CRT displays operating at 1800 baud, other models are designed to be compatible with the "Videojet" and "Inktronic" Printers operating up to 1200 baud.

Model 440/MQ 600/600 baud
Standard EIA RS-232 interface options Rx 600 baud Tx 600 baud.
$449.00

Model 440/MR 1200/150 baud
Accommodates CRT terminals, Inktronic Printers and other high speed equipment with EIA specification interface rates up to and including 1200 baud Rx/150 baud Tx.
$649.00

Model 440/MX 1200/1200 baud
Capable of transmitting and/or receiving at speeds up to and including 1200 baud, make possible a remote, high speed CRT terminal that is completely portable. Rx 1200 baud, Tx 1200 baud. (5 baud supervisory.)
$1025.00

Model 440/MS 1800 baud
Super high speed reception is compatible with CRT's A.B. Dick, " Video Jet Set" & "Inktronic Printers" or other high speed displays over standard telephone lines. Assures you of continued usefulness as the state-of-the-art advances.
$825.00



Data Set

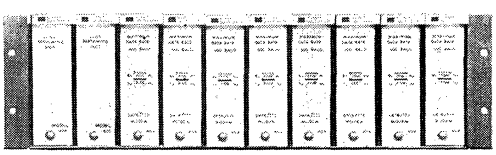
DATA TTY MODEMS

Data speeds from DC to 600 baud. Transmit and receive frequencies in accordance with CCITT recommendations or MIL-STD-188B Electronic Hybrid Circuits.
All modems identical except for plug-in frequency determining networks.

Model 402/PD Terminal Unit
Houses 2 LMU and 8 Modems. Provides all necessary interwiring, rectified and filtered power (unregulated) and cooling air, if required. Model 402/PE supplies power and houses 10 Modems, as an expansion unit.

Model 404/PL Data/TTY Modem
Data transmission is through FSK (Frequency Shift Keying) techniques. Crystal controlled transmitter for high stability, with filtered output. Data demodulation is accomplished with a digital quadrature detector. Status indicator for necessary field adjustments and test points are on front panel.
Standard CCITT frequency allocation.

Model 406/PD Line Matching Unit (LMU)
Provides all necessary circuits to interface with telephone lines or with carrier equipment. 600/900 ohm balanced input and output. Mixes transmit tones from up to 24 modems for line transmission. Drives as many as 24 modems. Transmit level strappable, —12 to 0 dbm. Receive level gives full limiting at —37 dbm, tolerates up to +6 dbm. Can be wired to operate into either a single line, or a duplex pair.



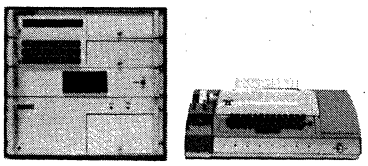
Model 402, 404 and 406

a MULTITECH company **Multitech Data Products**

583 Monterey Pass Road, Monterey Park
California 91754 Telephone: (213) 283-7773

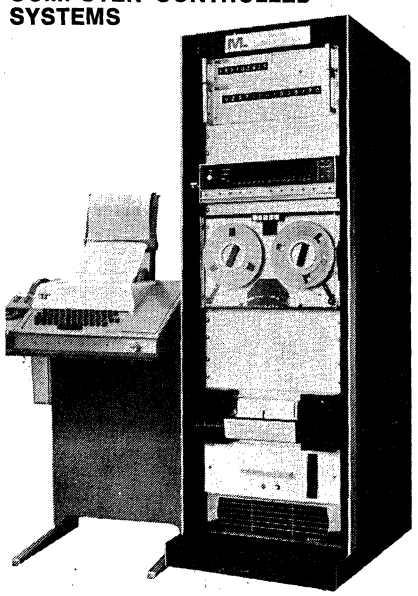
ML DATA SYSTEMS AND COMPONENTS
monitor labs, inc.

DATA LOGGERS



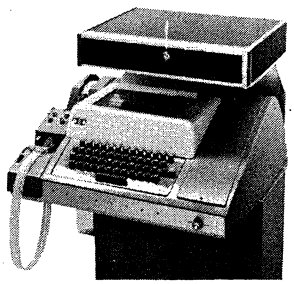
Series 10021 data loggers scan, digitize and record up to 200 input channels. Use of Model 4200 data coupler allows recording on typewriters, magnetic tape recorders, teleprinters, and paper tape punches. In addition, real or elapsed time counting is available for automatic start up and recording.

COMPUTER CONTROLLED SYSTEMS



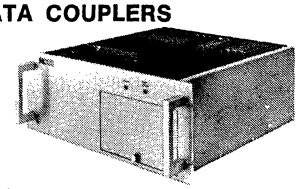
Series 10030 computer controlled systems use mini-computers to program system operation, calculate and convert data, generate control signals, alarms, etc. This flexible series is ideally suited wherever data acquisition, analysis and control are involved.

TELEPRINTING DATA LOGGERS



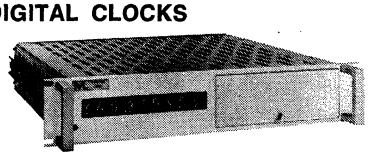
Series 7100 data loggers offer programmable scanning, digitizing, counting and time recording in a compact, single unit. Employing a Teletype 33 ASR, this series can also be used as a time share terminal.

DATA COUPLERS



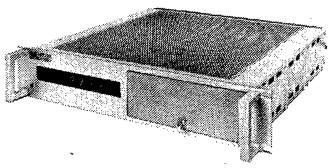
Model 4200 couples up to 100 parallel input characters to one or more output devices, such as paper tape punches, teleprinters, magnetic tape transports, etc. Parallel data can be retransmitted to drive a data printer. Two serial input devices, each with its own code, can be driven simultaneously. Input and output devices are changed by simply plugging in the appropriate card.

DIGITAL CLOCKS



Series 3100 digital clocks offer 4, 6, 7, 8 and 9 digit real or elapsed timekeeping with day or year (or month), hours, minutes and seconds. Clocks offer over 63 selectable output time intervals for automatic starting of systems or processes. Crystal time bases and output storage are available options.

ANALOG SCANNERS



Model 1100 and 1200 offer inputs of 10 to 10,000 channels, employing relay and/or crossbar switching with remote address capability. Other features include thumbwheel and pushbutton channel selection, output programming, speeds to 400 channels per second, and resolutions to 1μv.

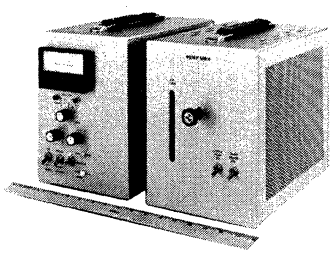
DATA PRINTERS

Series 5100 data printers offer from 7 to 21 columns of numeric and alphanumeric printout at speeds of up to 10 lines per second.

DIGITIZERS

Series 2100 digitizers offer 4 or 5 digit capability with true bi-directional (up/down) counting with input integration time of 16⅔ ms to 10 seconds. Full input/output isolation is standard.

AIR POLLUTION MONITORING



Series 8100 Air Pollution Analyzers are a group of instrument modules employing accepted wet chemical techniques which incorporate all of the features required for accurate, reliable air monitors at central and remote locations. They are designed to be compatible with the most advanced automatic data acquisition system techniques used in continuous remote monitoring.

ML CAPABILITY

Monitor Labs engineers have broad based experience in the design and manufacture of complete data acquisition systems and system components. Monitor Labs Manufacturing team produces modern, dependable equipment subject to a rigid quality control program.

Standard off-the-shelf components are used in the design and manufacture of the systems, including computer based versions. Located in modern facilities in San Diego, California and Rockville, Maryland, ML provides complete system design, integration, installation, customer training and service.

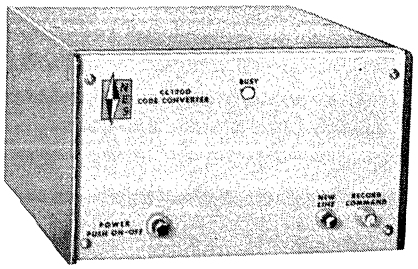
Call today for comprehensive literature and applications information.

(714) 453-6260

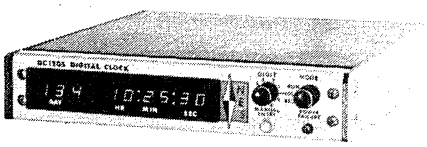
ML monitor laboratories, inc. 10451 Roselle, San Diego, California 92121

NES . . . your headquarters for everything in data communications equipment

CC 1200
Half-rack size

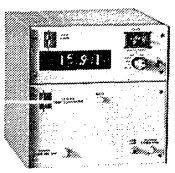


DC 1205
Half-rack size



Optional clock package

DATA LOGGERS



A

K

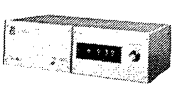
Compact, low cost, data acquisition unit. Accepts a 10 digit BCD (40 bit) input, and converts the data to a serial ASCII output code for driving teletypewriters. The data printout is formatted into seven 10 character words per line. The input lines to the storage memory are buffered; a logic "1" is from 2v to 80v. Switch selected positive or negative true logic signals. Switchable even or odd parity. Isolated (10^{10} Ohms) constant-current output. Many options available. **Price: $845**

DIGITAL CLOCKS

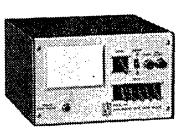
Clock, calendar, timer, and power supply can all be contained in a 1¾" high x 8⅝" wide x 9½" deep cabinet. LED readout has various ranges: 23:59:59, 12:59:59, 23:59.99, 12:59.99, 23.999, 12.999. Frequency standard of 50Hz, 60Hz, or internal 1MHz. Digit-by-digit time setting. Calendar option: 1-365 or automatic month and day. Various packaging configurations, and options. **Price: clock card $195; clock, 6 digit LED display, and power supply $585**

C

J



A



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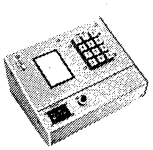
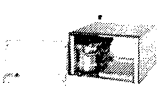
B



G



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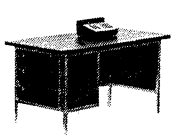
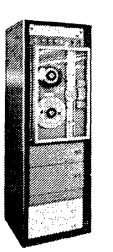
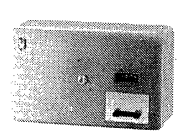


H

- **A** **CC1200-SP4** Analog input data loggers. By combining various A to D converters with the time proven CC1200 data logger, virtually any analog function can be recorded on a Teletype Model 33, 35, etc. **Price: $1050 - $1500**
- **B** **P. C. Cards** NES supplies vast amounts and varieties of individual printed circuit cards to OEM users. These include such items as: digital clocks, code converters, tone burst encoding and decoding, TTY drivers, etc. **Prices: from $75, single quantities.**
- **C** **CC1000 Code Converters** A complete line of modular code converters which allows translating any data code to any other. This permits direct communications between "incompatible" equipment, formats, and coding. Also, the CC1000 can be used for security purposes by bastardizing or scrambling a code. **Price: unidirectional $1100 - $1600; bi-directional $1700 - $3000**
- **D** **ETC 1050** Electronic Time Clocks. Attendance reporting systems obsolete old-fashioned card stamping systems. Processes employee time in/out information directly to computer compatible media. Save accounting manpower and reduce errors. Also, allows remote reading of personnel traffic for security control. **Price: $2500 - $4200**
- **E** **Data Acquisition Systems** Complete data acquisition systems on any type of storage media; this includes transducers, scanners, converters, multiplexers, transmission hardware, and storage equipment. **Price: $3500 - $25,000**
- **F** **Remote Data Entry Stations** Permits various input data, identification codes, and manipulation to be remote controlled at outlying stations of a computer system. **Price: $425 - $750**
- **G** **Versa-Trol Systems** Remote control systems for wire line, radio, and microwave carriers uses tone, tone combinations, and digitized tone techniques for dependable operation. Speech plus capability permits voice communications over the same carrier. **Price: from $925**
- **H** **Automation Computers** Process control computers which allow real time manipulation and decision making. Typical memory capacities of 4K x 12, 8K x 12 with stringing options. **Price: $8500 - $20,000**
- **I** **100-1400 Assembly** Finished card file/power supply package. One half rack 12-position file with I.C. regulated 5 VDC 2.5 A., overvoltage and short circuit protected power supply. Other voltage(s) available. **Price: $225**
- **J** **Control Units** Custom-fitted control panels for process control computers or data acquisition systems. Allows the elimination of written programs (software), because hard-wired systems and nomenclature are fitted for a particular industry.
- **K** **Accumulator/Time Logger** Digital clocks which allow the recording of real or elapse time on paper tape, magnetic tape, cards, etc. Also, by using the clock card as a pulse accumulator instead of for real time, the accumulator contents may be logged. **Price: $915 - $1200**
- **L** **LED Display** Add-on LED Display, 2 to 12 digits. Fasten to front panel of equipment. Only 1" deep.



E



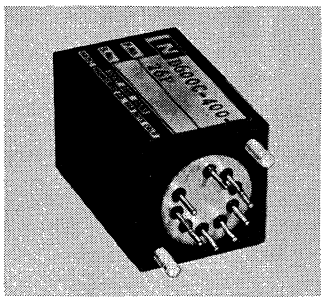
D

L

NATIONWIDE ELECTRONIC SYSTEMS, INC.

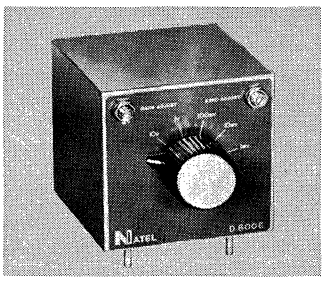
7N662 ROUTE 53, ITASCA, ILLINOIS 60143 TEL. (312) 773-0370 TWX 910-651-4713

NATEL ENGINEERING COMPANY
A NEI COMPANY



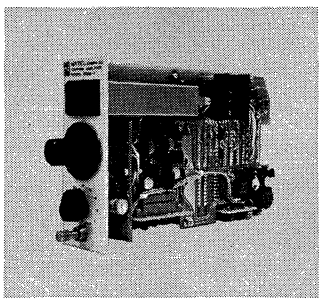
ϕ Sensitive Demodulator!

The D500 or D600 series phase-sensitive demodulator provides AC to DC conversion with accuracies not normally found in *higher priced* units. Featuring MTBF of 500,000 hours, the units operate trouble-free through dozens of programs.



Phase Sensitive Amplifier-Demodulators MODELS D6006, D7006, D8006

The D6006 series phase sensitive amplifier-demodulators convert low level suppressed carrier AC input signals to linearly proportional high level DC output voltage. Amp-Demods are designed for airborne and ground instrumentation to operate sub-carrier oscillators, meters, galvanometers, or other types of control applications. Both single-range or multi-range models are available from stock.

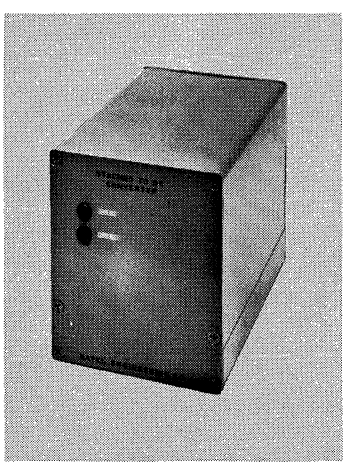


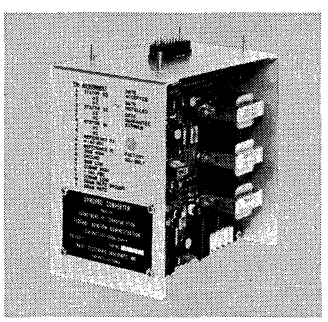
MODEL 2086

This carrier-amplifier system uses a carrier frequency of 150K Hz to provide a frequency response of 40K Hz. The system incorporates a "Foolproof" set-up procedure by means of a graphic instruction procedure displayed on the front panel. Only the adjustment to be accomplished is accessible to the operator. Model 2088 incorporates all the characteristics of Model 2088.

SYNCHRO TO LINEAR DC CONVERTER MODEL 406

An all solid-state synchro converter which provides a linear DC voltage output proportional to an AC shaft angle input. Model 406 can be ordered to interface with any standard or non-standard synchro input. Available options include a variable zero offset capability; small angle amplification; internal power supply; or multiplexing capabilities. Accuracy of the 406 is ±6 minutes of arc.





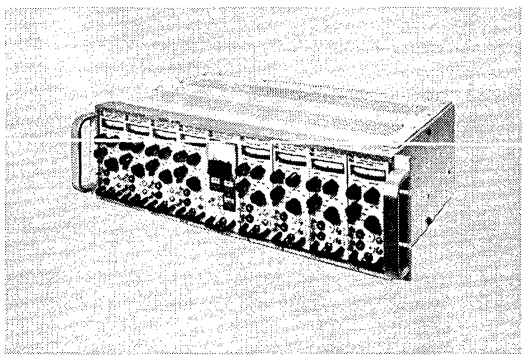
MODEL 431

A synchro input becomes a sine/cosine signal without the dynamic errors encountered in electro-mechanical systems. The accuracy tolerance remains ±6 min. even when the synchro excitation voltage varies ±10%. Models are available for all standard or non-standard synchro and/or resolver inputs.

NATEL ENGINEERING COMPANY, 8944 Mason Avenue, Canoga Park, California 91306 (213) 882-9620

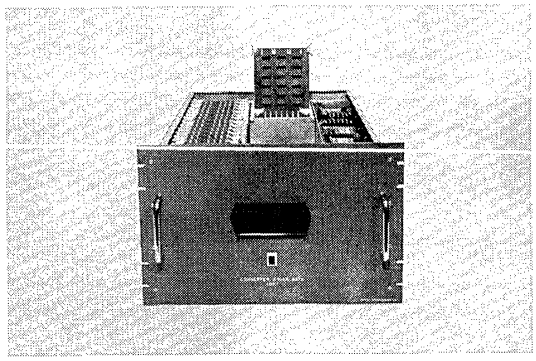
ELECTRONICS FOR ENGINEERING MEASUREMENTS

Signal conditioning systems
Signal conditioning modules
Synchro converters



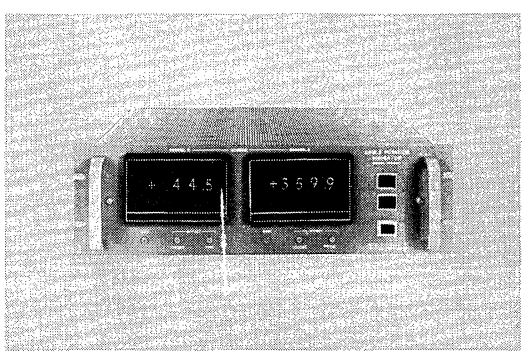
SYSTEM "N"
MODEL 2088

A carrier amplifier system designed for use with cable-connected transducers remotely located as far as two miles from the conditioning system. "UNIVECTOR" 360° phase shift adjustment offsets any possible phase shift error due to line length, and AC type conditioning provides improved signal and noise characteristics.



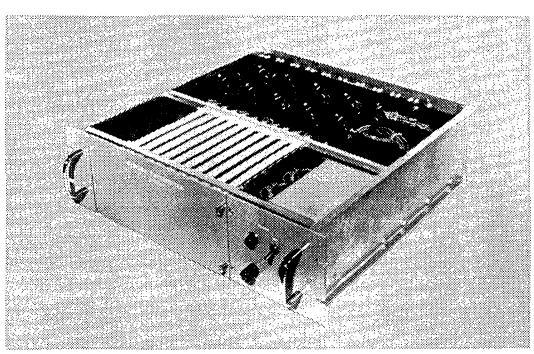
MODEL 2067

A Multi-plexed synchro to digital converter system. Conversion speed is equal to 200 usec and each channel can be read automatically on the front panel mounted digital readout. Synchros can be intermixed according to customer requirements. Available configurations range from 6-channel synchro or resolver input to 52-channel synchro to digital, as pictured. These systems can be specified for sequential sampling or remote channel select. Contact factory for details.



ANGLE-POSITION INDICATORS
MODEL 2S4061

A dual-channel synchro angle position indicator. Monitors constantly azimuth and elevation information from antenna or launch pedestals. Accurate to ±6 minutes. The indicator includes a capability for 0 to 360° zero shift adjustment. Single channel configuration also available.



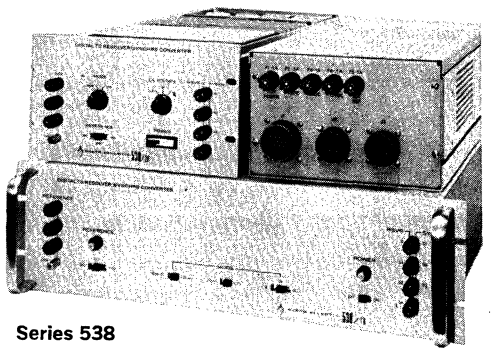
SOLID-STATE SYNCHRO TRANSMITTER
MODEL 2066

A multi-channel DC or sine/cosine to synchro converter, designed for use in simulator or other type control systems. Model 2066 provides a 3-wire synchro or 4-wire resolver output accurate within .05% of the analog inputs. Models are available providing all standard or non-standard synchro or resolver output voltages and can be intermixed at customer option.

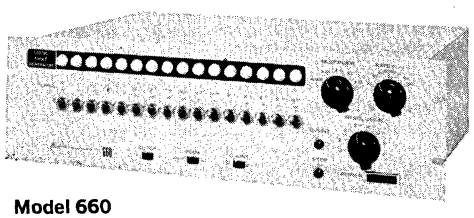
NATEL ENGINEERING COMPANY, 8944 Mason Avenue, Canoga Park, California 91306 (213) 882-9620

PRECISION DIGITAL-TO-RESOLVER/SYNCHRO AND RESOLVER/SYNCHRO-

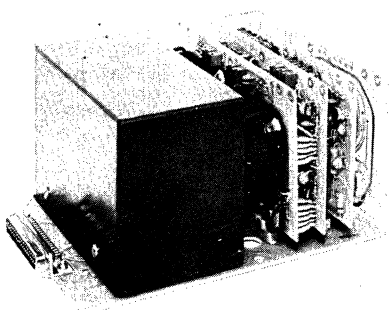
NORTH ATLANTIC *industries, inc.*



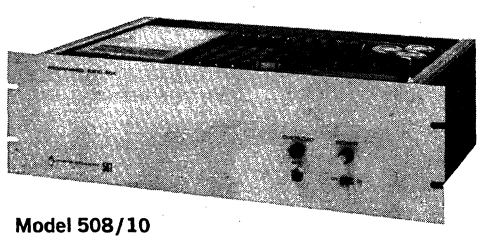
Series 538



Model 660



Series 701



Model 508/10

Digital To Resolver/Synchro Converters

These units provide a complete high-speed interface from digital to analog systems, enabling precise simulation of resolver/synchro data. All converters feature semi-conductors, integrated circuits, precision trigonometric transformers, and precision resistor networks. Basic models use 400Hz as the signal data frequency, with optional operation at other frequencies from 60Hz to 10KHz. A variety of system-oriented options are available in each model, and multi-speed or multi-channel systems can be provided.

Series 538 — Digital-to-Resolver/Synchro Converters

The Series 538 D/R-S Converters offer 9- to 17-bit single-speed resolution with digital input as binary angle. The input register is strobed and the digital data is then held until the next strobe. The internal logic selects the appropriate trigonometric transformer taps, thus simulating actual 4-wire resolver or 3-wire synchro data at the selected line-line voltage. Built-in protection circuits are provided for power-line voltage and frequency transients, over-load and short-circuit. The Model 538/30 provides 9- to 13-bit resolution with 6-minute accuracy and the Models 538/10 (full-rack) and 538/20 (half-rack) converters provide 14- to 17-bit resolution with better than 1-minute accuracy. Series 536 D/R Converters and Series 537 D/S Converters are also available as single-mode units.

Model 660 — Digital Angle Generator

The Model 660 Digital Angle Generator provides digital angle input data and data strobe signals to the Series 538 D/R-S Converters. Useful in semi-automatic test system applications, static data angles and angular data rates from 1 arc-minute/second to 2000°/second can be generated from an internal or an external clock.

Series 701 Digital-To-Synchro Converter Card Sets

The 701 D/S converters are designed for use as components in digital systems. Featuring maintainable plug-in circuit boards and a mother board assembly, all card sets are provided with transformer output isolation. The 701 Card Sets are offered in 8- to 11-bit resolution with 9-bit accuracy, and in 11- to 13-bit resolution with 12-bit accuracy. Features also include 11.8V, 26V, or 90V output at 60Hz or 400Hz and output power of 1VA or 10VA. Optionally available is 13-bit accuracy and resolver output.

Digital-To-AC-Converters

Model 508/10 — Digital-to-AC Converter

In automatic test systems, this solid-state-switched, AC ratiometric converter can be directly programmed from a punched card reader, a paper tape reader, or a digital computer. Featuring BCD digital data input with 10-microsecond data acceptance, the Model 508/10 400Hz D/AC Converter has a ratio of zero to unity with 4- or 5-decade (BCD) resolution, is accurate to .005% (50 ppm), and includes full inversion. Also available is the Model 508/11, which accepts a pulse train input and provides an AC ramp output.

Resolver/Synchro To Digital Converters

These converters provide a complete high-speed interface from analog to digital systems through continuous conversion of analog resolver and synchro data into digital data at angular velocities up to 20,000°/sec. High-speed continuous tracking is achieved through use of a unique electronic servo technique which provides velocity constants to 200,000 sec^{-1} and eliminates any data staleness errors. These 400Hz converters fea-

TO-DIGITAL COMPUTER-INTERFACE, AND ATE EQUIPMENT.

ture semiconductors, integrated circuits, precision trigonometric transformers and resistive ladder networks. A wide selection of application-oriented options including operation at other frequencies. Multi-speed and multi-channel systems are also available.

Model 545 — Automatic Angle Position Indicator

This instrument has .001° resolution and 10-second accuracy for all line-to-line voltages from 11.8 to 90V at 400Hz. The digital angle is both displayed and available in BCD format at the rear connectors. Remote or front-panel selection of resolver or synchro input, line-line voltage range and operating mode. Operating modes are tracking at 2000°/sec with K_v 200,000 sec^{-1}, 100ms track sequence upon command then hold, and repetitive track/hold sequences. Optional signal frequency 60Hz.

Model 545/100 — Automatic Angle Position Indicator

Similar to the Model 545 in overall function, but provided with .01° accuracy and resolution. This instrument accepts both 60 & 400Hz resolver and synchro data, and tracks data at 20,000°/sec.

Model 546/20 Binary S/D Converter

This half-rack R-S/D Converter features 16-bit resolution and 15-bit accuracy for 400 Hz resolvers and synchros at all line-to-line voltages from 11.8 to 90 V. The binary display is useful for system integration. Front-panel selection of resolver or synchro input, and line-line voltage range. The unit continuously tracks input data, and its output is always available for computer use. Optional special signal frequencies, multiplexed and multi-speed units.

Model API-8025 — Angle Position Indicator

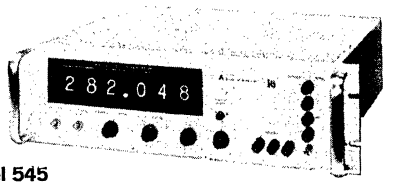
High-speed performance 400Hz servo for field test and production test measurement of synchro and resolver transmitters. The half-rack API-8025 provides accuracy of 6 arc-minutes, repeatability of 30 arc-seconds, and slew speed of 25°/second with a digital readout display. Optional retransmit components, dual-mode, and two-speed operation.

Model 8525 — Angle Position Indicator

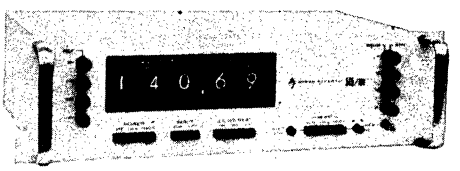
The Model 8525 offers 3-minute accuracy and .01° resolution, and can be supplied directly interchangeable with the Model API-8025 without any change in panel cutout or wiring. The Model 8525, with 5-decade BCD digital output and a data tracking speed of 1000°/second, is available as a two-channel instrument for any combination of synchro and/or resolver inputs at 11.8V, 26V, or 90V line-line 60Hz or 400Hz. Push-button channel selection automatically sets the line-line level, resolver or synchro input configuration, and also selects the correct rear connector terminals.

Series 711 Synchro-To-Digital Converter Card Sets

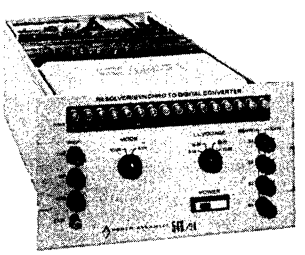
The 711 S/D converters offer .05° accuracy and 13-bit resolution with input transformer isolation, and are designed for integration into digital systems. The 711 Card Set will accept 11.8V, 26V, or 90V resolver or synchro inputs with a reference of 26V or 115V 400Hz. A Data Freeze line is provided to hold the conversion process during data transfer or test. External power is required for the 3 circuit boards and the associated mother board assembly.



Model 545

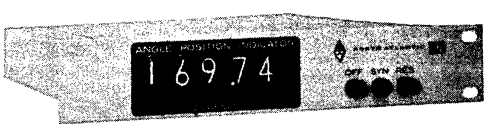


Model 545/100

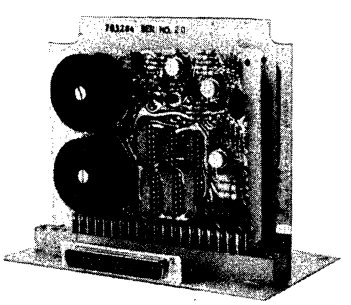


Model 546/20

Model API-8025



Model 8525



Series 711

NORTH ATLANTIC
industries, inc.
TERMINAL DRIVE, PLAINVIEW, NEW YORK • (516) 681-8600

Norden Encoders perform for you!

Look at these new 1971 additions to Norden's line. More are on the way.

	Total Count	Revolutions for Full Count	Diameter"	Model Number
NEW! Optical Absolute	10,000	50	2.25	OADC-23/4/BCDQ-200L
NEW! Optical Absolute	1,000	1	2.25	OADC-23/3/BCD-1000L
NEW! Optical Incremental: Series now available with shaft seal—permits drenched operation.				
NEW! Contact Size 11	8,192	32 or 64	1.06	ADC-11/13/BNRY-256L
NEW! Contact Size 11 Altitude Reporting Encoder	1,280	16	1.06	ADC-11-ALT-1280
NEW! Contact Size 11	10,000	100	1.06	ADC-11/4/BCDX-100
NEW! Contact Size 11	3,600	36	1.06	ADC-11/4-36/BCDX-100
NEW! Rugged Industrial Grade Optical Incremental Encoders				
All available with quadrature and internal squaring circuit options	4,000	1	3.500	OADC-35/4000/INC
	3,000	1	3.500	OADC-35/3000/INC
	2,500	1	3.500	OADC-35/2500/INC
	2,000	1	3.500	OADC-35/2000/INC
	1,200	1	3.500	OADC-35/1200/INC
	1,000	1	3.500	OADC-35/1000/INC
	600	1	3.500	OADC-35/600/INC
	400	1	3.500	OADC-35/400/INC
	200	1	3.500	OADC-35/200/INC
Optical Incremental Encoders				
All available with index marker, quadrature outputs and internal squaring circuit options. Other counts on special order	500	1	2.250	OADC-23/500/INC
	512	1	2.250	OADC-23/512/INC
	1,000	1	2.250	OADC-23/1000/INC
	1,024	1	2.250	OADC-23/1024/INC
	2,000	1	2.250	OADC-23/2000/INC
	2,048	1	2.250	OADC-23/2048/INC
IC-Compatible Encoders. For direct interface with TTL & DTL circuits				
Binary	128	1	1.750	ADC-ST7-BNRY-E/L
	8,192	64	1.750	ADC-13-BNRY-E/L
	524,288	4.096	1.750	ADC-19-BNRY-E/L
Binary-Decimal Code	100	1	2.250	ADC-ST2-BCD/L
	1,000	10	2.250	ADC-3-BCD/L
	10,000	100	2.250	ADC-4-BCD/L
	100,000	1,000	2.250	ADC-5-BCD/L
	1,000,000	10,000	2.250	ADC-6-BCD/L
	360	1	2.250	ADC-3-36BCD-E-360L
	3,600	10	2.250	ADC-4-36BCD-E-360L
	36,000	100	2.250	ADC-5-36BCD-E-360L
	360	1	3.250	ADC-ST3-36-BCD/L
	3,600	36	2.250	ADC-4-36-BCD/L
	36,000	360	2.250	ADC-5-36-BCD/L
	360,000	3,600	2.250	ADC-6-36-BCD/L
External Logic V-Scan Binary Encoders				
	128 or 256	1	1.750	ADC-7/8-BNRY-XB
	8,192 or 16,384	64	1.750	ADC-13/14-BNRY-XB
	524,288 or 1,048,576	4,096	1.750	ADC-19/20-BNRY-XB
Single Turn Gray Code Encoders				
Available with various levels of RFI suppression	256	1	1.066	ADC/11/8/GRAY
	256	1	1.750	ADC-ST8-GRAY
	512	1	2.250	ADC-ST9-GRAY
	1,024	1	3.062	ADC-ST10-GRAY
Multiturn Gray Code Encoders				
Available with various levels of RFI suppression	1,024	4	1.062	ADC-11/10GRAY256
	1,024	16	1.062	ADC-11/10GRAY 64
Low Cost Magnetic Noncontacting Encoders				
Incremental	128	1	1.750	MADC-18/128/INC
Binary	128(V scan)	1	1.750	MADC-18/7/BV
Binary	8,192(V scan)	64	1.750	MADC-18/13/BV
Binary	524,288(V scan)	4,096	1.750	MADC-18/19/BV

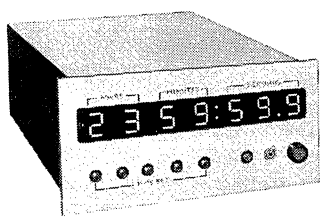
For more information and detailed specs, write Norden, Att: Components Dept., Helen Street, Norwalk, Conn. 06856. Phone (203) 838-4471. TWX: 710-468-0788.

Norden DIVISION OF UNITED AIRCRAFT CORPORATION

PARABAM

DIGITAL CLOCKS
SOLID STATE—ELECTROMECHANICAL

For computers, data logging, missile launch count-down display and control. Multi-channel digital time programming for control of automatic processing and radio/TV broadcasts. Variety of logic outputs compatible with most data readout devices. Single or multiple remote glow-tube or projection-type time displays.



SOLID STATE CLOCKS

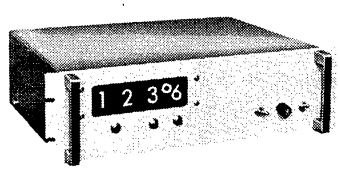
For countdown and/or elapsed time, time-of-day. Combined calendars provide day-of-year or month-day. Various time bases, time data output formats and displays available.

From $299.00

features:

- Integrated circuits used for basic logic.
- Front panel display Seven Bar Nixie or projection type.
- Logic output compatible with standard recording devices.
- Options: Battery operation, variety of time bases, variety of time ranges, multiple display.

Write for Tech. Bulletin No. 470-33



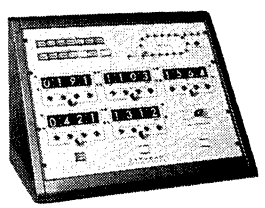
ELECTROMECHANICAL DIGITAL CLOCKS

Time resolution down to one second. Single or multiple isolated contact closure outputs in 10-line decimal, teletype code, and/or any BCD format. Wide choice of number and type of time displays.

features:

- Time Synchronized to line frequency or external pulse input.
- Countdown/elapsed time or real time.
- Outputs interface readily with digital systems.
- Special time-controlled pulse closures available.

Write for Tech. Bulletin No. 1066-27



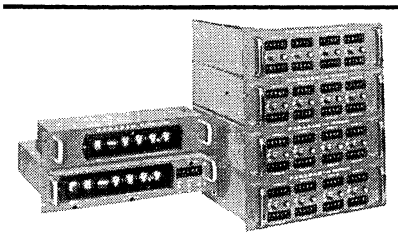
AUTOMATIC RACE TRACK TIMING SYSTEMS

Automatically measures and displays the precise quarter mile times and finish time for all types of races and for all race distances. Designed for operation by non-technical personnel.

features:

- All solid state electronics.
- For track, turf, and harness races.
- Output drives two tote board display units.
- Automatically programs photocells for selected race distances.

WRITE FOR DESCRIPTIVE LITERATURE



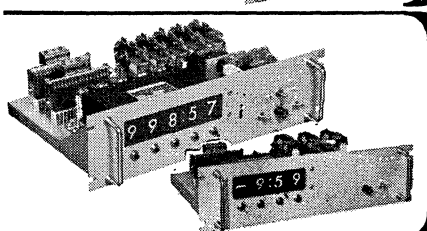
DIGITAL TIME PROGRAMMERS

Standard units accept time data inputs from solid state or electro-mechanical digital clocks and provide any number of precisely timed signal outputs as pre-selected by the wiring of one or more program plugs.

features:

- Programmed time interval accuracy well within the clock resolution.
- Display of output channel numbers and status available.
- Complete program changed in seconds by replacing program plugs.

Write for Tech Bulletin No. 566-24



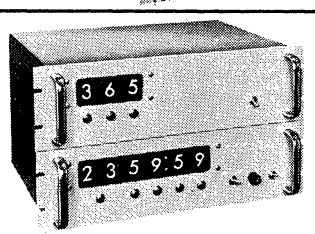
COUNT/DOWN, COUNT/UP DIGITAL CLOCKS

Used in missile launch, testing, radio-television — anywhere time is counted down, then afterward elapsed time is observed.

features:

- Available with digital logic output or for programming and recording.
- Plus/minus count in most time ranges and resolutions.
- Projection type or Nixie displays.
- Standard system operates up to 40 displays.

Write for Tech. Bulletin No. 162-16A



DIGITAL CALENDARS

Provide nonambiguous contact closures in parallel form corresponding to date in Month-Days (months from 01 to 12, days from 01 to 31) or Day-of-the-Year (from 001 to 365). Used in data logging, process control or other date of time oriented systems.

features:

- May be ordered in Month-Day or Day-of-Year Models.
- Outputs in decimal or various codes of binary coded decimal.
- Projection type or Nixie displays.
- Switch for leap year correction.

Write for Tech. Bulletin No. 1066-29

PARABAM, INC.

Special Design Charges eliminated through hundreds of off-the-shelf designs.

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TYMETER®

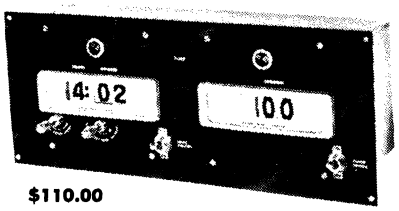
"Time At A Glance"

- **DIGITAL READ-OUT CLOCKS**
- **ELAPSED TIME COMPUTERS**
- **INTERVAL, COUNT DOWN AND IMPULSE TIMERS • MADE IN U.S.A.**

Featuring:

- ***FRONT PANEL MOUNT***
- ***DESK OR BENCH USE***
- ***DIGITS RESETTABLE INDIVIDUALLY***

CSA and UL approved motor & cord

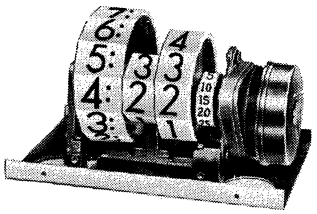


$110.00

DIGITAL CLOCK SECOND BY SECOND

Time registered on 5 polygonal drums. One Hour drum, one 10-minute drum, one minute drum, two seconds drums. 4½" h, 12" w, 3¼" d. Wt. 6 lbs. Black metal dustproof case.

#110-12H ..... 12 Hour
#110-24H ..... 24 Hour



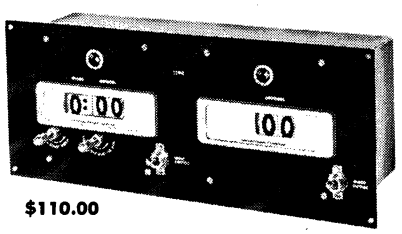
TYMETER® "Time At A Glance" 12 HOUR 24 HOUR

DIGITAL CLOCK MOVEMENT

DIGITS RESETTABLE INDIVIDUALLY

Available in 50, 60 cy., all voltages, AC. UL approved motor and cord. 3" high, 5½" wide, 3½" deep. Wt. 2 lbs. One Year Guarantee.

#130-12H — 12 Hour $16.50
#131-24H — 24 Hour $16.50



$110.00

ELAPSED TIME DIGITAL COMPUTER

6 DIGIT READ OUT

Automatically calculates and registers elapsed time in hours, 10 minutes, minutes and seconds. Second by second. 4½' h, 12" w, 3½" d. Wt. 6 lbs. Stop and Hold Control. Count down or Count up. Black metal dustproof case.

Available In:

#115 — 30 Minute, 60 Minute, 12 Hour, 24 Hour

$61.00

DIGITAL CLOCK

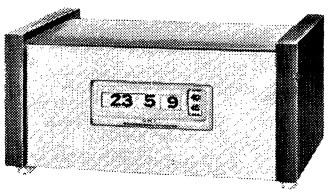
12 and 24 hour 6 digit read out . . . minutes, 10 minutes and hours. Rotating visual 1 RPM calibrated seconds drum. 4½"h, 6"w, 3¼"d. Wt. 3½ lbs. Black metal dustproof case.

#160-12H ..... 12 Hour
#161-24H ..... 24 Hour

24-HOUR DIGITAL READ OUT CLOCK

Calculates time automatically. Stainless steel case with walnut wood ends. 3⅞"h, 7¾"w, 3¾"d. Wt. 3 lbs. 110V 60 Cy. AC.

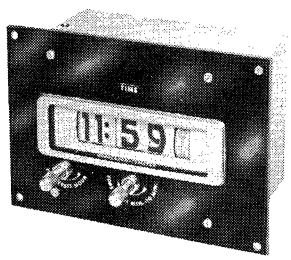
#920-24 Hour $28.50
#920-12 Hour $25.00

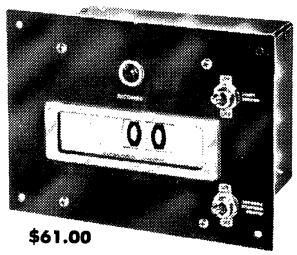


DIGITAL CLOCK

12 and 24 hour read out . . . minutes, 10 minutes and hours. Rotating 1 RPM seconds wheel in visual 5 second increments. Completely enclosed black metal dust-proof case. 3½"h, 5½"w, 3¼"d. Wt. 3½ lbs.

#140-12H — 12 Hour.... $39.50
#141-24H — 24 Hour.... $39.50



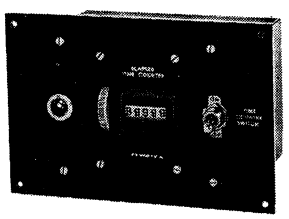


$61.00

ELAPSED TIME DIGITAL COMPUTER

Second by second 2 digit read out . . . 00-59. Automatically calculates and registers elapsed time in seconds. 4"h, 6"w, 3¼"d. Wt. 3½ lbs. Black metal dustproof case. Stop and Hold Control. Count down or count up.

#10-60S ..... 60 Seconds



ELAPSED TIME COUNTER

Digits resettable individually. Stop and Hold Control. Time Control switch. Black metal dustproof case. 3½" h, 5½" w, 3¼" d. Wt. 3½ lbs.

RANGES:

Hours ..... 99,999 hours
Hours, and tenths of hours ..... 9,999.9 hours
Minutes ..... 99,999 minutes
Minutes, and tenths of minutes ..... 9,999.9 minutes

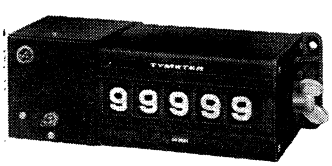
#120 ..... $41.00

#96—LARGE FIGURE COUNTER....$92.50

Digits ¾" high, 19/32" wide. Digits resettable. Stop and Hold Control. 10½" w, 3½" h, 4½" d. Wt. 5½ lbs.

RANGES:

Seconds ..... 99,999 seconds
Tenths of minutes 9,999.9 minutes
Minutes ..... 99,999 minutes
Tenths of Hours..... 9,999.9 Hours ..... 99,999 hours

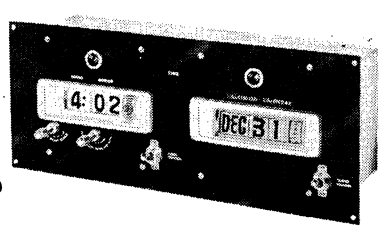


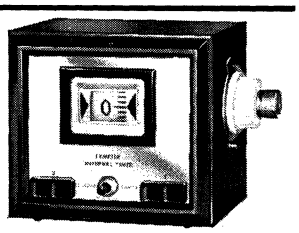
CALCHRON CALENDAR and *TYMETER DIGITAL CLOCK

Digits resettable individually. Black metal dustproof case, 4½" h, 12" w, 3½" d. Wt. 6 lbs.

* #125-12H — 12 Hour
* #125-24H — 24 Hour

#125 ..... $127.50





DIGITAL TIMER for All-Purpose Laboratory & Industrial TEST TIMING

Adjustable reset stop to enable rapid repeat timing. Closes load circuit during OR after a preset interval. Buzzer sounds at end of interval. 120V 60 cy. AC. Ranges available: 57 seconds by seconds, 57 minutes by minutes, 11.5 hours by ¼ hours, 23 hours by ½ hours, 57 hours by hours. 5"h, 5½"w, 3½"d. Wt. 3½ lbs.

#90 ..... $27.50

ALL TYMETERS AVAILABLE IN ALL VOLTAGES & CYCLES. CATALOG OF COMPLETE LINE ON REQUEST.

PENNWOOD NUMECHRON CO. - TYMETER ELECTRONICS

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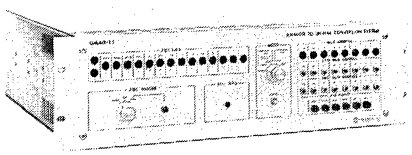
Tel. (714) 776-6400

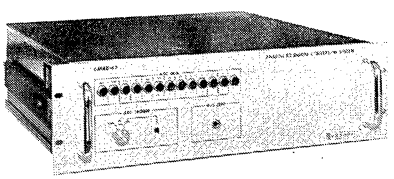
ANALOG TO DIGITAL CONVERTERS



GMAD1
A/D CONVERTER
SYSTEM

Preston Scientific's versatile GM Series analog-to-digital converters offer the "World's Fastest A/D Converter" incorporated into a flexible systems oriented concept providing these outstanding features:

- Accuracy up to 0.01% over a temperature range from 0° to +50°C
- Multiplexing (single-ended or differential) with up to 112 channels built into the same 5¼ inch chassis with A/D converter and power supply
- Digital-to-Analog Converters, 15 bit resolution, 300 kHz data rates, with optional four quadrant multiplying and 100 volt output features
- Total conversion time for sign plus 14 binary bits is less than 1.5 microseconds
- Sample-and-Hold Apertures of less than 10 nanoseconds with optional multi-channel simultaneous configurations

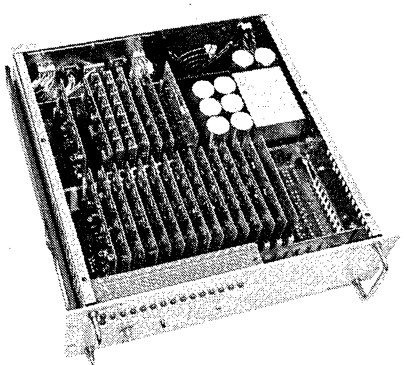


GMAD01
A/D CONVERTER

SPECIFICATIONS, ANALOG-TO-DIGITAL CONVERTER

Model	Resolution	Accuracy*	Input Z	Conversion Time	Display	Options	Size	Price**
GMAD-1	6-14 Binary Bits & Sign	±0.01% ±½ LSB	10 Megohms	1.5 μs	Neon Lamp	High Z Buffer S & H Mux	A	$7840.
GMAD-01	4-13 Binary Bits & Sign	±0.015% ±½ LSB	95 Ohms	.1 μs			A	$8555.
GMAD-2	6-14 Binary Bits & Sign	±0.01% ±½ LSB	10 Megohms	5 μs			A	$3725.
GMAD-2D	3 or 4 Digits BCD & Sign			8 μs			A	$4075.
GMAD-3	6-14 Binary BCD & Sign			18 μs			A	$2095.
GMAD-3D	3 or 4 Digits BCD & Sign			40 μs			A	$2295.

* Accuracy is specified for 14 binary bits and sign.
** Price is subject to resolution and options.
(A) 5.25H, 19.00 W, 20.00 L (including mating connectors).



GMAD1/GMDAC
A/D D/A CONVERTER
SYSTEM

SPECIFICATIONS, MULTIPLEXER

Model	Type	Switch Time	FS Input	Lin.	Cross-talk	Input Z	Drift	Temp.	Channel Selection	Size**	Price
GMM	Solid State	1 μsec	±10 Volts	0.01% FS	±0.01% FS	50 Megohms	±1 mv 0° to 50°C	0° to +50°C	Random Sequential and Manual	A	B
GMM-3		5 μsec				100 Megohms				A	B

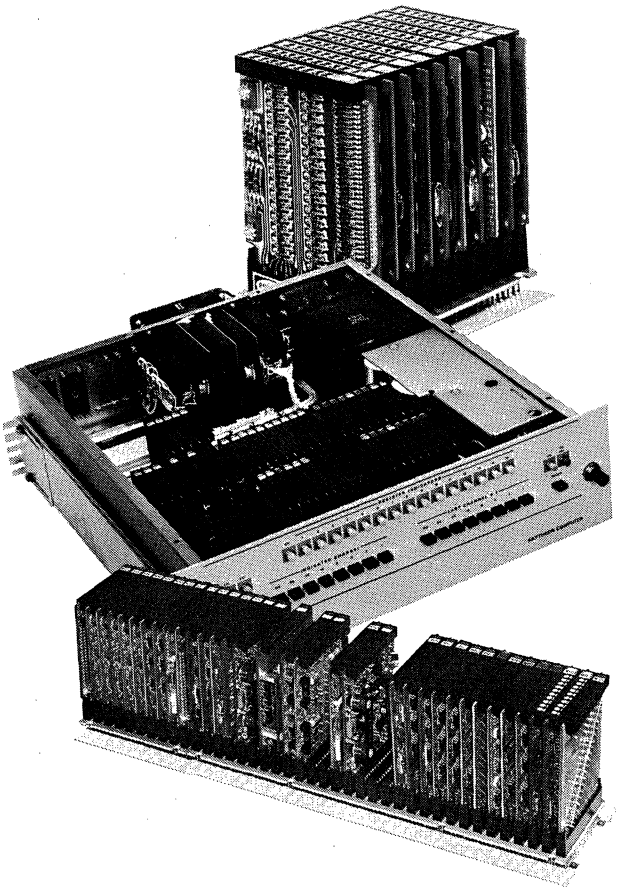
SPECIFICATIONS, SAMPLE-AND-HOLD

Model	Description	Type	Gain	Lin.	Set Time	Aperture	Noise	Droop	Temp.	Output Z	Size**	Price
GMSH-100	Sample & Hold Amplifier	Single-ended	Unity	±0.01% of full scale	4 μsec Max.	50 nsec	0.5 mv p-to-p	±1 mv/ 1 msec	0° to 50°C	Less than 1 ohm	C	$445.
GMSH-10					0.5 μsec Max.	10 nsec					C	$715.

**(A) 5.25H, 19.00W, 20.00L (B) Price subject to number of channels. (C) Mounted on standard GM circuit board.

PRESTON SCIENTIFIC also manufactures Instrumentation Amplifiers EEM Section 1100 Page 1293 and Digital Voltmeters and Digital Panel Meters EEM Section 2900 Page 549. For the location of your nearest PRESTON representative refer to the Yellow Section.

Analog-To-Digital Conversion Equipment



Raytheon Computer builds an extensive line of analog-to-digital conversion equipment, including basic ADC's, multiplexing ADC's, simultaneous sample-and-hold equipment, and multiplexing equipment. This equipment is available in single or multiple channels and in a variety of physical configurations *completely wired, tested, and documented.* Resolution is available in 10-bit, 12-bit, 14-bit, and 15-bit binary, and in 3-digit BCD.

Multiplexing ADC Raytheon Computer multiplexing ADC's (Miniverters™) feature a MOS-FET multiplexer, a sample-and-hold amplifier, and an A/D converter in a single chassis. A variety of options in packaging, speed and performance is available. The units are supplied fully wired and tested in connector block assemblies or case-mounted.

The 15-bit unit, referred to as the Multiverter III®, features 100KHz throughput and low power consumption. The high-performance ADC has an accuracy of 0.01%. It's all contained in less than 200 cubic inches. The unit is available in a connector block or case-mounted with front panel controls and indicators.

Basic ADC For convenience and versatility, Raytheon Computer offers basic A/D converters supplied fully wired and tested in connector blocks or case-mounted. The low-cost converters feature high packing density and are extremely flexible when used as building blocks in conversion systems.

Simultaneous Sample-and-Hold This equipment is available with up to 8 channels of medium or high performance sample-and-hold amplifiers in a single connector block. Standard input range is ±10 volts full scale.

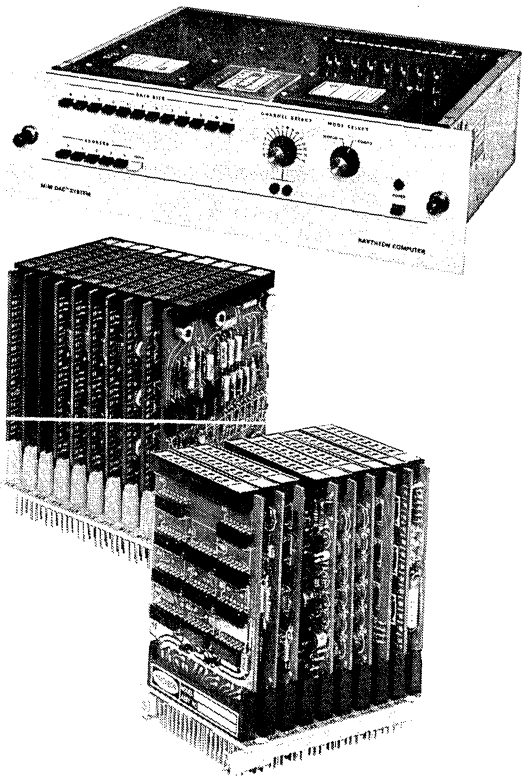
Multiplexing Up to 48 channels of multiplexing and control is available in a fully wired and tested single connector block. This unit is ideally suited for expansion of your conversion equipment.

Specifications	MADC 10 10-Bit Binary	MADC 12 12-Bit Binary	MADC 12F 12-Bit Binary	MADC 13 3-Digit BCD	MADC 14 14-Bit Binary	MADC 15 15-Bit Binary
SYSTEM PERFORMANCE						
Resolution	9 Bit + Sign	11 Bit + Sign	11 Bit + Sign	3 BCD + Sign	13 Bit + Sign	14 Bit + Sign
Max. Throughput Rate	**50 KHz**	**35 KHz (50 KHz*)**	**100 KHz**	**40 KHz**	**50 KHz**	**100 KHz**
Conversion Time	9.8 μs	18.5 μs	7.5 μs	12.5 μs	15 μs	(Consult
Min. Sample Time	10 μS	10 μs	2.5 μs	10 μs	5.0 μs	Factory)
Overall Accuracy	±0.1% ±½ LSB	±0.065% ±½ LSB	±0.05% ±½ LSB	±0.065% ±½ LSB	±0.025% ±½ LSB	±0.025% ±½ LSB
Temp. Range	0° - 50°C	0° - 50°C	0° - 70°C	0° - 50°C	0° - 70°C	15° - 50°C
Temp. Coefficient	0.8 mv/°C	0.8 mv/°C	0.4 mv/°C	0.8 mv/°C	0.1 mv/°C	0.3 mv/°C
ANALOG INPUTS						
Voltage Range	±10 vfs	±10 vfs	±10 vfs	±10 vfs	±10 vfs	±10 vfs
Max. Source Impedance	1 Kohm	1 Kohm	1 Kohm	1 Kohm	1 Kohm	1 Kohm
Input Impedance	25 Mohm	25 Mohm	100 Mohm	25 Mohm	100 Mohm	100 Mohm
Aperture Time	100 ns	100 ns	50 ns	100 ns	25 ns	50 ns
LOGIC LEVELS						
Logical "1"	+2.5 to +5.0v	+2.5 to +5.0v	+2.5 to +5.0v	+2.5 to +5.0v	+2.5 to +5.0v	+2.5 to +5.0v
Logical "0"	0 to 0.5v	0 to 0.5v	0 to 0.5v	0 to 0.5v	0 to 0.5v	0 to 0.5v

*MADC 12A

RAYTHEON

Digital-To-Analog Conversion Equipment



Digital-to-Analog Converters. Digital-to-analog conversion equipment is available from Raytheon Computer in a wide range of configurations and types. Resolution of 10 and 12-bits binary is provided. (Consult the factory for availability of 14 and 15-bit resolution.) Capacities range from single channel DAC's contained on 2 printed circuit cards to up to 48 channels rack mounted with front panel controls and indicators. The units are all high speed, low cost DAC's with high packing density.

The rack mounted configurations (standard 19-inch Retma) are fully assembled, *wired and tested,* and contain the necessary drive and storage electronics. They also offer several options such as front panel controls, computer interface and power supplies. Up to four channels of D/A conversion can be provided fully wired and tested in a connector block assembly. These units include input storage register, output operational amplifiers, reference supplies and data and address drivers.

Analog Data Distributor. Raytheon Computer offers a low-cost Analog Data Distributor consisting of a 12-bit DAC, a high current driving amplifier, up to 64 analog output sample-and-hold amplifiers and all the necessary power supplies and controls. The system accepts digital information from a computer, along with address information, converts the data into equivalent analog form and distributes it to the selected output holding amplifier. The overall system is comprised of an analog data distributor master drawer and additional distributor slave drawers.

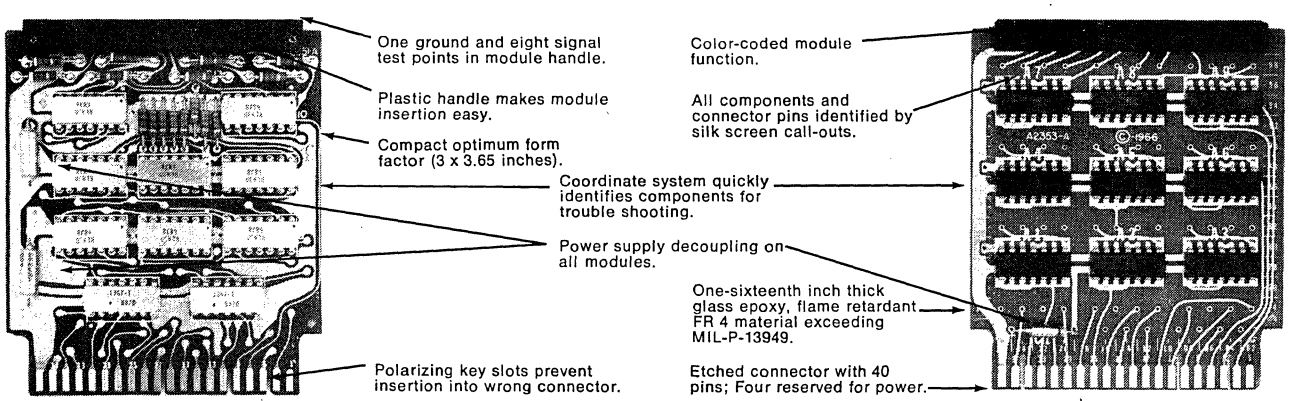
M-SERIES IC DIGITAL AND ANALOG MODULES

With Raytheon Computer's new M-Series Integrated Circuit Digital Modules, the digital designer has for the first time a true module system, not just a line of circuits. The modules themselves, the connectors, cases, power supplies, and power distribution scheme have been so thoroughly engineered that the designer can concentrate on his digital data problem, not the mechanical details of putting it together and making it work.

The M-Series logic system offers the user these specific advantages:

1. Complete complement of digital and analog modules, cases, power supplies and accessories. Digital modules available with DTL or TTL Integrated Circuits.
2. Module connectors unitized in groups of 10, 30 or 40 on aluminum plates; eliminates handling and mounting of separate connectors. Mounting plate is used as system ground plane to minimize noise.
3. Power and ground distribution in module cases simplified by use of laminated bus bars. Power wiring errors eliminated and assembly time reduced.
4. Point-to-point wiring minimizes capacitance.
5. Connector and hardware configurations designed for automatic wire wrapping — provide fast system delivery, high reliability, low cost and wiring consistency.
6. MINIVERTER and other analog instruments.

GENERAL SPECIFICATIONS *See catalog SP-230 for complete specifications.*



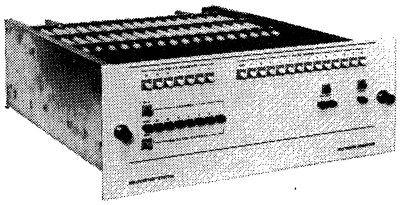
M-SERIES TTL MODULE **M-SERIES DTL MODULE**

RAYTHEON COMPUTER • 2700 SO. FAIRVIEW ST., SANTA ANA, CALIFORNIA, 92704, (714) 546-7160 TWX 910-595-1570 RAYTHEON

RAYTHEON

Low Level/High Level Data Acquisition System

GENERAL DESCRIPTION OF THE MILLIVERTER™



The Raytheon Computer Milliverter represents the latest advancements in the field of data acquisition. This instrument converts analog signals in the range of 5 millivolts to 10 volts to a digital representation. This conversion process is accomplished at a 40 kilohertz throughput rate while maintaining excellent high frequency noise rejection. These characteristics make theMilliverter an ideal instrument for systems where analog information is to be processed by a digital computer.

In most low level data acquisition systems, noise limits the overall system accuracy. Each low level signal to the Milliverter is conditioned by an instrumentation type amplifier that offers high gain and a 3 pole Butterworth filter. The 3 db frequency of the low pass filter is set at 6 Hz which yields 60 db noise rejection at 60 Hz. Available gains of the amplifiers are 2000, 200 or 20 which allows processing of signals with 5, 50 or 500 millivolts full scale input.

The Milliverter is also designed to convert differential high level analog signals in the ranges of 1, 5 or 10 volts full scale. These high level analog signals are first multiplexed and then conditioned with a high performance differential amplifier.

The amplified low level signals and the high level signals are then multiplexed using FET switches featuring low ON resistance. A high performance sample and hold amplifier then holds the multiplexed analog signal for conversion.

Two analog-to-digital converters are offered with the Milliverter — 12 bit resolution or 14 bit resolution. These converters use the successive approximation method of converting the analog signal to a digital representation.

The entire assembly is mounted in a 19 inch RETMA rack mounting chassis with a 7 inch front panel. The chassis depth is approximately 20 inches and is equipped with quick disconnect slides.

SPECIFICATIONS

ANALOG INPUTS	Low Level	High Level
Channel Capacity	64	96*
Differential Voltage Range	±5 mV ±50 mV ±500 mV	±1 V ±5 V ±10 V
Maximum Differential Voltage (Without damage)	±7.0 V	±20 V
Common Mode Voltage	7.5 V	10.5 V @ 1 VFS 8.5 V @ 5 VFS 6.0 V @ 10 VFS
Maximum Common Mode Voltage (Without damage)	20 V	20 V
Common Mode Rejection (With 1 KΩ source unbalance)		
at DC	100 db	80 db
at 60 Hz	100 db	60 db
Normal Mode Rejection	60 db @ 60 Hz	N/A
Input Impedance	100 MΩ	100 MΩ
Maximum Source Impedance	10 KΩ	2 KΩ
Input Offset Current	20 nA	500 NA
Aperture Uncertainty	25 ns	25 ns
Crosstalk at 400 Hz (1 KΩ source)	80 db	80 db

* Maximum capacity is 64 low level channels and 32 high level channels. 16 channels of low level can be replaced with 16 channels of high level. A Milliverter with all high level signals can accommodate 96 channels.

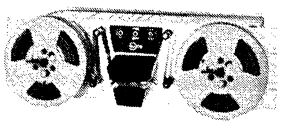
PERFORMANCE	MADS 12	MADS 14
Resolution	11 bits + sign	13 bits + sign
Max. throughput rate	40 kHz	40 kHz
Overall Accuracy, ±½ LSB (With 50 Ω source unbalance)		
5 mV Full Scale	0.08%	0.06%
50 mV Full Scale	0.07%	0.05%
500 mV Full Scale	0.06%	0.04%
1, 5, or 10 VFS	0.07%	0.05%
Temperature Coefficient		
Low Level Channels	0.5 μV/°C RTI	
High Level Channels	25 μV/°C RTI	
Temperature Range	0°C to 50°C	
Output Code	Binary 2's Complement	
DIGITAL INPUT		
Voltage Levels		
Logical 1	+2.0 to +5.5 V	
Logical 0	0 to +0.95 V	
DIGITAL OUTPUT		
Voltage Levels		
Logical 1	+2.5 to +5.0 V	
Logical 0	0 to +0.5 V	
POWER REQUIREMENT		
Voltage	115 V ±10%	
(Optional)	220 V ±10%	
Frequency	50 to 400 Hz	

REMEX

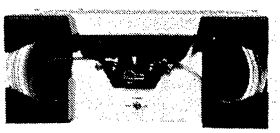
A UNIT OF EX-CELL-O CORPORATION

FOR PERIPHERALS

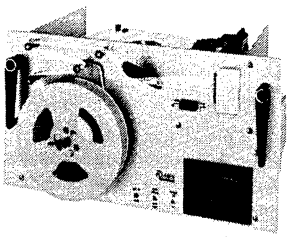
REMEX offers a complete range of peripheral products as follows: Photoelectric Punched Tape Readers, Punched Tape Spoolers, Punched Tape Perforators, Digital Magnetic Tape Cassette Systems, Combinations of the above and is a specialist in the manufacture of input/output equipments for all types of usages.



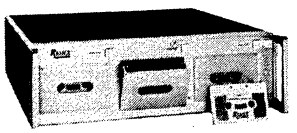
PUNCHED TAPE READER/SPOOLER



PUNCHED TAPE READER



PUNCHED TAPE PERFORATOR/SPOOLER



DIGITAL MAGNETIC TAPE CASSETTE

PHOTOELECTRIC PUNCHED TAPE READERS

REMEX Punched Tape Readers, Spoolers and Reader/Spoolers are available in four standard versions to satisfy any typical application and in many special configurations for customized requirements as follows:

Function	Series RR/RRS 1150	Series RR/RRS 0305	Series RR/RRS 3000	Series RR/RRS 4001
Speed (C.P.S.)	150	100 - 300	100 - 400	300 - 1000
Tape Motion	Bi-Directional	Right	Left, Right and Bi-Directional	Left, Right and Bi-Directional
Tape Stopping	On Character	On Character	On Character	On Character (500)
Inputs/Outputs	DTL/TTL Compatible	DTL/TTL Compatible	DTL/TTL and High Level Compatible	DTL/TTL and High Level Compatible
Transparency (%)	57	40	70	70
Reel Size	4⅝" - 8½"	4⅝" - 5¼"	7½" - 8"	7½" - 10½"
Hub Type	½" or N.A.B.	REMEX	½" or N.A.B.	½" or N.A.B.
Rewind Speed (C.P.S.)	250	350	2000	2500
Other Options	Yes	Yes	Yes	Yes

PUNCHED TAPE PERFORATORS

REMEX Punched Tape Perforators and Perforated Spoolers are available in four standard versions as follows:

Function	Series RPM 0030	Series RPR/RPS 0030	Series RPM 1075	Series RPR/RPS 1075
Form	Mechanism	System	Mechanism	System
Tape Motion	Bi-Directional	Bi-Directional	Bi-Directional	Bi-Directional
Speed (C.P.S.)	30	30	75	75
Input/Output	To Solenoids	DTL/TTL Compatible	To Solenoids	DTL/TTL Compatible
Reel Size	D.N.A.	4⅝" - 8½"	D.N.A.	4⅝" - 8½"
Hub Type	D.N.A.	½" or N.A.B.	D.N.A.	½" or N.A.B.

DIGITAL MAGNETIC TAPE CASSETTE SYSTEMS

REMEX Magnetic Tape Cassette Systems are available in several versions as follows:

Function	Series RCM 0500	Series RCS 0500
Form	Mechanism	System
Cartridge	Philips	Philips

REMEX®

A UNIT OF EX-CELL-O CORPORATION

1733 ALTON STREET, SANTA ANA, CALIFORNIA 92705
TELEPHONE (714) 557-6860 TWX (910) 595-1715

XLO

RENCO OPTICAL ENCODERS

INCREMENTAL | ROTARY | LOW INERTIA
ABSOLUTE | LINEAR | HEAVY DUTY

Renco encoders are the result of many years of experience in producing optical shaft angle encoders for industrial, military and aerospace programs. Renco encoders are produced in a wide variety of sizes and configurations in both absolute and incremental models.

Employing optical techniques to convert shaft angle into a digital format, Renco encoders combine versatility and low cost, without sacrificing quality, performance or reliability.

Renco absolute whole word encoder outputs are furnished in parallel form in cyclic gray code, binary coded decimal or natural binary.

Renco incremental encoders are offered in many combinations of outputs: sine wave, square wave, single track, dual track in phase quadrature for bi-directional counting. Zero reference pulse optional.

Also available are multiplication circuits of 1X, 2X and 4X, all fabricated from solid state electronics and housed within the encoder package.

Renco linear encoders are available in the same combinations of outputs and multiplication circuits featuring high resolution capability.

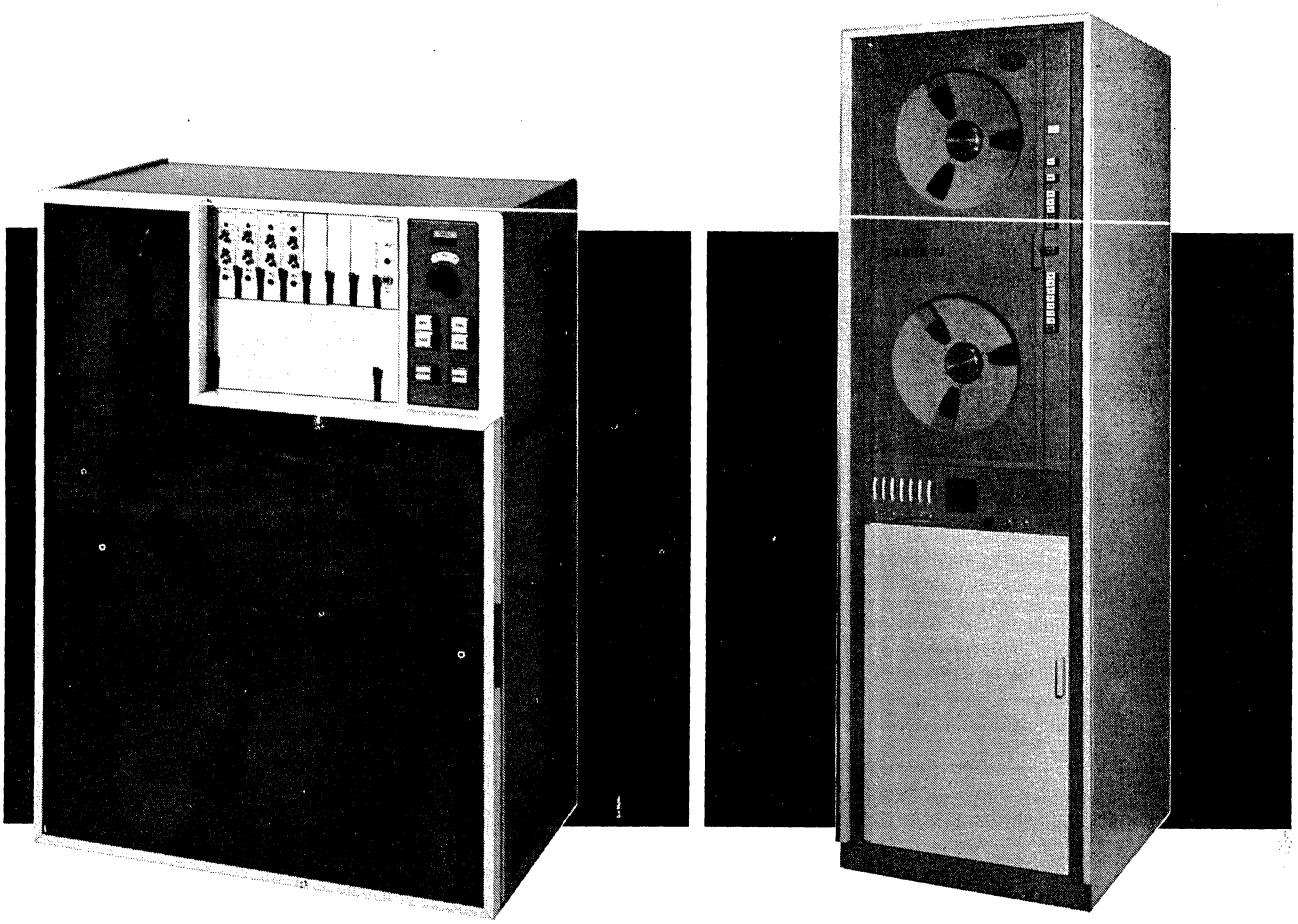
Renco encoders exhibit high reliability. All are metal in construction, light weight, and are completely field serviceable, with replacement lamps and circuit modules.

RENCO CORPORATION

150 AERO CAMINO, GOLETA, CALIFORNIA 93017 • (805) 968-1525

Instrumentation

Magnetic tape recording systems



PORTABLE SYSTEMS

Featuring:

IRIG Compatibility
All-band Capability
- Direct bandwidths to 2.0 MHz
- FM bandwidths to 500 KHz

Analog and/or Digital High Density PCM
Eight speed transports (1⅞ ips - 120 ips)
7, 14, 28 and 32 track capacity
AC or DC operation
Airborne, shipboard, mobile environments

LABORATORY SYSTEMS

Featuring:

IRIG Compatibility
All-band Capability
- Direct bandwidths to 2.0 MHz
- FM bandwidths to 500 KHz

Analog and/or Digital High Density PCM
Eight speed transports (1⅞ ips - 120 ips)
7, 14, 28, 32 and 42 track capacity

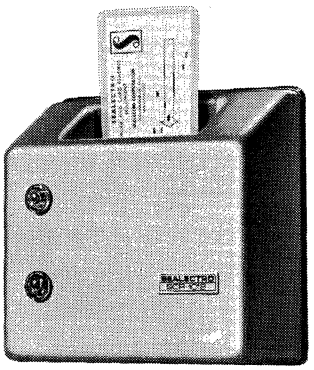
Sangamo's SABRE Series of Instrumentation Magnetic Tape Systems offers a family of recorder/reproducers with unequalled performance characteristics while providing unparalleled versatility. The SABRE Series allows complete interchangeability of record and reproduce electronics between portable and laboratory systems to reduce training and spares problems. Unique packaging provides maximum rack space utilization while providing the longest recording times available. Tape usage, handling and storage problems are reduced by providing the highest tape utilization factor in the industry.

For more information call or write

SANGAMO
ELECTRIC COMPANY
Data Systems, P.O. Box 3347
Springfield, Illinois 62708
(217) 544-6411

SEALECTRO

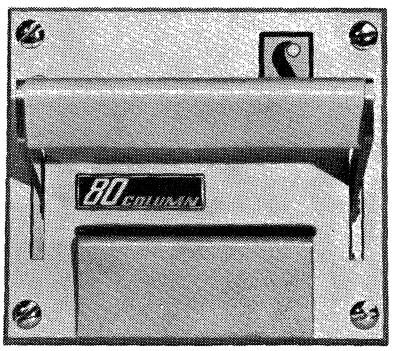
SEALECTROCARD™ CARD, BADGE AND TAB READERS



10 x 10-10 x 12 BADGE READERS

Completely automatic Badge Readers that accept standard IBM and Friden Type Badge cards in 10x10 or 10x12 formats. Ideal for personnel identification, production control and process control operations.

Go/no-go lights immediately indicate if the card is inserted correctly. No contacts actuate until the card is properly inserted. Remote solenoid-operated contacts sense hole patterns and read. Read function is automatically held until feedback from system releases contacts and card is automatically ejected. Flexible output wiring allows bussed or discrete contact interface connections.



12 x 80 CARD READER

The Sealectrocard card reader is designed to be completely compatible with all standard 12 x 80 TAB type punched-cards. This unit combines features which provide maximum reliability, convenience and economy in programming. The 12 x 80 Sealectrocard is ideally suited as peripheral equipment for a wide range of computers or as a programming device. Programs consisting of up to 960 bits of information can be read instantly from conventional punched-card formats. Features include:

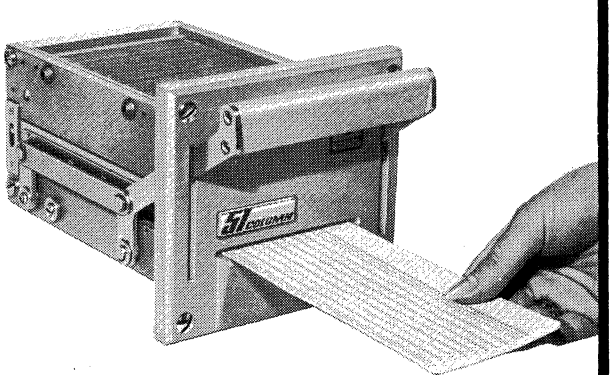
- Remote contacts with double contact wiping surfaces.
- Positive mechanical lockout if a card is mis-orientated.
- Wide choice of terminations.
- Simple, fast operation even by unskilled personnel.

12 x 51 TAB READER

Accepts and reads standard 80 column TAB card, but limits read area to 51 columns, providing 612 bits of information. Ideal for data acquisition in production control and other terminal operations of data processing systems not requiring full 960 point readout.

Completely foolproof. Correct orientation and positioning of card electrically interlocks operating handle eliminating faulty readouts. Card is inserted in insertion slot, handle pulled down to read position, and unit is in operation.

Utilizes same electrical contact assembly as 12 x 80 Reader. Can be bussed vertically or horizontally. It may be used with completely discrete circuitry for each of the 612 points.



PROGRAMMING DEVICES DIVISION
SEALECTRO CORPORATION
MAMARONECK, N. Y. 10543
PHONE: 914 698-5600 TWX: 710-566-1110
Sealectro Ltd. Portsmouth, Hants, England
Sealectro S.A. Villiers-le-Bel, Paris, France

TAURUS

World Leaders in Card Readers

FEATURING HIGH RELIABILITY

A Complete Line of Punched Card Readers for Static and Serial Programming

APPLICATIONS

COMMERCIAL USES: Automatic test equipment, batching, automated warehousing, data processing, process control, flight simulators etc.

MILITARY USES: Ground checkout equipment, programming, testing, component testing, simulators, etc.

STANDARD SPECIFICATIONS

Cards—IBM, Rem. Rand or others.

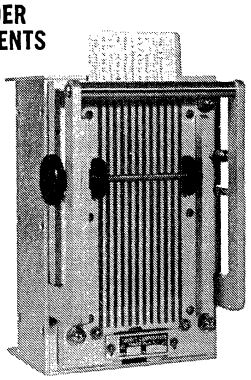
No. of Switches—10 to 960—(Form A, B or C).

Electrical—Dry Circuit to 3 AMPS.

MODEL M-4 *NEW!*

FULL IBM CARD STATIC READER
SMALLER — MANY IMPROVEMENTS

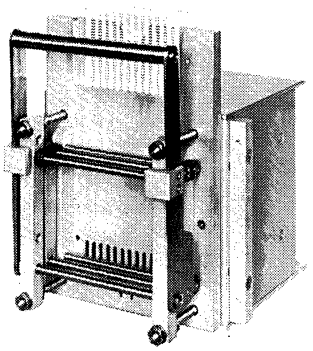
Reads up to 80 columns, or 960 switches, (complete IBM card). Most compact switching array available. Reads indirectly for maximum reliability. After insertion, punched hole has a closed switch, no hole an open switch. Switch reliability 100,000 cycles. Mechanical reliability 500,000 cycles.



MODEL JM-4 *NEW!*

SMALLER — MANY IMPROVEMENTS
STATIC READER FOR ONE HALF OF AN IBM CARD

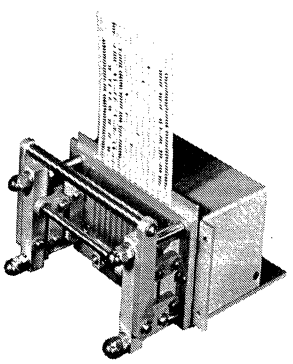
Reads up to 40 columns, or 480 switches, of an IBM card. After insertion, punched hole has a closed switch, no hole an open switch. Switch reliability 100,000 cycles. Mechanical reliability 500,000 cycles.



NEW!

MODEL CM-20

Reads up to 20 cards or 240 switches. Specifically designed for stacker cranes. Same switches as in M-4 and JM-4.

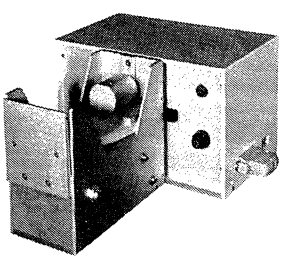


NEW!

MODEL 610-P

SERIAL READER
PHOTO-ELECTRIC

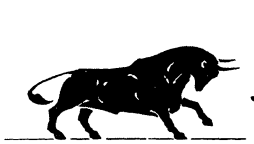
Feed and Read . . .
Less than $1,000.



Reads standard 80-column, 12-row cards, serially, column by column, 40 columns per second or less. For on line computer, remote transmission, interfaced with other machines, numerical control, card duplication or correction. Sizes 6¼″ High x 9¾″ Wide x 6½″ Deep. Automatic card feed available for sequential feeding of up to 200 cards.

Also Teflon Terminals and Printed Circuit Board Guides

CUSTOM BUILT UNITS ARE OUR SPECIALTY. We will fill your requirements in spacing, switch action, number of switches and any other special needs, and will determine the most economical size and type for your operations. **Send for 1971 Catalog.**



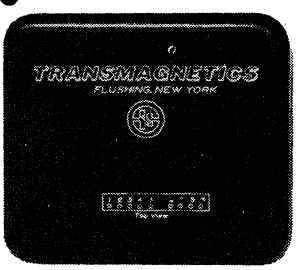
TAURUS CORPORATION
LAMBERTVILLE, NEW JERSEY 08530
AREA CODE (609) 397-2390

Solid State Synchro/Resolver Converters

Transmagnetics' unique compact solid state series converts all standard synchro or resolver formats to sine-cosine DC, linear DC with angle or digital angle outputs, replacing cumbersome mechanical servos and interfacing with digital computers and data processors.

SYNCHRO/RESOLVER TO SINE-COSINE DC

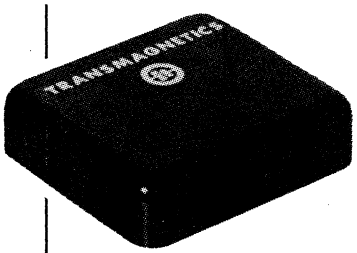
SERIES 655
are miniature modules which generate sine and cosine DC outputs proportional to the synchro or resolver input angle



SYNCHRO OR RESOLVER INPUT: 60 or 400 Hz, 90V or 11.8 VRMS line to line, 26 or 115 VRMS line
OUTPUTS: 10 sine and 10 cosine θ nominal. Outputs vary proportional to line. Also see 655-NVR series below.
ACCURACY: ± 5 minutes of arc.
DC POWER: Required for A655 models (buffered output) only, ± 15 VDC ± 3% at 20 MA
OPERATING TEMPERATURE: 0 to 70°C or −55 to +85°C
PACKAGES: for 400 Hz 11.8V L.L. — 0.58″H x 2.03 x 2.28
for 400 Hz 90V L.L. — 0.78″H x 2.53 x 3.22
for 60 Hz 90V L.L. — 1.28″H x 2.53 x 3.22

NON-VARIANT SYNCHRO TO SINE-COSINE DC

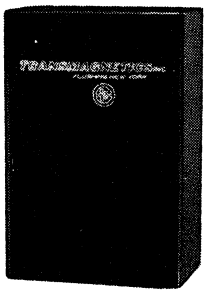
SERIES 655-NVR
modules maintain the sine-cosine outputs constant when the line and frequency vary and are independent of synchro non-linear characteristics. Synchro transformation ratios vary with line amplitude and frequency. In the 655 NVR series, these variations are computed and corrected for.



SYNCHRO OR RESOLVER INPUT: 60 or 400 Hz, 90V or 11.8V L.L. 26V or 115V RMS line
OUTPUTS: 10 sine and 10 cosine
CONFORMITY: Each output within ± ½% FS includes ± 10% line and ± 5% frequency variation, measured with actual synchro input.
ANGULAR ACCURACY: ± 15 minutes of arc.
DC POWER: ± 15V ± 1% at 50 MA
OPERATING TEMPERATURE: 0 to 70°C or −55 to +85°C
PACKAGE: 1.78″H. x 3.19 x 3.44

SYNCHRO TO LINEAR DC

SERIES 678
convert synchro or resolver inputs to a linear DC output proportional to the angle. The output rejects changes in line amplitude and frequency.



SYNCHRO OR RESOLVER INPUT: 60 or 400 Hz, 90 or 11.8V L.L. 26 or 115 VRMS line.
OUTPUT: −10 to +10V DC linear with angles from −180 to +180°.
ACCURACY: 6 or 15 minutes of arc. Effect of ± 10% amplitude and ± 5% frequency less than 3 minutes of arc.
DC POWER: +15V ± 3% at 125 MA max, −15V ± 3% at 60 MA max
OPERATING TEMPERATURE: 0 to 70°C or −55 to +85°C
PACKAGE: 1.80″H x 3.06 x 4.56

SYNCHRO/RESOLVER TO DIGITAL

SERIES 1623

See Transmagnetics page on D/A and A/D converters for characteristics of Series 1623 converters.

TRANSMAGNETICS INC.

210 Adams Boulevard, Farmingdale, New York 11735 • Phone: 516-293-3100

Solid State Computing Resolvers

Coordinate rotation, polar to rectangular or rectangular to polar conversion, sine-cosine generation and similar trigonometric computing functions which in the past have been implemented with mechanical resolver servo-systems, are now performed with Transmagnetics compact modules.

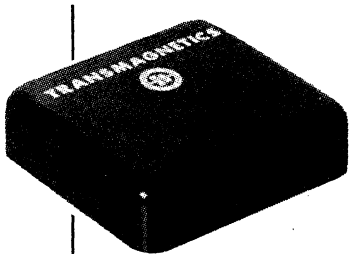
LINEAR DC TO SINE-COSINE OUT

C670 SERIES
accepts a DC input proportional to angle and provides two DC outputs proportional to sine and cosine of the angle.

INPUT: —10 to +10VDC representing angles from +180 to —180° into 75K ohms min input impedance.
OUTPUTS: K sine A and K cosine A where K = 10 ± 1%, outputs impedance less than 1 ohm, short circuit protected, 2000 ohms min. res. load.
ACCURACY: ± 15 minutes of arc as defined by ratio of outputs.
DYNAMIC RESPONSE: For a — 90 to + 90° step input, 25 milliseconds to reach rated accuracy.
DC POWER: + 15V ± 3% at 50 MA
— 15V ± 3% at 50 MA
+ 5V ± 5% at 200 MA
OPERATING TEMPERATURE:
0 to 70°C or — 55 to + 85°C
PACKAGE: 1.78"H X 3.19 X 3.44

COORDINATE ROTATOR

689 SERIES
accepts rectangular input (X and Y) and rotates the input through an angle proportional to a linear DC input



INPUT A: X = R cos A and Y = R sin A, each — 10 to + 10 VDC where R may vary from 20 mv to 10V, into 100K ohms nom.
INPUT B: — 10 to + 10VDC linear with angles from 0 to 360° into 100K ohms nominal.
OUTPUTS: R sin (A + B) and R cos (A + B)
ACCURACY: Angle ± 15 minutes at R = 10.
R: ± 0.15% FS
DYNAMIC RESPONSE: 450 conversions per second min.
DC POWER: + 15V ± 1% at 60 MA max
— 15V ± 1% at 60 MA max
5V ± 10% at 85 MA max
OPERATING TEMPERATURE:
0 to 70°C or — 55 to + 85°C
PACKAGE: 1.78"H X 3.19 X 3.44

POLAR TO RECTANGULAR CONVERTER

1618 SERIES
converts input in polar form R, A to rectangular R Sin A and R Cos A

INPUTS: R: 20 MV to 10V into 100K ohms nom.
A: — 10 to + 10V into 100K ohms nom., linear with angles from 0 to 360°.
OUTPUTS: R Sin A and R Cos A into 2K ohms min. res. load
ACCURACY: Angle: ± 15 minutes at R = 10
R: ± 0.15% FS
DYNAMIC RESPONSE: 450 conversions per second min.
DC POWER: + 15V ± 1% at 60 MA max
— 15V ± 1% at 60 MA max
5V ± 10% at 85 MA max
OPERATING TEMPERATURE:
0 to 70°C or — 55 to 85°C
PACKAGE: 1.78"H X 3.19 X 3.44

RECTANGULAR TO POLAR CONVERTER

695 SERIES
converts input in rectangular form X, Y to polar R, A

INPUTS: R Cos A and R Sin A into 100K ohms min. impedance. R may vary from 50MV to 10V.
OUTPUTS: R and A from less than 10 ohms to 2K ohms min. load.
ACCURACY: Angle: ± 15 minutes at R = 10
R: ± 0.1% FS
DYNAMIC RESPONSE: 450 conversions per second min.
DC POWER: + 15V ± 1% at 75MA max.
— 15V ± 1% at 75MA max.
+ 5V ± 5% at 50MA max.
OPERATING TEMPERATURE:
0 to 70°C or — 55 to + 85°C
PACKAGE: 1.78"H X 3.19 X 3.44

TRANSMAGNETICS INC.

210 Adams Boulevard, Farmingdale, New York 11735 • Phone: 516-293-3100

TEMPO

logic cards
high density packaging

DTL, TTL, & INTERFACE LOGIC CARDS

DTL

FLIP FLOPS (universal, register, counter, R-S, storage).

NAND GATES (inverters, 2, 3, 4 & 8 input).

DRIVER GATES (2 & 4 input buffers, 4 input power gate).

ONE SHOTS (fixed, adjustable, retriggerable).

MIXED LOGIC (NAND gates and inverters, AND gates, OR gates, transfer gates, NAND gates-inverters-flip flops, adders with clocked storage, and matrix select gate).

COUNTERS/DECODERS (universal, binary, BCD, synchronous, decoder).

SHIFT REGISTERS (2, 4, 8, 16 bit).

TTL

FLIP FLOPS (universal, register, counter).

NAND GATES (inverter gates, 2, 3, & 4 input NAND gates).

DRIVER GATES (2 & 4 input NAND Buffer).

ONE SHOTS (fixed, adjustable, retriggerable).

COUNTERS (binary & BCD synchronous, forward/reverse synchronous).

CLOCK SOURCE (crystal oscillator with frequency division).

DIGITAL COMPARATORS (4, 8, 12, 16 bit).

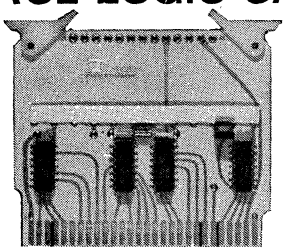
SHIFT REGISTERS (8, 16 bit).

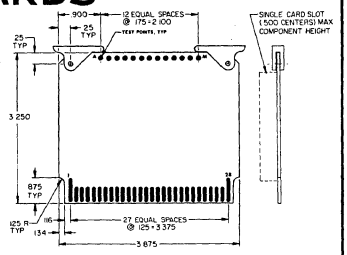
MULTIPLEXERS (8, 16 bit).

DECODERS (BCD to decimal; lamp driver, 7 segment, Nixie).

INTERFACE CARDS

Lamp drivers, relay drivers (form A and C) converters, static shift registers, memory with inverter drivers.





ELECTRICAL

LOADING:
Input: Flip-Flops. a) Clocks — 2 load units. b) Gates — 2/3 load units. c) Reset — 2 load units. Gates — 1 load unit. **Output:** Flip-Flops — 11 load units. NAND Buffer Gates — 25 load units. NAND Power Gates — 27 load units. NAND Gates — 8 load units.

Note: Load unit is equivalent to 3.75 K ohms to +5.00 V (one DTL/TTL input gate).

POWER SUPPLY REQUIREMENTS (Typical):
Series 20,000: +5.00 V ±10% • Series 21,000: +5.00 V ±5%

MECHANICAL

TEMPERATURE:

Operating	0°C to 75°C
	−55°C to 125°C optional
Storage	−65°C to 125°C

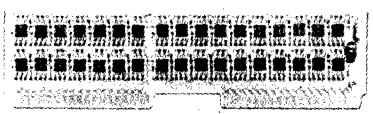
TEST POINTS: Up to 12 test points plus ground are provided at the top of the card. Test points are eyeleted to minimize wear and provide a mechanically strong point for probe connections.

BOARD MATERIAL: Thickness: .062 inch. **Type:** Glass epoxy per MIL-P-13949, Type GF. **Color:** White.

CONNECTOR: Type: Card Edge, 56 positions. **Material:** Gold plated per MIL-G-45204 over 1 oz. copper. **Width:** .062 inch. **Center to Center Spacing:** .125 inch. **Conductor Clearance:** .062 inch. **Insertion:** Over 500 insertion and withdrawal cycles. **Keying:** Consult applicable data sheet.

SPECIALIZED HIGH DENSITY PACKAGING

Tempo has developed HI-D® — a highly reliable economical and easily maintainable method of packaging electronic circuits.

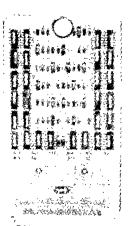


TYPICAL COMPONENT DENSITY

HI-D® is a stitch-wire welding process which consists of cold-flow welding insulated nickel wire to gold-plated stainless steel pins. Components are welded or soldered on the opposite side of the wired board. All connections are insulated and conformally coated for ruggedized use.

Major advantages of using this technique are:

- Only one basic board is used from which a multitude of logic configurations can be wired.
- Design modifications can be made with relative ease — a feature not available using other interconnection techniques.
- HI-D® permits full use of LSI and MSI circuits allowing installation of multiple packages on a single board, with a resultant decrease in back plane wiring.



INTERMIXING OF COMPONENTS

STITCH-WIRED INTERCONNECTIONS

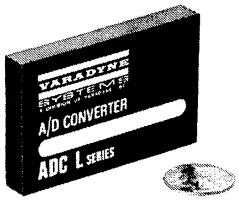
TEMPO INSTRUMENT DIVISION
Allen Electric and Equipment Company

9135 Independence Avenue
Chatsworth, Calif. 91311 Tel. 213-882-7722

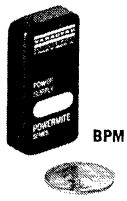
VARADYNE SYSTEMS
A DIVISION OF VARADYNE, INC.

DATA CONVERSION MODULES
D. C. POWER SUPPLIES

ADC-L SERIES



DAC-HB SERIES



BPM 15/50

ULTRAMINIATURE D.C. POWER SUPPLIES

A/D CONVERTER MODULES

Model	Output Resolution (DTL/TTL Compatible)	Available Input Voltage Ranges	Total Conversion Time	Maximum Sample Rate	Accuracy (Incl. Quantizing Error)	Linearity	Temperature Coefficient	Case Size (Inches)
ADC—898B	8 Binary Bits	0 V to +10 V	200 μsec	5,000/SEC	±0.2% of FS ±½ LSB	±½ LSB	±50 ppm/°C	3L x 2W x 0.4H
ADC—898D	2 Digit BCD	or ±5 V	100 μsec	10,000/SEC	±0.2% of FS ±½ LSB	±½ LSB	±50 ppm/°C	3L x 2W x 0.4H
ADC—E Series								
ADC—E 8B	8 Binary Bits		312 μsec	2000/SEC	±0.05% of FS ±½ LSB	±½ LSB	±50 ppm/°C	4L x 2W x 0.4H
ADC—E 10B	10 Binary Bits	±1 V	1.25 msec	800/SEC	±0.05% of FS ±½ LSB	±½ LSB	±50 ppm/°C	4L x 2W x 0.4H
ADC—E 12B	12 Binary Bits	±5 V	5.00 msec	200/SEC	±0.05% of FS ±½ LSB	±½ LSB	±50 ppm/°C	4L x 2W x 0.4H
ADC—E 8D	2 Digit BCD	±10 V	312 μsec	2000/SEC	±0.05% of FS ±½ LSB	±½ LSB	±50 ppm/°C	4L x 2W x 0.4H
ADC—E 12D	3 Digit BCD		5.00 msec	200/SEC	±0.05% of FS ±½ LSB	±½ LSB	±50 ppm/°C	4L x 2W x 0.4H
ADC—L Series								
ADC—L 8B2	8 Binary Bits		12 μsec	83,000/SEC	±0.02% of FS ±½ LSB	±½ LSB	±10 ppm/°C	3L x 2W x 0.4H
ADC—L 10B2	10 Binary Bits	0 V to +5 V	16 μsec	62,000/SEC	±0.02% of FS ±½ LSB	±½ LSB	±10 ppm/°C	4L x 2W x 0.4H
ADC—L 12B2	12 Binary Bits	0 V to +10 V	20 μsec	50,000/SEC	±0.02% of FS ±½ LSB	±½ LSB	±10 ppm/°C	4L x 2W x 0.4H
ADC—L 8D2	2 Digit BCD	±5 V	12 μsec	83,000/SEC	±0.02% of FS ±½ LSB	±½ LSB	±10 ppm/°C	4L x 2W x 0.4H
ADC—L 12D2	3 Digit BCD	±10 V	16 μsec	62,000/SEC	±0.02% of FS ±½ LSB	±½ LSB	±10 ppm/°C	4L x 2W x 0.4H
ADC—M Series								
ADC—M 8B2	8 Binary Bits		4.0 μsec	250,000/SEC	±0.01% of FS ±½ LSB	±½ LSB	±10 ppm/°C	3L x 2W x 0.4H
ADC—M 10B2	10 Binary Bits	0 V to +5 V	11.5 μsec*	87,000/SEC*	±0.01% of FS ±½ LSB	±½ LSB	±10 ppm/°C	4L x 2W x 0.4H
ADC—M 12B2	12 Binary Bits	0 V to +10 V	13.0 μsec**	77,000/SEC**	±0.01% of FS ±½ LSB	±½ LSB	±10 ppm/°C	4L x 2W x 0.4H
ADC—M 8D2	2 Digit BCD	±5 V	4.0 μsec	250,000/SEC	±0.01% of FS ±½ LSB	±½ LSB	±10 ppm/°C	4L x 2W x 0.4H
ADC—M 12D2	3 Digit BCD	±10 V	11.5 μsec*	77,000/SEC*	±0.01% of FS ±½ LSB	±½ LSB	±10 ppm/°C	4L x 2W x 0.4H
ADC—H Series								
ADC—H 4B	4 Binary Bits	0 V to −5 V	250 nsec	4 Million/SEC	±0.1% of FS ±½ LSB	±½ LSB	±15 ppm/°C	4L x 2W x 0.4H
ADC—H 6B	6 Binary Bits	0 V to −10 V	400 nsec	2.5 Million/SEC	±0.1% of FS ±½ LSB	±½ LSB	±15 ppm/°C	4L x 2W x 0.4H
ADC—H 8B	8 Binary Bits	±5 V	800 nsec	1.2 Million/SEC	±0.1% of FS ±½ LSB	±½ LSB	±15 ppm/°C	4L x 2W x 0.4H
		±10 V						

A/D CONVERTER ACCESSORY MODULES

SHM—1 . . . Sample and Hold, Output Setting Time 5 μsec, aperature time 50 nsec., Acquisition Time 5 μsec, size 2"L x 1"W x 0.4"H.
SHM—2 . . . Sample and Hold, Output Setting Time 1 μsec, aperature time 10 nsec., Acquisition Time 100 nsec, size 2"L x 1"W x 0.4"H.
MM—8 . . . Analog Multiplexer, 8 channel with decoders and drivers, size 2"L x 1"W x 0.4"H.

D/A CONVERTER MODULES

Model	Input Resolution (DTL/TTL Compatible)	Output "V" . . . "I"	Output Settling Time	Linearity	Temperature Coefficient	Accuracy	Case Size (Inches)
DAC—9 Series							
DAC—298B	8 Binary Bits	±5 V @ ±5 ma	20 μsec to ±0.2% of FS	±½ LSB	±50 ppm/°C of FS	±0.2% of FS ±½ LSB	2L x 2W x 0.4H
DAC—298D	2 Digit BCD	0 V to +10 V @ 5 ma	20 μsec to ±0.2% of FS	±½ LSB	±50 ppm/°C of FS	±0.2% of FS ±½ LSB	2L x 2W x 0.4H
DAC—4910B	10 Binary Bits	±5 V @ 5 ma	25 μsec to ±0.1% of FS	±½ LSB	±50 ppm/°C of FS	±0.1% of FS ±½ LSB	2L x 2W x 0.4H
DAC—4912D	3 Digit BCD	0 V to +10 V @ 5 ma	25 μsec to ±0.1% of FS	±½ LSB	±50 ppm/°C of FS	±0.1% of FS ±½ LSB	2L x 2W x 0.4H
DAC—I Series							
DAC—I 8B	8 Binary Bits	±1.2 V (max.) ±1 ma	150 nsec to ±0.025% of FS	±½ LSB	±15 ppm/°C of FS	±0.05% of FS ±½ LSB	2L x 1W x 0.4H
DAC—I 10B	10 Binary Bits	±1.2 V (max.) ±1 ma	150 nsec to ±0.025% of FS	±½ LSB	±15 ppm/°C of FS	±0.05% of FS ±½ LSB	2L x 1W x 0.4H
DAC—I 12B	12 Binary Bits	±1.2 V (max.) ±1 ma	150 nsec to ±0.025% of FS	±½ LSB	±15 ppm/°C of FS	±0.05% of FS ±½ LSB	2L x 1W x 0.4H
DAC—I 8D	2 Digit BCD	±1.2 V (max.) ±1 ma	150 nsec to ±0.025% of FS	±½ LSB	±15 ppm/°C of FS	±0.05% of FS ±½ LSB	2L x 1W x 0.4H
DAC—I 12D	3 Digit BCD	±1.2 V (max.) ±1 ma	150 nsec to ±0.025% of FS	±½ LSB	±15 ppm/°C of FS	±0.05% of FS ±½ LSB	2L x 1W x 0.4H
***							
DAC—V Series							
DAC—V 8B	8 Binary Bits	±10 V @ ±10 ma	2 μsec to ±0.025% of FS	±½ LSB	±20 ppm/°C of FS	±0.01% of FS ±½ LSB	2L x 2W x 0.4H
DAC—V 10B	10 Binary Bits	±10 V @ ±10 ma	2 μsec to ±0.025% of FS	±½ LSB	±20 ppm/°C of FS	±0.01% of FS ±½ LSB	2L x 2W x 0.4H
DAC—V 12B	12 Binary Bits	±10 V @ ±10 ma	2 μsec to ±0.025% of FS	±½ LSB	±20 ppm/°C of FS	±0.01% of FS ±½ LSB	2L x 2W x 0.4H
DAV—V 8D	2 Digit BCD	±10 V @ ±10 ma	2 μsec to ±0.025% of FS	±½ LSB	±20 ppm/°C of FS	±0.01% of FS ±½ LSB	2L x 2W x 0.4H
DAC—V 12D	3 Digit BCD	±10 V @ ±10 ma	2 μsec to ±0.025% of FS	±½ LSB	±20 ppm/°C of FS	±0.01% of FS ±½ LSB	2L x 2W x 0.4H
DAC—HB Series							
DAC—HB 8B	8 Binary Bits	±5 V @ ±5 ma	5 μsec to ±0.05% of FS	±½ LSB	±30 ppm/°C of FS	±0.025% of FS ±½ LSB	2L x 1.5W x 0.4H
DAC—HB 10B	10 Binary Bits	±5 V @ ±5 ma	5 μsec to ±0.05% of FS	±½ LSB	±30 ppm/°C of FS	±0.025% of FS ±½ LSB	2L x 1.5W x 0.4H
DAC—HB 12B	12 Binary Bits	±5 V @ ±5 ma	5 μsec to ±0.05% of FS	±½ LSB	±30 ppm/°C of FS	±0.025% of FS ±½ LSB	2L x 1.5W x 0.4H
DAC—HI Series							
DAC—HI 8B	8 Binary Bits	±1.2 V (max.) ±2.5 ma	25 nsec to ±0.1% of FS	±½ LSB	±15 ppm/°C of FS	±0.05% of FS ±½ LSB	2L x 2W x 0.4H
DAC—HI 10B	10 Binary Bits	±1.2 V (max.) ±2.5 ma	25 nsec to ±0.1% of FS	±½ LSB	±15 ppm/°C of FS	±0.05% of FS ±½ LSB	2L x 2W x 0.4H

ULTRAMINIATURE D.C. POWER SUPPLY MODULES

Model	Output Voltage and Current	Input Voltage	Line Regulation	Load Regulation	Output Ripple and Noise	Case Size (Inches)
UPM — 5/300	5 VDC @ 300 ma	115 V ±10 VAC @ 47 to 420 Hz	±0.05% typ.	±0.05% typ.	2 mV RMS	2L x 1W x 0.4H
UPM — 5/1000	5 VDC @ 1000 ma	115 V ±10 VAC @ 50 to 400 Hz	±0.05% typ.	±0.1% typ.	1 mV RMS	3.5L x 2.5W x 1.25H
BPM — 15/50	±15 VDC @ 50 ma	115 V ±10 VAC @ 47 to 400 Hz	±0.05% typ.	±0.05% typ.	2 mV RMS	2L x 1W x 0.4H
BPM — 15/100	±15 VDC @ 100 ma	115 V ±10 VAC @ 50 to 400 Hz	(±0.05%) typ.	±0.1% typ.	0.5 mV RMS	3.5L x 2.5W x .875H
BPM — 15/150—D	±15 VDC @ 150 ma	5 VDC or 28 VDC ±4 VDC	±0.05% typ.	±0.05% typ.	2 mV RMS	2L x 2W x 0.4H

NOTE: * A/D Input Power is ±15 VDC and +5 VDC
** D/A Input Power is ±15 VDC
*** Operating Temperature Range 0°C to +70°C For All Modules

VARADYNE SYSTEMS
A DIVISION OF VARADYNE, INC.
1020 TURNPIKE STREET / CANTON, MASSACHUSETTS 02021 / TEL. (617) 828-6395 / TWX 710-348-0135

VERNITRON CATALOG DIGEST

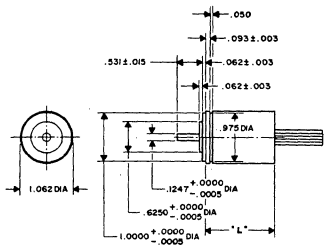
CONTACT SHAFT ENCODER

Type Number	Code	Full Count	Rev./ Full Count	Wt. (oz.)	Dia. (in.)	Lg. (in.)
VGE 11-403	Gray	2^8 (250	1	3	1.062	0.835
VGE 11-442	Gray	2^{14} (2,048)	32	4	1.062	1.750
VGE 18-403	Gray	2^8 (256)	1	4	1.750	1.125
VGE 18-443	Gray	2^{12} (4,096)	16	6	1.750	2.125
VGE 18-450	Gray	2^{19} (524,288)	2048	9	1.750	3.125
VGE 31-407	Gray	2^{10} (1,024)	1	12	3.062	1.250
• VBE 11-204	Binary	2^8 (256)	1	3	1.062	0.835
• VBE 11-219	Binary	2^{13} (8,192)	32	4	1.062	1.750
• VBE 18-201	Binary	2^8 (256)	1	4	1.750	1.125
• VBE 18-216	Binary	2^{12} (4,096)	16	6	1.750	2.125
• VBE 18-237	Binary	2^{19} (524,288)	2048	9	1.750	3.125

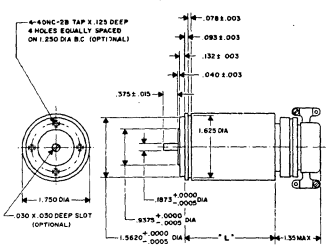
Type Number	Code	Full Count	Rev./ Full Count	Wt. (oz.)	Dia. (in.)	Lg. (in.)
VBE 18-250	Binary	2^7 (128)	1	6	1.750	2.375
VBE 18-260	Binary	2^{12} (4,096)	32	9	1.750	3.375
VBE 18-274	Binary	2^{19} (524,288)	4096	12	1.750	4.375
VBE 23-252	Binary	2^8 (256)	1	8	2.250	2.000
VBE 23-260	Binary	2^{12} (4,096)	16	12	2.250	2.750
VBE 23-274	Binary	2^{19} (524,288)	2048	16	2.250	3.750
VDE 23-301	BCD	0-359	1	8	2.250	2.000
VDE 23-302	BCD	0-3599	9	12	2.250	3.000
VDE 23-303	BCD	0-35999	90	16	2.250	4.125

• External logic required. Temperature Range: −55°C to +125°C.
Speed: 200 RPM maximum. Intermediate bit ranges available for all encoders.
Request catalog for full listing of standard products.

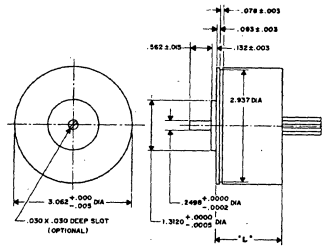
MECHANICAL CONFIGURATIONS



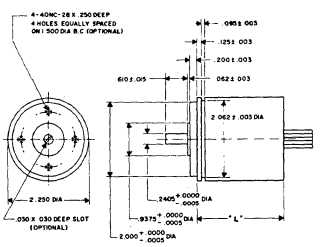
STANDARD SIZE 11 UNIT with Leads. "L"—See Chart.



STANDARD SIZE 18 UNIT with Connector. "L"—See Chart.



STANDARD SIZE 31 UNIT with Leads. "L"—See Chart.



STANDARD SIZE 23 UNIT with Leads. "L"—See Chart.

OUTPUT LOGICS:

I. Discrete
- A. Positive: Binary 1 = +5 to +15 VDC @ 5ma per bit.
  Binary 0 = Open Circuit.
- B. Negative: Binary 1 = −5 to −15 VDC @ 5ma per bit.
  Binary 0 = Open Circuit.

II. Integrated Circuits
- A. Binary 1 = +5 VDC from DTL type logic.
  Binary 0 = 0 VDC.

OPTICAL ENCODER RANGE

	Type Number	Supply Voltage	Max. Current (Amps)	Output Code	Logic Output	Total Count	Lamp Life (Min. Hrs.)	Overall Dia. (in.)	Shaft Dia. (in.)	Overall Lg. (Max.) (in.)	Moment of Inertia (CM/CM²)	Torque (BM/CM)	Maximum Speed (RPM)	Options
INCREMENTAL: Single Output	VOE 31-102	+18 to +24 VDC	1	Sq. Wave Output Marker 1/Rev.	"On" +50% of Volt Supply @ 10K Loading "Off" +½ Volt (Max.)	500	10,000	3.062 / 3.057	0.2405 / 0.2407	5	71	2	2,000	Direction Sensor & Lamp Failure Indicator
	VOE 31-102					720								
	VOE 31-103					1,000								
	VOE 31-104					1,024								
	VOE 31-105					1,440								
	VOE 31-106					2,000								
	VOE 31-107					2,048								
INCREMENTAL: Dual Output	VOE 31-201	+12 VDC		2 Sq. Waves 90° Elec. PH Shifted Between Each Other	"0" +6 Volt (Min.) @ 10K Loading "Off" +½ Volt (Max.)	500								Marker Pulse Direction Sensor Lamp Failure Indicator
	VOE 31-202					720								
	VOE 31-203					1,000								
	VOE 31-204					1,024								
	VOE 31-205					1,440								
	VOE 31-206					2,000								
	VOE 31-207					2,048								
INCREMENTAL: Dual Output	VOE 35-201	+6V ±½V	¼	2 Sq. Waves Gnd. to 6V Displaced by 90° Elec.	"0" = 0 Volt to +½V "1" = 6 Volt Via 270 Ohms	500	30,000	3.500	0.5000 / 0.4998	3.037	220	56 With (Shaft Sealed)	3,000 RPM or 10 kHz Whichever is Lower	Marker Pulse Direction Sensor Lamp Failure Indicator
	VOE 35-202					720								
	VOE 35-203					1,000								
	VOE 35-204					1,024								
	VOE 35-205					1,440								
	VOE 35-206					2,000								
	VOE 35-207					2,048								
ABSOLUTE	VOE 31-301	+12 VDC	1	BCD	"0" = 0 Volt to +½V "1" = +6V to +12V	1,000	10,000	3.062 / 3.057	0.2405 / 0.2403	7.706	71	2	1,200	
	VOE 31-401	+12 VDC ±5%		Gray		2^{10}								
	VOE 31-501	+12 VDC ±5%		Binary		2^{10}								

NOTES: 1) One revolution for full count
2) Unit life — 100 million revolutions
3) Slew speed. 6,000 RPM
4) Incremental encoders are bi-directional; absolute encoders are cw for increasing count

VERNITRON CORPORATION
* Motor Products Division
300 Marcus Boulevard, Deer Park, New York 11729 / (516) 586-5100, TWX: 510-227-6079
Other Control Components Group Products: Control Components Division, Torrance, California - Synchros, Resolvers, Torqsyns*, Servo Assemblies; Magnetic Technology Division, Canoga Park, California - Torque Motors and Tachometer Generators. *Reg. T.M.

VERNITRON CATALOG DIGEST

Vernitron, one of the world's leading manufacturers of synchros, motors, and shaft encoders, offers the broadest range of synchro/digital conversion available, both solid-state and electro-mechanical. Please consult the factory for any option not listed below.

SYNCHRO TO DIGITAL CONVERTERS

Hz	L-L Voltage	Resolution	Accuracy	Power Requirements	Size (inch)	Model No.	Available Options
60	90	12 Bit Bin	±1 LSB	±15 VDC; +5V; 115 VAC Ref.	5 x 4 x 2	VSD-609SB	1. Package Configuration 2. Self Contained Power Supplies 3. 13 and 14 Bit Resolution 4. −55°C to +85°C Operating Temperature 5. Serial Output 6. Higher Tracking Rates 7. Multi-speed Conversion 8. Multi-channel Conversion
60	90	0-3599 BCD	±1 LSB	±15 VDC; +5V; 115 VAC Ref.	5 x 4 x 3	VSD-609SB-D	
400	11.8	12 Bit Bin	±1 LSB	±15 VDC; +5V; 26 VAC Ref.	5 x 4 x 1	VSD-401SB	
400	11.8	0-3599 BCD	±1 LSB	±15 VDC; +5V; 26 VAC Ref.	5 x 4 x 2	VSD-401SB-D	
400	90	12 Bit Bin	±1 LSB	±15 VDC; +5V; 115 VAC Ref.	5 x 4 x 2	VSD-409SB	
400	90	0-3599 BCD	±1 LSB	±15 VDC; +5V; 115 VAC Ref.	5 x 4 x 3	VSP-409SB-D	

ALL VERNITRON CONVERTERS WILL:
1. Operate over 0-70°C range.
2. Have a Digital Interface with DTL or TTL Compatible Logic.
3. Track at 270°/second, MINIMUM.
4. Be repairable in the field, if ever necessary.

DIGITAL TO SYNCHRO CONVERTERS

Hz	Output Voltage	V.A. Output	Accuracy	Power Requirements	Size (inch)	Model No.	Available Options
60	90	2	±1 LSB	±15 VDC; +5 VDC; 115 VAC Ref.	5 x 4 x 2*	VDS-609SP-2	1. Package Configuration 2. Self Contained Power Supplies 3. −55°C to +85°C Operating Temperature 4. Serial Input 5. Multi-channel Inputs
60	90	5	±1 LSB	±15 VDC; +5 VDC; 115 VAC Ref.	5 x 4 x 1**	VDS-609SP-5	
400	11.8	2	±1 LSB	±15 VDC; +5 VDC; 26 VAC Ref.	5 x 4 x 2	VDS-401SP-2	
400	11.8	5	±1 LSB	±15 VDC; +5 VDC; 26 VAC Ref.	5 x 4 x 1**	VDS-401SP-5	
400	90	2	±1 LSB	±15 VDC; +5 VDC; 115 VAC Ref.	5 x 4 x 2*	VDS-409SP-2	
400	90	5	±1 LSB	±15 VDC; +5 VDC; 115 VAC Ref.	5 x 4 x 1**	VDS-409SP-5	

ALL VERNITRON CONVERTERS HAVE:
1. 12 Bit parallel binary coded angle input (MSB = 180°, . . .).
2. Digital interface compatible with DTL or TTL logic.
3. Field repairability, if ever necessary.

* Transformers to be mounted externally.
** Transformers, power transistors, and heat sinks to be mounted externally. Consult factory for required volume.

SPECIAL CONVERTERS

Type Converter	Model No.	Characteristics
Solid State Synchro Signal Amplifier	VSA-101	Input: 3 Wire Synchro Data, 90V (L-L) 60 or 400 Hz; 115 VAC Reference Output: 3 Wire Synchro Data, 90V (L-L) 60 or 400 Hz Channels: Two, each completely isolated Accuracy: Plus/Minus 6 minutes of arc Size: Standard 19″ Rack (19″ x 6″ x 20″) Misc.: Self-contained Power Supplies; Short Circuit Protected; Automatic Cutoff of DC Supply if Overload exists; Overload Indicator
Electro-Mechanical Synchro to Digital Converter	VSD-120E	Input: Any 3 Wire, 90V (L-L) Synchro Data (Accepts 50-440 Hz); 115 VAC Reference Output: 0-359 BCD Accuracy: Plus/Minus 1 LSB Size: 7.0″ x 3.0″ Diameter (Also available in 5″ x 2.5″ x 5″) Speed: Up to 200 RPM (1200°/Second)
Electro-Mechanical Synchro to Resolver Converter	VSR-126E	Input: Any 3 Wire, 90V (L-L) Synchro Data (Accepts 50-440 Hz); 115 VAC Reference Output: 23RS4a Output Size: 10.0″ x 3.5″ x 4.0″ Misc.: This unit can be modified easily to accommodate any Size 23 Resolver
Electro-Mechanical Synchro to Digital Converter with Display	VSD-117E	Input: Two Channels, each 36x and 1x, 400 Hz, 90V (L-L) 3 Wire Synchro Data Output: Two Channel BCD, 0-35999; Two Displays, each 0-35999 Size: Standard 19″ Rack (19″ x 4″ x 19″)

STILL OTHER PACKAGES AVAILABLE AT VERNITRON:

DIGITAL TO RESOLVER • RESOLVER TO DIGITAL • SYNCHRO TO DC • DC TO SYNCHRO • STANDARD SERVO PACKAGES • SUB-SYSTEMS, WITH DISPLAYS AND POWER SUPPLIES • DIGITAL TO SHAFT POSITION CONVERTERS • UP-DOWN COUNTING SERVO PACKAGES • TORQSYN-ENCODER PACKAGES

VERNITRON CORPORATION

*** Motor Products Division**

300 Marcus Boulevard, Deer Park, New York 11729 / (516) 586-5100, TWX: 510-227-6079

Other Control Components Group Products: Control Components Division, Torrance, California - Synchros, Resolvers, Torqsyns*, Servo Assemblies; Magnetic Technology Division, Canoga Park, California - Torque Motors and Tachometer Generators. *Reg. T.M.

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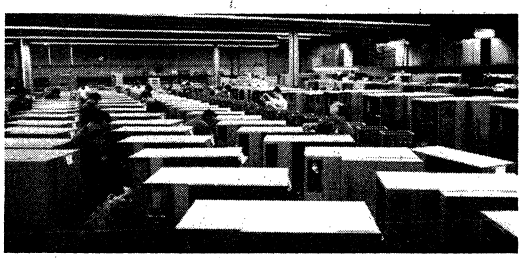
1 ENVIRONMENTAL TESTING

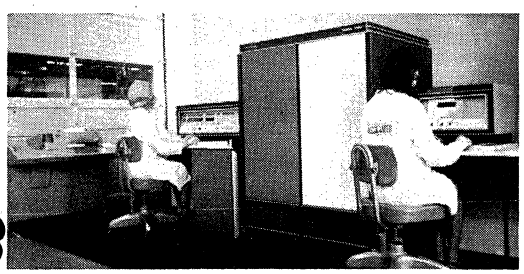
by one of the world's most experienced independent testing laboratories. Associated offers the finest in test equipment and engineering talent for military and commercial testing. Over 75,000 square feet of laboratory facilities offer vibration, shock, thermal vacuum, temperature—humidity, and salt spray testing on components, black boxes, or total systems.



2 ENVIRONMENTAL TEST CHAMBERS

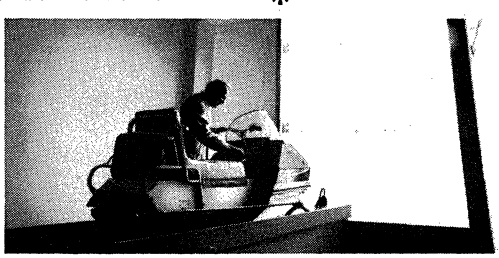
designed and specified to operate in accordance with the most rigorous government and commercial requirements, are built by Associated's Manufacturing Division. The widest selection of this type equipment is manufactured in production quantities, and delivered from stock.

✲ LOW-HIGH TEMPERATURE CHAMBERS
✲ TEMPERATURE-HUMIDITY CHAMBERS ✲ BURN-IN TEST CHAMBERS



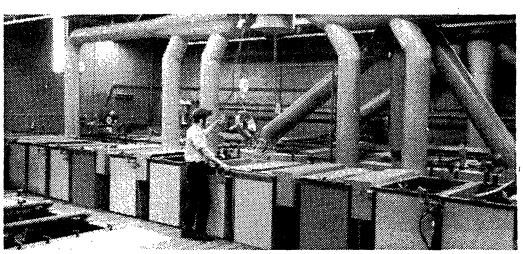
3 SEMICONDUCTOR SCREENING

is offered on a contract basis through Associated's Semiconductor Screening Division. Evaluation of integrated circuits, transistors, and diodes are available in programs which test a device from a go-no-go determination through a complete TX screen in accordance with MIL-STD-883.



4 COMMERCIAL TESTING

Products and components can be tested before you market...for safety, reliability, performance and convenience...at prototype stage, or against competition. Objective and subjective testing programs, geared to your requirements, can reduce product liability and provide accurate statistics on life expectancy, trouble areas and technical weaknesses.



5 METALS TESTING COMPANY, INC.

located in South Windsor, Connecticut, is an affiliate of Associated concentrating in the nondestructive testing area. Magnetic particle inspection, alloy testing, fluorescent and dye penetrant inspection, as well as anodizing and etching are performed in this modern, fully certified nondestructive testing laboratory.

ASSOCIATED TESTING LABORATORIES, INC.

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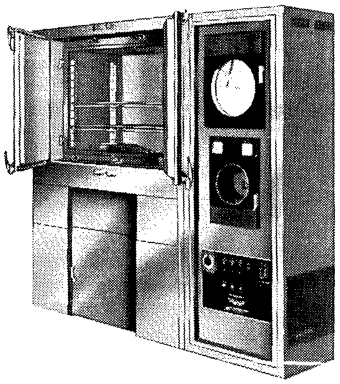
NEW ENGLAND DIVISION: NORTHWEST INDUSTRIAL PARK, BURLINGTON, MASS. 01803 • (617) 272-9050

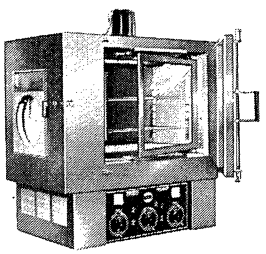
BLUE M TEMPERATURE CONTROLLED EQUIPMENT FOR ELECTRONICS RESEARCH AND PRODUCTION



FULL-RANGE TEMPERATURE/HUMIDITY CHAMBERS

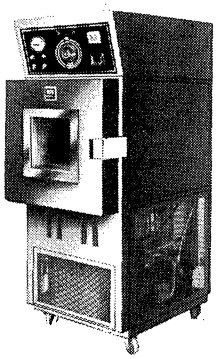
Maximum capability cabinets to perform all current MIL humidity tests. Dual wet and dry bulb POWER-O-MATIC 60® Saturable Reactor Control Systems assure absolute stability and reliability. High speed stabilization and the finest control tolerances available insure accurate reproduction of today's test requirements plus the capability of meeting future requirements when existing standards are tightened. These mechanical convection, horizontal air-flow units feature programming and separate monitoring recorder. Temperature range: −18°C. to +93°C. (±½°C.). Meets MIL-202D, Method 106C, Step 7A; automatically performs −10°C. dip without changing cams. Maintains R. H. ±½%. Chamber sizes: 5.8, 11, 27, and 64 cu. ft.

Similar units for single steady state tests available. Also new, compact top loading cabinets with similar operating characteristics.



AIR-COOLED TEMPERATURE/HUMIDITY CABINETS

HUMID-FLOW(TM) Combination Temperature/Humidity Cabinets with independent wet and dry bulb POWER-O-MATIC 60 Saturable Reactor Control Systems provide extreme accuracy from +12°C. above ambient to +93°C. (±½°C.). Use air for cooling, not costly conditioned water. Saves 30,000-100,000 gallons a year. The most reliable and economical chamber ever developed for long-term high temperature / humidity testing. Ideal for such steady state tests as MIL-202D, Method 103B — continuous operation for 56 days. Four sizes. 1.47, 3.24, 5.5, and 10 cu. ft.

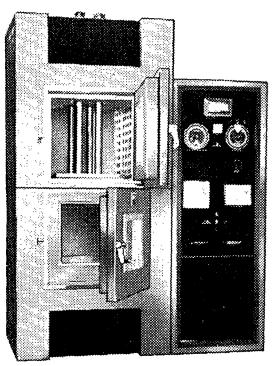


VERSA-RANGE® REFRIGERATED TEST CHAMBERS

Incomparable control accuracy, reliability and dependability—plus a choice of two versatile ranges: −100°F. to +400°F. and −40°F. to +200°F. Five chamber sizes—3 to 64 cu. ft.—for each range. POWER-O-MATIC 60 control carefully matched with heating system and exclusive quality non-cycling mechanical refrigeration system for maximum efficiency and economy. Rapid pull-down. Also chest type cold chambers with ranges to −40°F. and −120°F.

THESE ARE ONLY EXAMPLES OF OUR COMPLETE TEMPERATURE/HUMIDITY AND REFRIGERATION CONTROL CAPABILITY

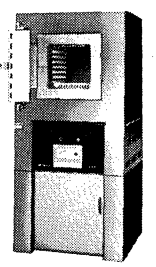
BLUE M THERMAL SHOCK TEST CHAMBERS DESIGNED FOR MIL-STD-202D AND 883



Ask about our complete line of thermal cycling chambers, LN_2 chambers, and new Versa-Whirl baths for MIL-STD-883, Method 1011, Conditions A to F.

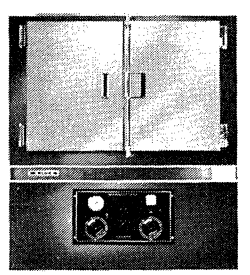
DUAL THERMAL SHOCK TEST CABINETS

2.3 cu. ft. work chamber moves vertically from lower cold chamber to upper heat chamber as required by spec. Cold chamber uses LN_2 to reduce incoming load to −55°C or −65°C. Has solid-state instrumentation. Heat chamber, with range of +204°C (+400°F), regulated by POWER-O-MATIC 60 Control for reliable, straight-line performance. Also available: 3-stage Thermal Cycling Test Cabinets to meet MIL-STD-202D, Method 102A, Preferred Conditions C & D. Test accomplished in one unit instead of two as is customary. Operation of both models is fully automatic—with reliability and accuracy to meet spec. easily.



BLUE M FURNACES

A wide variety of research and production models to suit the strictest needs. Box type muffle furnaces, Globar units — in bench and floor models — new tube furnace. Most have solid-state instrumentation for extremely accurate temperature control and unmatched reliability. Temperatures to +3000°F. Quality materials and workmanship throughout.



BLUE M OVENS

All types. Mechanical and gravity... batch, aging, vacuum, life-test, hazard-safe, gas forming, annealing. Simple lab models to units for Mil Specs. Sizes to 96 cu. ft.... temperatures to +1200°F. Most have patented POWER-O-MATIC 60 Control, others feature patented POWER-O-MATIC 70® Solid-State Proportioning Control. All accessories, including programming, available.

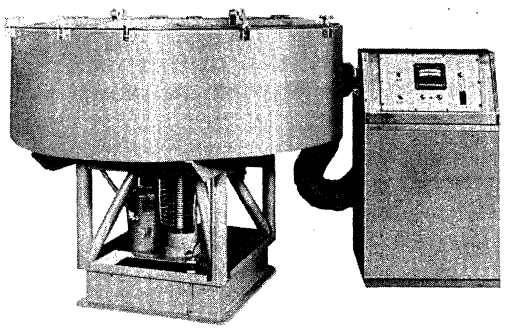
FOR FULL DETAILS ON THESE PRODUCTS AND FOR INFORMATION ON OUR COMPLETE CONTROLLED TEMPERATURE CAPABILITY, WRITE:

BLUE M | **BLUE M ENGINEERING COMPANY,** A Division of Blue M Electric Company
Corporate Headquarters: BLUE ISLAND, ILLINOIS 60406

See Sections 2200, 4100 and 5500 for additional information on other Schaevitz Engineering Products

PROGRAMMED ENERGY SYSTEMS

Schaevitz Programmed Energy Systems are complete equipment packages designed to provide kinetic energy sources on a pre-programmed basis. These systems are of three basic types: electro-mechanical, electro-hydraulic and electro-pneumatic. Two standard families of products are currently manufactured by Schaevitz Engineering – precision centrifuges and tensile testing equipment. Other pre-programmed force and position controllers are offered as special systems.

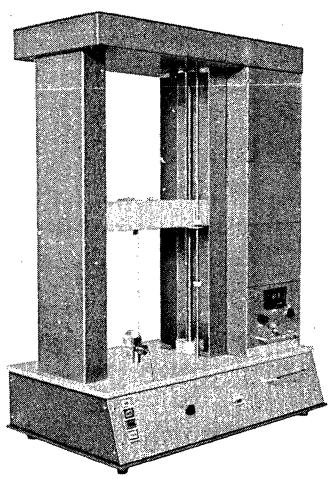


PRECISION CENTRIFUGES

Schaevitz offers a comprehensive line of precision centrifuges. These machines apply pre-programmed acceleration forces to test specimens over a wide range of capacities. Closed-loop velocity feedback and SCR motor drive control assure reliable and accurate system performance. Schaevitz centrifuges are heavy-duty precision machines designed for safety and service.

Centrifugal Capacities:	1000 to 50,000 G-pounds
Acceleration Ranges:	50 to 20,000 G
Specimen Weights:	1 to 1000 pounds
Accuracies:	0.001 to 0.1%

Request Technical Bulletin 6001



TENSILE TESTING EQUIPMENT

The Schaevitz precision line of tensile testing equipment incorporates advanced engineering techniques for automatically testing paper, fabrics, yarns, plastics, and light metals. The following automatic functions are included: constant rate of extension, constant rate of load, and constant rate of strain. Equipment options offered include: digital printing, x-y recording, automatic programming, digital-coded output and computer interfacing.

Load Range:	50 grams to 2000 pounds
Crosshead Travel:	28 inches
Loading Accuracy:	0.2%

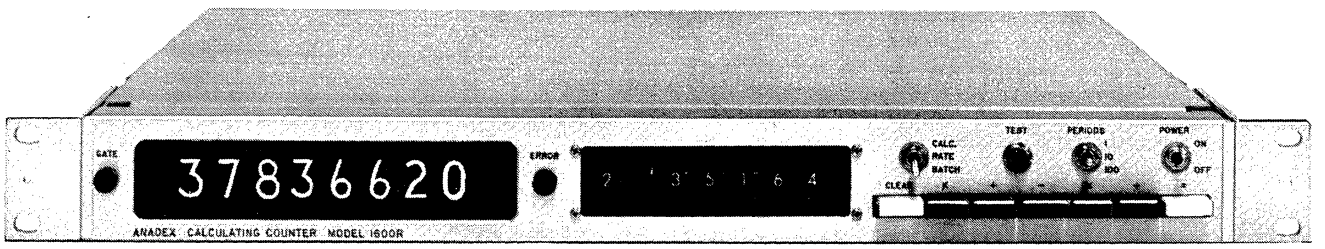
Request Technical Bulletin 6501

The Measurement and Control Company — **schaevitz engineering**

U. S. Route 130 & Union Ave., Pennsauken, N. J. / P. O. Box 505, Camden, N. J. 08101 / 609-662-8000 / TWX: Pennsauken 710-892-0714

ANADEX
INSTRUMENTS, INC.

ANADEX CALCULATING COUNTERS MODEL 1600R



- CALCULATES AND DISPLAYS NORMALIZED **RATE** AUTOMATICALLY IN P.P.H., G.P.M., RPM, Hz., ETC., BY MEASURING TIME FOR 1, 10, OR 100 PERIODS OF THE INPUT FREQUENCY.
- CALCULATES **VELOCITY** AUTOMATICALLY IN F.P.S., M.P.H., ETC., BY MEASURING TIME INTERVALS TO 1 μs RESOLUTION.
- CALCULATES CUMULATIVE (TOTAL) AMOUNT AUTOMATICALLY IN POUNDS, BARRELS, GALLONS, ETC., IN **BATCH** MODE.
- IN **CALCULATE** MODE, MULTIPLIES, DIVIDES, ETC., WITH UP TO 8 SIGNIFICANT DECADES.
- ZERO CONTRIBUTED ARITHMETIC ERROR.
- 10 MV RMS INPUT SENSITIVITY WITH HIGH COMMON MODE REJECTION.
- SINGLE AND MULTIPLE INPUT CHANNEL MODELS.

7833 HASKELL AVENUE, VAN NUYS, CALIFORNIA 91406 / PHONE 213-873-6620 / TWX 910-495-1762
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DIGITAL COUNTERS

ANADEX
INSTRUMENTS, INC.

- **PLUG-IN TTL INTEGRATED CIRCUITS**
- **15 MHz COUNT RATE**
- **10 MV OR 100 MV INPUT SENSITIVITY**
- **1¾" x 19" or 3½" x 8½" FRONT PANEL HEIGHT**
- **HIGH NOISE IMMUNITY**
- **1 MHz CRYSTAL TIME BASE**
- **LOW COST**

The Anadex "600" Series of Frequency Counters are designed to meet your specific functional requirements for industrial production test equipment and system applications.

Custom features in standard models provide compactness, environmental tolerance and greatly enhanced serviceability, at significant economies.

On all CF Series you have the choice of input sensitivity and count rate capability and you MUST SPECIFY WHICH STANDARD OPTION YOU DESIRE. It is possible to change to the other selection at a later date since the amplifier board is readily replaced. Choose the options you require, such as display memory, front panel input BNC's, digital output signals, and REMOTE FUNCTION PROGRAMMING. Most models may be ordered with 4, 5, 6, or 7 decades. Bench/half rack and 1¾" high full rack configurations are available.

The use of PLUG-IN TTL INTEGRATED CIRCUITS on flat printed circuit boards provides easy accessibility and makes the counters exceptionally reliable and easily serviced. DC switching and TTL integrated circuits provide inherent HIGH NOISE IMMUNITY.

GENERAL SPECIFICATIONS

All silicon solid-state with long-life, in-line numerical indicator tubes.

Plug-in TTL integrated circuits.

Count rate to 100 KHz @ 10 MV sensitivity, or 10 MHz @ 100 MV sensitivity rolling off to 200 MV @ 15 MHz available on all models.

Decimal indicators on applicable models.

Display time continuously variable from 0.1 seconds to 8 seconds and infinite in HOLD except for the Totalizer series.

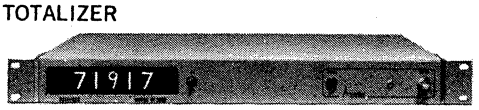
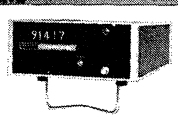
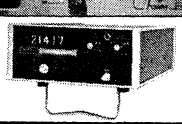
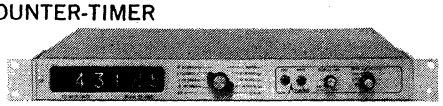
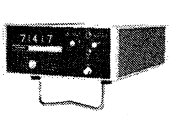
Reset by front panel pushbutton or rear input from remote solid-state or mechanical switch closure to common terminal or pulse.

Gate Output: All modes. +0.4V DC maximum when count gate is open and +2.4V DC minimum all other times to permit gating up to 5 slave counters or totalizers.

Reset Output: Pulse output from +2.4V DC minimum to +0.4V DC maximum at rear terminal to permit resetting up to 5 slave counters or totalizers.

Operating Temperature Range: 0°C to +60°C.

Power: 105 to 125V or 210 to 250V, 50 to 400 Hz, except the Frequency Counter Series. 5-decade model without options, 20 watts nominal.

ANADEX SERIES 600 COUNTERS	MODEL	# OF DIGITS	UNIT PRICE (See Note 6)	OPT. AVAIL.		INPUTS	TIME BASE REFERENCE
TOTALIZER	DC-600-3R	3	325	C E G-5A	A	3 Volts PK-PK Square Wave or Pulse (See Note 3)	
	DC-600-4R	4	360				
	DC-600R	5	395				
	DC-600-6R	6	430				
	DC-600-7R	7	465				
	DC-600-3	3	375	J-4			
	DC-600-4	4	410				
	DC-600	5	445	J-5			
	DC-600-6	6	480				
	DC-600-7	7	515				
FREQUENCY COUNTER	CF-603-4R	4	485	A C E G-5A P-1 RP	A	10 MV RMS or 100 MV RMS (See Note 1)	60 Hz Power Line (50 Hz Opt. P-1)
	CF-603R	5	520				
	CF-603-6R	6	555				
	CF-603-7R	7	590				
	CF-603-4	4	535				
	CF-603	5	570				
	CF-603-6	6	605				
	CF-603-7	7	640				
COUNTER-TIMER	CF-600-4R	4	585	A C D E G-5A	A	10 MV RMS or 100 MV RMS (See Note 1)	1 MHz crystal controlled oscillator or external input thru rear BNC. Accuracy of internal time base: Aging: ±1 PPM/WK Temp: ±10 PPM from 15°C to 50°C (±1 PPM from +10°C to +60°C avail. with Opt. D)
	CF-600R	5	620				
	CF-600-6R	6	655				
	CF-600-7R	7	690				
	CF-600-4	4	635		B	RATIO 1 Volt RMS (See Note 2)	
	CF-600	5	670				
	CF-600-6	6	705				
	CF-600-7	7	740				

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ANADEX
INSTRUMENTS, INC.

STANDARD OPTIONS ("600" SERIES)

A. Display Memory: Provides continuous numeric display and includes gate light. Disable switch on rear panel.
Price: $15.00/decade

C. Front panel input A, B, and/or C BNC in parallel with rear input BNC.
Price: $10.00/BNC

D. Temperature-controlled crystal oven: ±1 PPM total from +10°C to +60°C.
Price: $55.00

E. Special paint finish (Fed. Std. 595 colors). **Price: $60.00 per lot, regardless of quantity. Other than Fed. Std. 595 colors, as above plus cost of paint.**

G-5A. BCD Output: Provides 1, 2, 4, 8 BCD parallel data outputs. Logic "0": +0.4V DC maximum at a sink current of 6 ma maximum. Logic "1": +4.7V DC nominal unloaded with source resistance of 1.8K. Print command signal is also provided. **Price: $40.00**

J-4. 10 MV preamp (see Note 1, OPTION S1). **Price: $60.00**

J-5. 100 MV preamp (see Note 1, OPTION S2). **Price: $60.00**

P-1. 50 Hz Power Line Frequency.
Price: $25.00

RP. Remote Function Programming.
Price: Consult Factory

NOTES

1. Associated with the front panel sensitivity control is a rotary switch to decrease maximum sensitivity by factors of 10 and 100. ONE OF THE FOLLOWING OPTIONS MUST BE ORDERED.

Option S1
Sine Wave: 10 MV RMS maximum from 3 Hz to approximately 100 KHz (rolling off above 100 KHz at −12 db per octave); 100 MV RMS at 1 Hz; 20V pk-pk maximum input on X1 position of input sensitivity multiplier switch: 200V pk-pk maximum input on X10 position; and 300V pk-pk maximum input on X100 position. Impedance is 100K ohms (nominal) in parallel with 50 pf shunt.

Pulses or Square Waves: 30 MV pk from 0 to 100 KHz. Rise time, 1 μs maximum for negative pulses.

Option S2
Sine Wave: 100 MV RMS from 3 Hz to 10 MHz, rolling off to 200 MV RMS at 15 MHz; 20V pk-pk maximum input on X1 position of input sensitivity multiplier switch; 200V pk-pk maximum input on X10 position; and 300V pk-pk maximum input on X100 position. Impedance is 1 megohm (nominal) in parallel with 50 pf shunt.

Pulses or Square Waves: 300 MV pk from 0 to 10 MHz (rolling off to 600 MV pk at 15 MHz); Pulse width, 50 nanoseconds for negative pulses.

2. Ratio: 1V RMS sine wave input, 100 Hz to 1 MHz. Input impedance 1000 ohms nominal.

Pulses or Square Waves: 3V pk, 0 to 1 MHz; Pulse width, 0.5 μs minimum for negative pulses.

3. 3 Volts pk-pk Square Wave or positive pulse, to 15 MHz, rise time 1 μs maximum duration 50 nanoseconds minimum.

4. START-STOP: Solid-state or mechanical switch closure to common terminal opens gate. Also DC level: +12V DC to open gate, OV DC or open circuit to close gate.

5. The Multi-Channel Variable Time Base Counters are also available as 3, 4, 5, and 6-channel input units. Add $110.00 per channel to 2 channel base price shown for rack models and $130.00 per channel for bench models.

6. Quantity Discounts: 1-9, List Net; 10-19, Less 5%; 20-49, Less 8%; 50-99, Less 10%; 100 and up, Factory Quote.

FREQUENCY MEASUREMENT (Accuracy ±1 Count ±Time Base Accuracy)	TOTALIZE & TIME INTERVAL MEASUREMENT	PERIOD MULTIPLE PERIOD, TIME FOR N EVENTS	RATIO MULTIPLE RATIO, PRESET COUNT
	TOTALIZE: Displays total input pulses. START-STOP: (See Note 4).		
Measures input frequency for time intervals of 0.1, 0.6, 1.0, 6.0 or 10 seconds as set by function switch.	TOTALIZE: Displays total input pulses. START-STOP: Separate or common start-stop pulse inputs, DC level or contact closure to ground. (See Note 4).		
Measures input A for time intervals of .01, 0.1, 1.0 or 10 seconds as set by selector switch. Decimal point indicates Hz or KHz.	TOTALIZE: Displays total input pulses. TIME: Displays time in microseconds, (1μsec. clock). START-STOP: Separate or common start-stop pulse inputs, DC level or contact closure to ground. (See Note 4).	Displays time for 1, 10 or 100 periods. Reads in milliseconds and microseconds with positioned decimal point.	RATIO: Displays $\frac{\text{Freq. of Input A}}{\text{Freq. of Input B}}$ x 10^3, x 10^4, x 10^5, x 10^6 and $\frac{\text{Freq. of Input B}}{\text{Freq. of Input A}}$ x 1, x 10, x 100 (See Notes 1 and 2 for Inputs).

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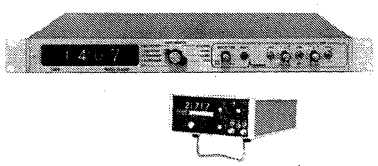
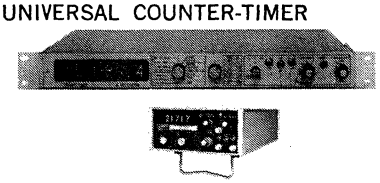
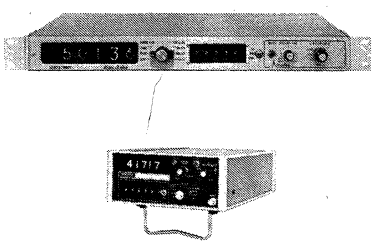
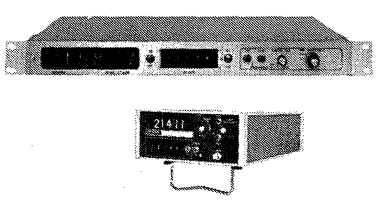
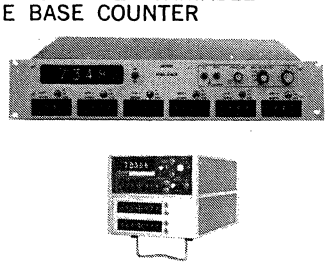
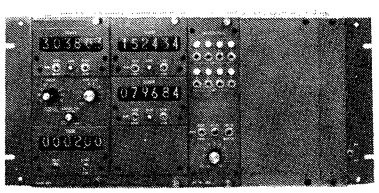
DIGITAL COUNTERS

ANADEX
INSTRUMENTS, INC.

ANADEX SERIES 600 COUNTERS	MODEL	# OF DIGITS	UNIT PRICE (See Note 6)	OPT. AVAIL.	INPUTS Opt. S1 to 100KHz; Opt. S2 to 10 MHz (See Note 1)		TIME BASE REFERENCE
TIME INTERVAL COUNTER 	CF-630-4R CF-630R CF-630-6R CF-630-7R	4 5 6 7	610 645 680 715	A C D E G-5A	A & B	DC Coupled (See Totalize and Time Interval Measurement)	1 MHz crystal controlled oscillator or external input thru rear BNC. Accuracy of internal time base: Aging: ±1 PPM/WK Temp: ±10 PPM from 15°C to 50°C (±1 PPM from +10°C to +60°C avail. with Opt. D)
	CF-630-4 CF-630 CF-630-6 CF-630-7	4 5 6 7	660 695 730 765				
UNIVERSAL COUNTER-TIMER 	CF-635-4R CF-635R CF-635-6R CF-635-7R	4 5 6 7	725 760 795 830	A C D E G-5A	A & B	DC Coupled (See Totalize and Time Interval Measurement) 10 MV RMS or 100 MV RMS (See Note 1)	
	CF-635-4 CF-635 CF-635-6 CF-635-7	4 5 6 7	810 845 880 915		C		
PRESET SCALER-TIMER 	CF-604R	5	945	A C D E G-5A RP	A	10 MV RMS or 100 MV RMS (See Note 1)	
	CF-604		995		B	RATIO 1 Volt RMS (See Note 2)	
VARIABLE TIME BASE COUNTER 	CF-601-4R CF-601R CF-601-6R CF-601-7R	4 5 6 7	860 895 930 965	A C D E G-5A RP	A	10 MV RMS or 100 MV RMS (See Note 1)	
	CF-601-4 CF-601 CF-601-6 CF-601-7	4 5 6 7	910 945 980 1,015		B	RATIO 1 Volt RMS (See Note 2)	
MULTI-CHANNEL VARIABLE TIME BASE COUNTER 	CF-602-4R CF-602R CF-602-6R Two-Channel Input (See Note 5)	4 5 6	1,205 1,240 1,275	A D E G-5A RP	A	10 MV RMS or 100 MV RMS (See Note 1)	
	CF-602-4 CF-602 CF-602-6 Two-Channel Input (See Note 5)	4 5 6	1,255 1,290 1,325		B	RATIO 1 Volt RMS (See Note 2)	

CUSTOM DESIGN PRODUCTS

Anadex provides custom design instruments to meet specific packaging and specification requirements. For example, Anadex supplies the major portion of the digital instrumentation to a large producer of micro-analysis instrumentation. This instrumentation package includes Scalers, Scaler Timers, Intercoupler to an ASR33, and



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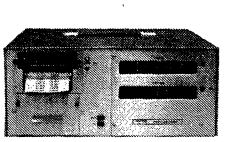
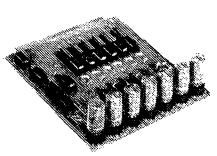
ANADEX
INSTRUMENTS, INC.

FREQUENCY MEASUREMENT (Accuracy ±1 Count ±Time Base Accuracy)	TOTALIZE & TIME INTERVAL MEASUREMENT	PERIOD MULTIPLE PERIOD, TIME FOR N EVENTS	RATIO MULTIPLE RATIO, PRESET COUNT
	Decimal point indicates time in seconds, milliseconds and microseconds. TIME: (Ranges shown are for 5 Digit Unit) — Clock Frequency 00000. to 99999. μs — 1 MHz 000.00 to 999.99 ms — 100 KHz 0000.0 to 9999.9 ms — 10 KHz 00000. to 99999. ms — 1 KHz 000.00 to 999.99 s — 100 Hz 0000.0 to 9999.9 s — 10 Hz 00000. to 99999. s — 1 Hz START-STOP: Individual DC level and slope controls from +30V DC to −30V DC, separate or common inputs. TOTALIZE: Displays total input pulses.		
Measures Input C for time intervals of .01, 0.1, 1.0 or 10 seconds as set by selector switch. Decimal point indicates Hz or KHz.		For Input C only, displays time for 1, 10 or 100 periods. Reads in milliseconds and microseconds with positioned decimal point.	RATIO: Displays $\frac{\text{Freq. of Input C}}{\text{Freq. of Input A}}$ x 1 to x 10^6 in seven decade steps
	TOTALIZE: Displays total input pulses. BATCH TOTALIZE: Displays prescaled input pulses. TIME: Displays three ranges. Clock Frequency 00000. to 99999. μs — 1 MHz 000.00 to 999.99 ms — 100 KHz 0000.0 to 9999.9 ms — 10 KHz START-STOP: Separate start-stop pulse inputs, DC level or contact closure to ground. (Note 4).	Displays time for period, multiple period, and TIME FOR N EVENTS, where N = 00001 to 100000 Clock Frequencies 1 μs 10 μs 100 μs	RATIO: Displays $\frac{\text{Freq. of Input A}}{\text{Freq. of Input B}}$ x N x 1, x 10, x 100 PRESET: Counter capacity is N (1, 10 or 100) N = 1 to 100,000
Measures Input A and displays "normalized" data in engineering units by means of thumbswitch controlled variable preset time. Preset Counting Time CF-604R .00001 to 1.00000 sec. x 1, x 10, x 100 Output signal is provided for count duration. CF-601R 0.0001 to 10.0000 sec. x 0.1, x 1, x 10 CF-602R .0001 to 1.0000 sec. x 1, x 10, x 100			RATIO: Displays $\frac{\text{Freq. of Input A}}{\text{Freq. of Input B}}$ x (0.0001 to 10.0000) x 10^5 x M M = x .1, x 1, x 10 (See Notes 1 and 2 for Inputs)
			RATIO: Displays $\frac{\text{Freq. of Input A}}{\text{Freq. of Input B}}$ x (.0001 to 1.0000) x 10^5 x M M = x 1, x 10, x 100 (See Notes 1 and 2 for Inputs)

Beam Current Converter in a Nuclear Instrumentation Module type configuration as shown in the picture.

Combinations of products into a single package are also provided. The system shown consists of two Anadex Model 1704-5116-16 Bi-Directional Totalizer Boards and an Anadex Model DP-650-14 Digital Printer for use with a theodolite.





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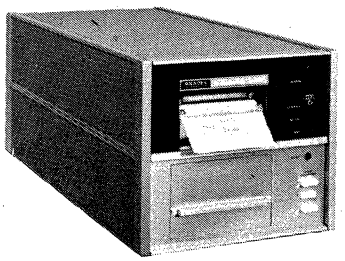
A SUBSIDIARY OF ELECTRONIC MEMORIES & MAGNETICS CORP.

DIGITAL PRINTERS
DP-600

ANADEX
INSTRUMENTS, INC.



- **Buffered Input**
- **Input Data Storage**
- **Programming and Format Capability**
- **Floating Decimal Point, Automatic Zero Suppression**
- **Roll or Fan-Fold Paper, Internally Stored**
- **Easy Front Access Paper Loading**
- **Red/Black Printing**

Basic Unit: 7 columns, field-expandable to the maximum capacity of 21 columns via 2 additional, identical plug-in circuit board sets.

Printing Rate: 3 lines/second (up to 63 characters per second).

Data Input Code: 1, 2, 4, 8 Binary (BCD for numerals).

Data Input Levels: 1, 2, 4, 8 I.C. logic — DTL and TTL compatible. Logic "1" = +2.4V min. (to +18V max.). Logic "0" = +0.5V max. (to −8V min.). Data Source Resistance = 8K max. (Complementary input logic levels of above are available as a Standard Option.)

Memory: Buffer storage is standard for each line of print.

Number of Data Sources: Input data from up to 3 data sources may be transferred into Memory by a print command signal.

PRICE: Model #DP-600 (Includes input mating connectors as required.)
7 columns $1,295.00
14 columns $1,495.00
21 columns $1,695.00

OPTIONS
- RC — REMOTE PROGRAMMER CONTROL, $50.
- CL — COMPLEMENTARY INPUT data logic levels, $50.

Print Configurations: (Programmed via 3 front panel pushbuttons.)

OR: Print-out of data from a data source occurs independently when that data source is "ready."

AND: Printing of data from all data sources will occur simultaneously when the data sources programmed are ready.

Decimal Point: Floating (Does not occupy a full column space).

Zero Suppression: Functions independently within each field of seven columns or may be programmed to operate across one or more fields.

Format Control: Almost any **input** character or space may be programmed into any columnar position.

Paper Feed: May be controlled by an externally generated logic level or front panel manual FEED pushbutton.

Out-of-Paper Warning: Front panel mounted light and output logic level. (Printing inhibited when out of paper.)

Paper: Standard is single-copy roll-type paper. 7″ fan-fold is also available and pressure-sensitive multiple-copy roll and fan-fold paper are available accessories.

Red/Black Printing: This standard feature is controlled by remotely generated logic level but can be used only on single-copy roll or fan-fold paper.

Paper Width: 3.5 inches nominal.

Character, Horizontal Spacing: 7 characters per inch.

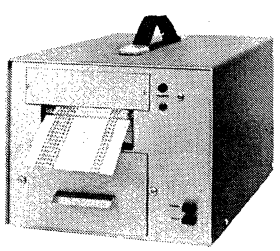
Line, Vertical Spacing: 5 lines per inch.

Physical Size: Standard — bench mount, 7″ high, 8½″ wide, and 18″ deep. Half rack mounting hardware, optional feature.

Power: 105V to 125V RMS or 210V to 250V RMS, 50 to 400Hz at approximately 50 watts.

OPTIONAL ACCESSORIES
- Roll Paper, $0.95/roll
- Fan Fold Paper, $1.50/stack
- Kit for center rack mounting, $25.
- Kit for dual rack mounting, $25.

DP-650



- **Low Cost**
- **OEM Features Available**
- **DTL/TTL Compatible**
- **Field Expandable via Plug-In IC's**
- **Roll or Fan-Fold Paper Internally Stored**
- **Red/Black Printing**

Basic Unit: 7, 14, or 21 columns including case, mating connector, power cord and one roll of paper. Available in other column capacities; without the case, without the power supply, or combinations thereof at reduced cost.

Printing Rate: 3 lines/second asynchronous (up to 63 characters per second).

Data Input Code: 1, 2, 4, 8 Binary code for each column.

Data Input Levels: DTL/TTL COMPATIBLE. Logic "0" = +0.4V at 3.2 ma maximum sink current; Logic "1" = +2.4V to 5V maximum or open circuit. Unterminated lines are equivalent to the logic "1" state.

Print Format: Standard DP-650 printers are supplied to print in the columns as follows: 7 columns, columns 13 through 19 inclusive; 14 columns, columns 6 through 19 inclusive; 21 columns, all columns.

Decimal Points: Nine floating decimal points in columns 10 through 18 selected by single line inputs, Logic "1" = +2.4V to 5V maximum or open circuit will energize the decimal point. Decimal points can be programmed in any nine columns, 1 through 19, by appropriate placement of resistors on P.C. board.

Paper Feed: May be controlled by an externally generated logic "0" level or front panel manual FEED pushbutton.

Red/Black Printing: Application of a logic "1" for a minimum duration of 75 ms actuates red select.

Paper: Standard is single-copy roll-type paper. 7″ fan-fold is also available and pressure-sensitive multiple-copy roll and fan-fold paper are available accessories.

Paper Width: 3.5″ nominal.

Character, Horizontal Spacing: 7 characters per inch.

Line, Vertical Spacing: 5 lines per inch.

Physical Size: 8½″w x 7¾″h x 14½″d. Case includes carrying handle and feet.

Power: 105 to 125V RMS, 210 to 250V RMS, 50 to 400 Hz, 50 watts nominal.

Price: Includes Input Connector.

DP-650-7 $745.00 DP-650-14 $770.00 DP-650-21 $795.00
Optional Out-of-Paper Warning — $37.50

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FREQUENCY TO DC CONVERTERS

ANADEX
INSTRUMENTS, INC.

Anadex Frequency to DC Converters have found wide acceptance in the industrial and aerospace industries for speed and flow rate monitoring and control applications. All models are compatible with low level signal sources such as flowmeters, tachometers, radiation detectors, etc. Package configurations range from rack mount models to hermetically sealed MIL-T type cans, industrial, and single printed circuit board units which require an external power supply.

Output signals of 0 to 5V DC, 1 to 5 ma, 4 to 20 ma, and 0 to 50 mv assure compatibility with most indicators, recorders and recorder controllers used in industry.

PI-200

- **Compact**
- **Lightweight**
- **±0.2% Linearity**
- **0 to 50 MV Output**
- **Low Cost**

Price: Includes Mating Connector
PI-200 $155.00 PI-220 $155.00 Opt. P $25.00

Full Scale Frequencies: 100, 200, 300, or 500 Hz; 1, 2, 3, 5, 10, 20, 30, or 50 KHz full scale. Two to one adjustment of full scale provided.

Input: Model PI-200 — Sine or square wave to a minimum of 5 Hz.
Model PI-220 — Pulse or square wave, +1V min. to +30V max., 1 μs min. duration, down to 0 Hz.

Sensitivity: 10 MV RMS to 30V RMS.

Input Impedance: 22K ohms.

DC Output: 0 to +50 MV, 1250 ohms output impedance.

Temperature Range: 0 to +165°F.

Temperature Coefficient: ±0.005% per degree F typical.

Linearity: ±0.2% of full scale frequency.

Square Wave Output: At input frequency rate. Approx. 8V pk-pk in series with 10K output impedance.

Power: 22 to 30V DC at 15 ma. Opt. P, 105 to 130V RMS, 50-400 Hz.

Dimensions: MIL-T-27 can, Type FB, stud mounted.

Connector: MS3102A-14S-6P. Solder header available if specified.

PI-355 & PI-375

- **±0.03% Linearity**
- **Isolated DC Output**
- **Fast Response**
- **−55° to +165°F Operating Range**
- **Transformer Coupled Input**
- **10 MV Sensitivity**

Price: $295.00 includes mating connector. Opt. P $25.00

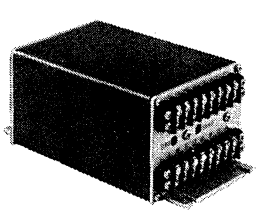
Full Scale Frequencies: 100, 200, 300, or 500 Hz; 1, 2, 3, 5, 10, 20, 30, or 50 KHz full scale. Two to one adjustment of full scale provided.

Input: SEE CHART. Either differential or single ended, transformer coupled.

Common Mode Rejection (PI-355): 60 db at 60 Hz.
Temperature Coefficient: ±0.005%/°F.
Temperature Range: −55° to +165°F.
Linearity: ±0.03% of full scale frequency.
DC Output: 0 to 5V full scale, 5 ma max. current. Isolated with respect to signal input and power supply.
Square Wave Output: 25V pk-pk at input frequency rate from 15K source impedance.
Power: 22 to 30V DC at 120 ma. Opt. P, 105 to 130V RMS, 50-400 Hz.
Size: MIL-T-27 can, Type FA, stud mount. Type GA for Opt. P.
Connector: MS-3102A-16S-1P, or solder header if specified.

Model	Input Sensitivity 5 Hz to 10 KHz	Input Sensitivity 50 KHz	Max. Input	Input Imped.	Output Imped.
PI-355	10 MV RMS	250 MV RMS	50V RMS	5K	0.5 ohms
PI-375	1V RMS	25V RMS	250V RMS	47K	0.5 ohms

PI-600



- **All Solid State**
- **±0.05% Terminal Linearity**
- **Multiple Outputs for Current and Voltage**
- **High Stability**
- **Industrial Packaging**
- **Easily Serviced**

Price: $295.00

Input: 10 MV sensitivity to 150 Volts max.; transformer coupled.

Frequency Range: 250 Hz full scale to 3000 Hz full scale sine wave, square wave or approximations thereof in three ranges selectable by terminal strip jumpers. Sensitivity control allows discrimination against noise.

Input Impedance: Greater than 5000 ohms.
Output: 0 to 5V DC, 1 to 5 MA and 4 to 20 MA selected by terminal strip jumpers.
Linearity: Better than ±0.05%.
Temperature Range: 0 to +165°F.
Temperature Coefficient: ±0.005% of F.S. per °F.
Size: 3"h x 4"w x 6" long, less flanges.
Power: 105-125 or 210 to 250V RMS, 50-400 Hz.

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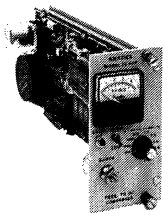
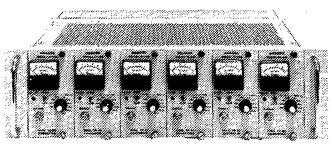
FREQUENCY TO DC CONVERTERS
PI-608

ANADEX
INSTRUMENTS, INC.



- All Solid State
- ±0.025% Terminal Linearity
- Selectable Transient Response Rate
- Low Output Ripple
- High Sensitivity Transformer Coupled Input
- High Common Mode Rejection
- 5 Hz to 51.2 KHz Range in 10 Ranges
- 0 to 5V DC Floating Output
- Floating Pulse Output
- Plug-in Modules



Price: $415.00/Module.
Price: Rack Adapter
Includes Mating Connectors.

HR-608	$650.00
HR-618	$575.00

Input: 10 MV sensitivity to 150 volts max.; guard-shielded and transformer-coupled.

Frequency Range: 5 Hz to 51,200 Hz in 10 switchable ranges with 2 to 1 front panel range adjustment.

Linearity: ±0.025% terminal linearity.

Output: 0 to 5V DC, floating, 20 MA maximum at 5V, short circuit protected.

Output Impedance: Less than 0.5 ohms.

Pulse Output: Floating transformer coupled pulse output, 2V pk-pk nominal. Will supply 20 MA into 50 ohm load.

Ripple: For sine or square wave input — with transient switch in LOW ripple is less than 1 MV pk-pk at upper F.S. frequency and less than 10 MV pk-pk at 10% of upper F.S. frequency.

Temperature Range: 0°F to +150°F.

Temperature Coefficient: ±0.005% per °F.

Transient Response: Two-position switch to select transient response of approximately 10/f in HIGH position or 50/f in LOW position, where f is the lowest full scale frequency on any one range.

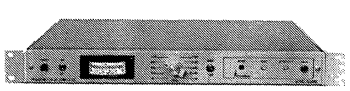
Power: 105-125V RMS, 50-400 Hz. DC power supply internal with module.

RACK ADAPTER

Models HR-608, HR-618: The Model HR-608 Rack Adapter holds six PI-608 modules in a standard 19″ rack. A crystal referenced calibration oscillator and associated circuitry generate ten calibration frequencies for the six PI-608 plug-in modules. The appropriate lower full scale calibration frequency is selected automatically by the range switch on the PI-608 modules and is introduced into the module whenever the respective front panel calibration button is depressed. The calibration process may also be initiated remotely by a contact closure. For example, when a PI-608 module selector switch is set to the 400-800 range, it will receive a 400 Hz calibration signal when calibration is initiated by either method. A single Model HR-608 is capable of supplying the calibration signals to a maximum of sixty PI-608 modules.

The Rack Adapter Model HR-618 is identical to the Model HR-608 except it does not include the calibration oscillator. It is generally used in larger systems where the calibration frequencies are provided by one HR-608 Rack Adapter. As an example, if a system consists of 60 PI-608 modules, one Model HR-608 and nine HR-618 Rack Adapters would be required.

PI-608R



Price: $595.00 Includes Mating Connectors.

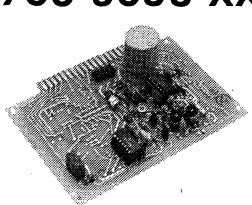
Opt. C-1	$170.00
Opt. C-2	$ 75.00

The Model PI-608R Frequency to DC Converter is designed for rack mounted applications. Specifications are the same as the Model PI-608.

When the Model PI-608R is ordered with Calibration Option C-1, a crystal referenced oscillator and associated circuitry required to generate ten calibration frequencies is provided within the enclosure. The appropriate lower full scale calibration frequency is selected automatically by the front panel mounted Range switch and is introduced into the converter when the front panel CALIBRATION button is depressed. The calibration process may also be initiated remotely by a contact closure. For example, when the PI-608R range selector switch is set to the 400-800 Hz range, it will receive a precision 400 Hz signal when calibration is initiated by either method.

Option C-2 provides internal relay control and hardware which enables the PI-608R to be driven by calibration frequencies provided by a remote source such as a Model PI-608R with Option C-1.

1700-5096-XX



- Systems Oriented
- ±0.03% Linearity
- 10 MV Sensitivity
- Isolated Outputs
- Low Cost

Price:

1-9	$175.00	20-49	$145.00	100 & Up	$120.00
10-19	$166.00	50-99	$139.00		

BASIC SPECIFICATIONS THE SAME AS MODEL PI-355 ON PAGE 397.
Power Required: +15V DC ±0.1% and −15V DC ±0.1%, each at 40 ma nominal current.

Zero & Span Controls: Separate ZERO and SPAN controls are provided on each board.

Connections & Physical Size: Single card, 5.20″ x 3.90″ with edge card contacts on one end, dual 18 pin 0.156″ spacing. Mating connector, Cinch #251-18-30-160 (Anadex 2103-5000-01 at $5.00). Height of components above board, 1.5″ max.

Frequency Level Detection: Available on request at additional cost for alarm purposes.

Ordering Information: Dash number after 1700-5096 describes full scale frequency.

Model	Hz	Model	KHz	Model	KHz
1700-5096-21	100	1700-5096-25	1	1700-5096-29	10
1700-5096-22	200	1700-5096-26	2	1700-5096-30	20
1700-5096-23	300	1700-5096-27	3	1700-5096-31	30
1700-5096-24	500	1700-5096-28	5	1700-5096-32	50

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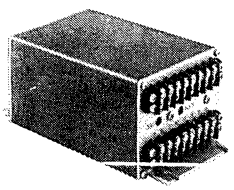
DC TO FREQUENCY CONVERTERS

ANADEX
INSTRUMENTS, INC.

Anadex offers a complete line of uni-polar and bi-polar voltage to frequency converters for use in the industrial and aerospace industries for analog signal digitizing or transmission. A choice of package configurations are provided to meet your specific requirements.

For systems applications, both uni-polar and bi-polar converters are available on plug-in printed circuit boards at attractive price schedules. Modifications are available and invited to meet special requirements.

DF-100 (UNI-POLAR)



- 100 MV Full Scale Input
- All Silicon Solid State
- Easily Serviced
- High Accuracy
- Instantaneous Response
- 100 KHz Output
- Industrial Packaging

Price: $325.00

100 KHz FULL SCALE OUTPUT	
Full Scale DC Input Voltage	Input Impedance
100 MV	1000 ohms
1.0 V	10 K ohms
10.0 V	100 K ohms
100.0 V	1 M ohm

Linearity: Better than 0.01% full scale from best straight line.

Output Waveform: Separate simultaneous DC coupled positive and negative pulses, 0V to +1.5V and 0V to −1.5V nominal peak amplitudes, each 2 microseconds nominal width.

Output Response: Essentially instantaneous, output changes to new frequency in less than one cycle of output.

Temperature Range: 0°F to +165°F.

Temperature Coefficient:
Full Scale: Less than ±0.005% per °F over operating temperature range.
Zero: ±10 microvolts per °F (referred to the input) over operating temperature range.

Size: 3"h x 4"w x 6"long less flanges.

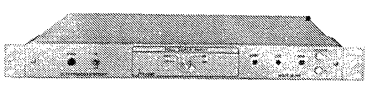
Power: 105-125 or 210-250V RMS, 50-400 Hz.

DF-110R (UNI-POLAR)

Features and Specifications the same as Model DF-100 except unit is 1¾" high and is for Rack Panel Mounting. Input thru rear mounted MS3102A-14S-7P connector.

Price: $525.00 Includes Input Mating Connector.

DF-115R (BI-POLAR)



- Bi-polar Conversion
- 100 MV Full Scale Input
- All Silicon Solid State
- Easily Serviced
- High Accuracy
- Instantaneous Response
- 100 KHz Output

Price: $795.00 Includes Input Mating Connector.

100 KHz FULL SCALE OUTPUT	
Full Scale DC Input Voltage	Input Impedance
±100 MV	1000 ohms
±1.0 V	10 K ohms
±10.0 V	100 K ohms
±100.0 V	1 M ohm

Linearity: Better than 0.01% full scale from best straight line.

Output Waveform: Separate simultaneous DC coupled positive and negative pulses, 0V to +1.5V and 0V to −1.5V nominal peak amplitudes, each 2 microseconds nominal width, for each quadrant.

Output Response: Essentially instantaneous, output changes to new frequency in less than one cycle of output.

Relay Output: One set of form C relay contacts transfer in accordance with the polarity of the DC input signal.

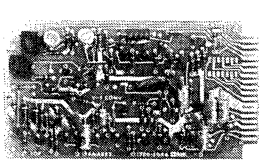
Polarity Indicators: Two lamps mounted on the front panel indicate polarity of the DC signal.

Temperature Range: 0°F to +165°F.

Temperature Coefficient:
Full Scale: Less than ±0.005% per °F over operating temperature range.
Zero: ±10 microvolts per °F (referred to the input) over operating temperature range.

Power: 105-125 or 210-250V RMS, 50-400 Hz.

1700-5044-00 (UNI-POLAR)



- 1 MHz Output Frequency
- All Silicon Solid State
- Compact Size
- 30% Overrange
- High Accuracy and Stability

Price:

1-9	$175.00	20-49	$145.00	100 & Up	$120.00
10-19	$166.00	50-99	$139.00		

Input: 0 to +10V DC, overrange to +13V DC.
Input Resistance: 50 K ohms ±1%.

Output: Negative pulse from +5V DC to ground up to 1 MHz full scale. Pulse duration is 200 ns nominal.

Response: Instantaneous.

Linearity: Better than 0.01% of full scale from best straight line.

Temperature Range: −10°C to +65°C.

Temperature Stability: Less than ±0.007% of reading. ±0.001% of full scale per °C.

Power Required: +15V DC ±0.1% @ 20 ma. −15V DC ±0.1% @ 50 ma.

Mating Connector: Viking #2VH18/ICND3 (Anadex P/N 2103-5010-00, $5.00).

Size: 5.75" x 3.00".

Optional Input Amplifier provides 1 MHz output for 1V DC Input.

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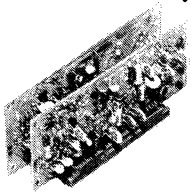
DC TO FREQUENCY CONVERTERS 7000-5072-00 (BI-POLAR)

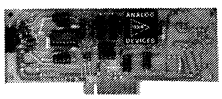
ANADEX
INSTRUMENTS, INC.



- **Bi-Polar Input**
- **1 MHz Output Frequency**
- **0.01% Linearity**
- **Instantaneous Response**
- **Low Cost**

Price: $275.00
Input: 0 to ±10V DC, overrange to ±13V DC.
Input Resistance: 50K ohms ±1%.
Output: Two signals, one for positive inputs and one for negative inputs. Each is a negative going pulse from +5V DC to ground up to 1 MHz full scale, duration 200 ns nominal.
Response: Instantaneous.
Linearity: Better than 0.01% of full scale from best straight line, each quadrant.
Temperature Range: −10°C to +65°C.
Temperature Stability: Less than ±0.007% of reading, ±0.001% of full scale per °C.
Power Required: +15V DC ±0.1% at 70 ma, and −15V DC ±0.1% at 70 ma.
Physical Size: Two cards, each 6.35″ x 2.63″, with edge card contacts on long side. Mating Connector, Viking #2VK10D/1-2 (Anadex 2103-5004-00, $5.00 each).
Options: Three output options and four input amplifier options available, CONTACT ANADEX.

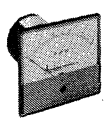
DATA AMPLIFIER SA-100



- **30 Megohm Input Impedance**
- **Differential Input**
- **High Common Mode Rejection**
- **±0.01% Linearity**
- **Four Gain Settings**

Price: $195.00
Input: Differential and may be either floating or grounded. No bias current return path required.
Input Impedance: 30 Megohms.
Sensitivity: ±10 mv to ±10V. Maximum over-voltage of 1000 times full scale or ±25V pk-pk, whichever is less.
DC Gain: Four fixed settings of 1, 10, 100, and 1000.
Common Mode Rejection: At gain = 1000, approx. 120 db.
Output: ±10 volts full scale at 1 ma, short circuit current safely limited. Impedance = 0.1 ohm in series with 50 μhenries. Capacitive load up to 1 μfarad without instability.
Stability: ±0.002% of reading per °C; ±0.01% of reading per month or ±0.02% of reading per 6 months; of initial setting, ±0.1% of reading.
Power Required: +15V DC ±0.1% at 50 ma and −15V DC ±0.1% at 50 ma.
Physical Size: 6.35″ x 2.63″, with edge card contacts on long side. Mating connector, Viking #2VK10D/1-2 (Anadex 2103-5004-00, $5.00).

FREQUENCY INDICATORS PI-100



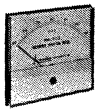
- **Compact**
- **Lightweight**
- **±1% of F.S. Accuracy**
- **Two to One Full Scale Range Adjustment**

Price: $195.00 Includes Mating Connector.
The Anadex PI-100 Series of Frequency Meters offers a complete selection of pulse rate integrators to fill the needs of industry for versatile and reliable indicators of frequency. Direct readout of frequency or normalized frequency, in engineering units, from transducers such as flow meters, tachometers, etc. is provided. Conversion of the input frequency signal to an analog output of DC voltage or current is also provided.

Model	Meter
PI-101, 121 PI-102, 122	3½″ 4½″

Input Sensitivity: PI-101 and PI-102; 0.01V RMS minimum (down to 5 Hz) 30V RMS maximum. Sine wave, square wave and approximations thereof with 20% minimum duty cycle @ minimum full scale frequency. PI-121 and PI-122; Pulse Input, +1.0V minimum, +30V maximum. Pulse duration of 1 μs minimum and 1V/μs maximum rise time. Negative pulse units available on special order.
Input Impedance: 22,000 ohms. Internal clipping of high input voltages prevents damage to the unit. The average input impedance diminishes whenever high input signals cause clipping.
Standard Full Scale Ranges: Maximum upper frequency limits of 50, 100, 200, 300, 500 Hz., 1, 2, 3, 5, 10, 20, 30, or 50 KHz. The full scale of the unit may be adjusted by means of a trimpot at the rear of the unit over a two to one range. Thus, a 1 KHz model may be adjusted for a full scale from 500 Hz to 1 KHz.
Meter: D'Arsonval type with converter integrally mounted.
Scale Plate: Marked 0 to 100, 50 divisions as standard. Special scales available at additional cost.
Pulse Output: A pulse output of approximately 8V pk-pk (+1V to +9V) (from 10K ohms source impedance) is available to drive electronic counters and recorders.
Accuracy: ±1% of full scale.
Power Supply: +22V to +30V @ 30 ma input is standard. Option P provides for a 115V RMS, 50 to 400 Hz power supply.
Connector: MS-3102A-14S-6P (solder header available at no extra charge but must be specified).
Option A: Provides a 0 to +50MV DC output signal from a source impedance of 1,250 ohms, single ended, with a linearity of ±0.25% of full scale. **Price:** $25.00
Option P: Provides compatibility with a 105 to 125V RMS, 50 to 400 Hz power supply. **Price:** $25.00

FREQUENCY DEVIATION INDICATORS PI-111 & 112



- **±0.1% Accuracy**
- **Power Derived From Signal Source**
- **3½″ or 4½″ Wide Meter**

Price: PI-111 $145.00 PI-112 $145.00
Signal Voltage: 105 to 125V AC RMS.
Power Required: 2 watts nominal
Accuracy: ±0.1% of reading.

Model	Meter	Range	No. of Scale Divisions
PI-111-50 Hz	3½″	47.5-52.5 Hz	50
PI-112-50 Hz	4½″	47.5-52.5 Hz	50
PI-111-60 Hz	3½″	57-63 Hz	60
PI-112-60 Hz	4½″	57-63 Hz	60
PI-111-400 Hz	3½″	380-420 Hz	40
PI-112-400 Hz	4½″	380-420 Hz	40

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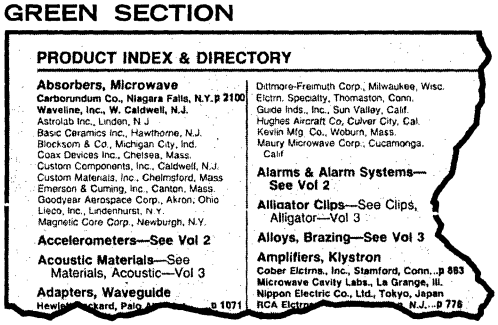
to find manufacturers of a specific product

GREEN SECTION


PRODUCT INDEX & DIRECTORY

Absorbers, Microwave
Carborundum Co., Niagara Falls, N.Y.p 2100
Waveline, Inc., W. Caldwell, N.J.
Astrolab Inc., Linden, N.J.
Basic Ceramics Inc., Hawthorne, N.J.
Blocksom & Co., Michigan City, Ind.
Coax Devices Inc., Chelsea, Mass.
Custom Components, Inc., Caldwell, N.J.
Custom Materials, Inc., Chelmsford, Mass
Emerson & Cuming, Inc., Canton, Mass.
Goodyear Aerospace Corp., Akron, Ohio
Lieco, Inc., Lindenhurst, N.Y.
Magnetic Core Corp., Newburgh, N.Y.

Accelerometers—See Vol 2

Acoustic Materials—See Materials, Acoustic—Vol 3

Adapters, Waveguide
Hewlett-Packard, Palo Alto ... p 1071

Dittmore-Freimuth Corp., Milwaukee, Wisc.
Elctrn. Specialty, Thomaston, Conn.
Gude Inds., Inc., Sun Valley, Calif.
Hughes Aircraft Co, Culver City, Cal.
Kevlin Mfg. Co., Woburn, Mass.
Maury Microwave Corp., Cucamonga, Calif

Alarms & Alarm Systems—See Vol 2

Alligator Clips—See Clips, Alligator—Vol 3

Alloys, Brazing—See Vol 3

Amplifiers, Klystron
Cober Elctrns., Inc., Stamford, Conn...p 883
Microwave Cavity Labs., La Grange, Ill.
Nippon Electric Co., Ltd., Tokyo, Japan
RCA Elctrn... N.J...p 776

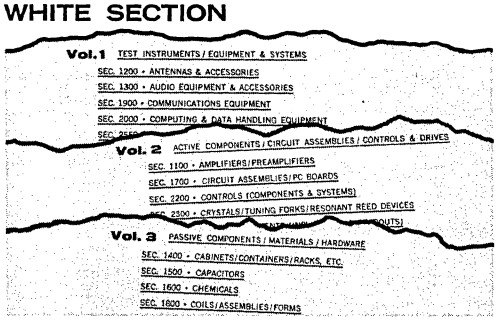
Each of the three volumes of **eem** contains a Product Index and Directory, the Green Section. This Index is a complete alphabetical listing of products. If the product you are looking for appears in the particular volume you are consulting, the green pages will provide a complete list of manufacturers who make that product. If the product is included in another volume of **eem**, the Index will provide a cross reference, directing you to the correct volume.

Boldface listings under product headings indicate that the listed manufacturer has products cataloged in **eem. Boldface** listings with page numbers indicate that this manufacturer's catalog pages include detailed data on the product indicated in the product heading.

Similar products are grouped together. For example, the many kinds of meters are listed in this manner: "Meters, Ampere," "Meters, Capacitance," "Meters, Flux" etc. To help you locate the prime product heading, there are hundreds of cross references, e.g. "Voltmeters — See Meters, Volt."

to find manufacturers' catalog information

WHITE SECTION


Vol. 1 TEST INSTRUMENTS / EQUIPMENT & SYSTEMS
SEC. 1200 • ANTENNAS & ACCESSORIES
SEC. 1300 • AUDIO EQUIPMENT & ACCESSORIES
SEC. 1900 • COMMUNICATIONS EQUIPMENT
SEC. 2000 • COMPUTING & DATA HANDLING EQUIPMENT
Vol. 2 ACTIVE COMPONENTS / CIRCUIT ASSEMBLIES / CONTROLS & DRIVES
SEC. 1100 • AMPLIFIERS/PREAMPLIFIERS
SEC. 1700 • CIRCUIT ASSEMBLIES/PC BOARDS
SEC. 2200 • CONTROLS (COMPONENTS & SYSTEMS)
SEC. 2500 • CRYSTALS/TUNING FORKS/RESONANT REED DEVICES
Vol. 3 PASSIVE COMPONENTS / MATERIALS / HARDWARE
SEC. 1400 • CABINETS/CONTAINERS/RACKS, ETC.
SEC. 1500 • CAPACITORS
SEC. 1600 • CHEMICALS
SEC. 1800 • COILS/ASSEMBLIES/FORMS

Catalog pages in **eem** are divided into three volumes based on very broad product groupings. These are:

Volume 1 — Test Instruments / Equipment and Systems

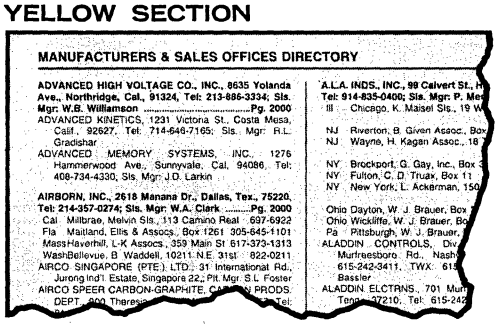
Volume 2 — Active Components / Circuit Assemblies / Controls and Drives

Volume 3 — Passive Components / Materials / Hardware

These volumes are further divided into 55 **eem** Product Sections which are assigned individually to the most appropriate volume. Within each of the 55 product sections manufacturers are arranged alphabetically, wherever possible. A complete index of all manufacturers' catalog pages is included in every volume. To locate the catalog pages of a specific manufacturer, refer to this index at the beginning of the white section in any of the three volumes. This index will provide the page numbers you require. In Volume 1, the index begins on page 302, in Volume 2 on page 1274 and in Volume 3, page 2310.

to find manufacturers' addresses, phones and sales offices

YELLOW SECTION


MANUFACTURERS & SALES OFFICES DIRECTORY

ADVANCED HIGH VOLTAGE CO., INC., 8635 Yolanda Ave., Northridge, Cal., 91324, Tel: 213-886-3334; Sls. Mgr: W.B. Williamson .....Pg. 2000
ADVANCED KINETICS, 1231 Victoria St., Costa Mesa, Calif., 92627, Tel: 714-646-7165; Sls. Mgr: R.L. Gradishar
ADVANCED MEMORY SYSTEMS, INC., 1276 Hammerwood Ave., Sunnyvale, Cal, 94086, Tel: 408-734-4330, Sls. Mgr: J.O. Larkin

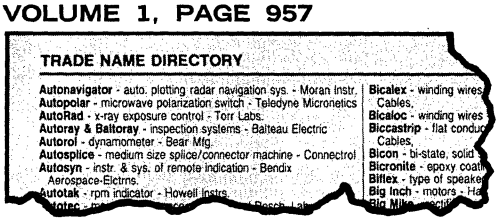
AIRBORN, INC., 2618 Manana Dr., Dallas, Tex., 75220, Tel: 214-357-0274; Sls. Mgr: W.A. Clark .....Pg. 2000
Cal Millbrae, Melvin Sls., 113 Camino Real 697-6922
Fla Maitland, Ellis & Assocs., Box 1261 305-645-1101
Mass Haverhill, L-K Assocs., 359 Main St 617-373-1313
WashBellevue, B Waddell, 10211 N.E. 31st 822-0211
AIRCO SINGAPORE (PTE) LTD., 31 International Rd., Jurong Ind'l. Estate, Singapore 22,; Plt. Mgr: S.L. Foster
AIRCO SPEER CARBON-GRAPHITE, ... PRODS. DEPT., ... Tel:

A.L.A. INDS., INC., 99 Calvert St., H... Tel: 914-835-0400; Sls. Mgr: P. Me...
Ill Chicago, K. Maisel Sls., 19 W...
NJ Riverton, B. Given Assoc., Box...
NJ Wayne, H. Kagan Assoc., 18...
NY Brockport, G. Gay, Inc., Box ...
NY Fulton, C. D. Truax, Box 11
NY New York, L. Ackerman, 150...
Ohio Dayton, W. J. Brauer, Box...
Ohio Wickliffe, W. J. Brauer, Bo...
Pa Pittsburgh, W. J. Brauer, ...
ALADDIN CONTROLS, Div. ... Murfreesboro Rd., Nash... 615-242-3411, TWX: 615... Bassler
ALADDIN ELCTRNS., 701 Mur... Tenn., 37210, Tel: 615-242...

More than 6,000 manufacturers of electronic components, materials, instruments, assemblies, systems and key services are listed in the Yellow Section. An identical Yellow Section appears in each of the three volumes of **eem**, listing addresses, phone numbers and sales managers' names. TWX numbers are also included where available. **Boldface** listings indicate that detailed information on the manufacturers' products is cataloged in the White Section of **eem. Boldface** listings also indicate that local sales offices or representatives are listed for that manufacturer.

to find trade name sources

VOLUME 1, PAGE 957


TRADE NAME DIRECTORY

Autonavigator - auto. plotting radar navigation sys. - Moran Instr.
Autopolar - microwave polarization switch - Teledyne Micronetics
AutoRad - x-ray exposure control - Torr Labs.
Autoray & Baltoray - inspection systems - Balteau Electric
Autorol - dynamometer - Bear Mfg.
Autosplice - medium size splice/connector machine - Connectrol
Autosyn - instr. & sys. of remote indication - Bendix Aerospace-Elctrns.
Autotak - rpm indicator - Howell Instrs.

Bicalex - winding wires Cables,
Bicaloc - winding wires
Biccastrip - flat conduc... Cables,
Bicon - bi-state, solid ...
Bicronite - epoxy coati...
Bifiex - type of speake...
Big Inch - motors - Ha...

If you know only the trade name, brand name or trade mark of a product, you can locate it in **eem** by using the **Trade Name Directory.** This appears only in Volume 1, beginning on page 957 of the White Section. These pages can be identified by a vertical black band along the outside edge.

if you require additional assistance

contact the Editorial Department, United Technical Publications, Inc., 645 Stewart Ave., Garden City, N.Y. 11530, or phone (516) 248-9700.

api INDICATING & CONTROLLING INSTRUMENTS

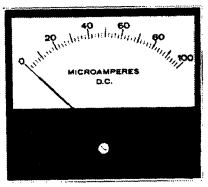
▶ Panel meters

API panel meters have standard 1% tracking and frictionless taut band movement in the most popular DC ranges—20 to 100 μa and 5 to 25 mv. Taut band (not 1% tracking) is standard in ranges between 3 and 10 μa. Most taut band DC meters can be calibrated for 0.5% tracking, 1% accuracy, or 0.5% accuracy. Pivot-jewel movement is standard above 100 μa.

New Series 7000 panel meters

API Series 7000 is an all-new line with forward styling and panel mounting versatility never before available in one meter design. Mounting options are front mount, bezel mount and lens mount. "Stick-on" color plates are offered for front-mounted meters. Other features: field-changeable scales, rugged phenolic cases and fronts, glass windows.

Sizes: Model 7025 (2½"), Model 7035 (3½"), Model 7045 (4½"), and Model 7055 (5½").

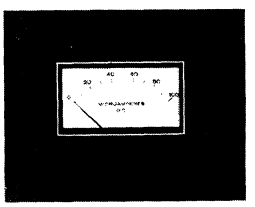


Front Mount.

Other API panel meters

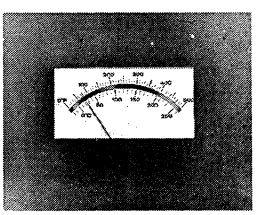
Additional panel meter types include black phenolic in both front mounting and recessed mounting styles, edge-reading models, ruggedized-sealed meters, and VU meters for recording and broadcasting applications. Sizes range from 2¼" to 10" in width.

New electronic panel meters, featuring 1% accuracy and 1-second response, are also available. Specify product when requesting literature.


Bezel mount.

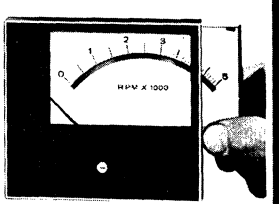
Indicating pyrometers

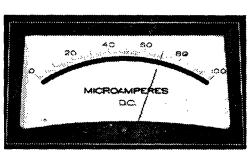
Pyrometers are thermocouple-actuated, all taut band, and both bimetal and thermistor compensated for ambient temperature changes. Standard mirrored scales read both °F and °C. They are stocked in popular ranges, with the same case styles as panel meters. Standard accuracy is 2%, with 1% available. Portable pyrometers also stocked.


Lens mount.

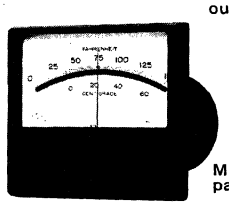
Meter-relays

Meter-relay types include the Ultimeter (potentiometric set point), contactless (optical), contacting (locking-coil), and contacting (magnetic), all of which are used with API circuit modules or other control circuitry. Adjustable single or double set points. Specify product when requesting literature.


Series 7000 scales are field-changeable without pointer damage.

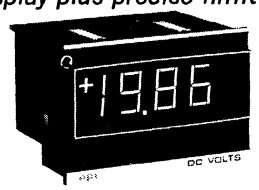


Model 561 panel meter.


Model 503-E electronic panel meter.

▶ Digital products

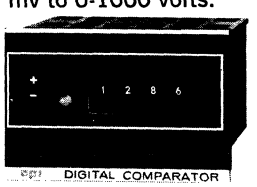
API digital panel instruments combine award-winning design with fine features. Digital panel meters may be teamed with matching comparators for large up-front display plus precise limit control.



Model 4304 digital panel meter.

Model 4304 digital panel meter

Model 4304 has large 7-bar segmented digits with easy-to-read display to ±1999 with 1000-megohm input impedance. Standard features include auto-polarity, 0.1% accuracy, BCD output, 100% over-range, front or rear panel mounting. Ranges are 0-199.9 mv to 0-1000 volts.



Model 4310 digital comparator.

Model 4310 digital comparator

This 4-digit comparator has BCD input 1-2-4-8, algebraic comparison, logic output, 2 amp relay contact, polarity switch, and visual lamp indicators. Logic circuitry is separable. Choice of fixed limit or adjustable thumbwheel limit. Remote programming models available.

7-bar segmented displays

Digital display modules may be used for low cost counters and readouts. Each module provides counter, storage and decoder-driver, BCD output, serial or parallel input, neon lamp, decimal point. Mounting hardware available for multi-decade displays.

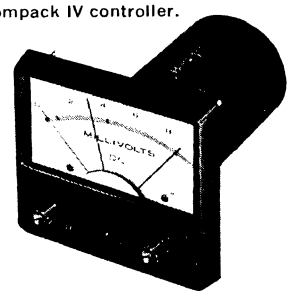
Model 4320 digital temperature indicator

Direct display of temperature with one degree F resolution, electronic T/C curve linearization, up to 0.15% full scale accuracy, and complete isolation between input and digital outputs. Standard features enhance system capabilities: 250 v input to output isolation, buffered BCD outputs, automatic cold junction compensation, 50 megohm input impedance, high common mode and normal mode noise rejection.

Controllers

API solid-state controllers provide many different levels of sophistication for controlling temperature and other process variables. Most temperature control models are thermocouple actuated, with no recalibration necessary up to 100 ohms thermocouple resistance. Quick delivery in standard ranges.

Compack IV controller.



Compack controllers

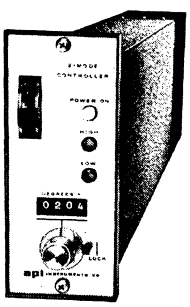
Compack IV On-Off controllers are dimensionally and electrically interchangeable with most controllers incorporating optical meter-relays, but they provide such improvements as 1% accuracy, faster response and solid-state reliability. Other features: switching independent of meter, chopper amplifier input impedance, adjustable single or double set points, self-contained power supply. Available as a thermocouple-actuated temperature controller.

Pyrometer models of Compacks I and II, built around optical meter-relays, offer On-Off, Time Proportioning or SCR driver control action.

Model 232 temperature controller.

Model 232 temperature controller

This low cost controller is designed for industrial and commercial ovens, laboratory environmental chambers, plastics and packaging machines. Built in the USA to DIN dimensions, it provides either relay or SCR type output for On-Off or Time Proportioning control. Standard ranges in stock (minimum span 0 to 300°F). Is also available as FM approved temperature limit.



Model 226—digital set point

Model 227—analog set point

Two-mode temperature controllers

These instruments cover a broad range of applications in plastics, packaging, textiles, hydrocarbons, and many types of furnaces and ovens. Outputs include voltage or current, Time Proportioning zero crossing, Time Proportioning relay, phase-fired pulse.

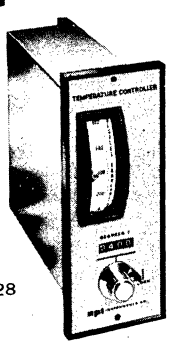
Models 225 and 226 offer field-changeable plug-in cards for ranges, outputs and optional alarm. Other features are adjustable proportional band, adjustable automatic reset, deviation meter. Model 225 has analog set point; Model 226 is digital.

Model 227 is the smallest, lowest priced instrument among two-mode controllers with indicating meters and integral control elements. No adjustments except temperature setting. Analog set point.

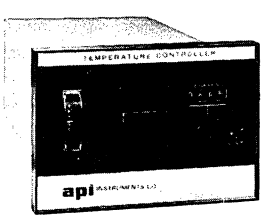
Model 228 incorporates a large indicating meter, 4-digit set point, and offers choice of plug-in output cards.

Model 235 has a 4-digit set point, deviation meter, adjustable proportional band, adjustable reset, choice of output cards.

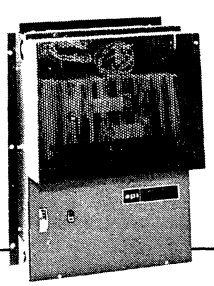
Solid-state power packs, for use with API process controllers, are available in 30, 50, 70 and 100 amperes.



Model 228



Model 235



Model 4011 power pack

For complete specifications and prices, write or call for specific API Product Bulletins.

api INSTRUMENTS CO. a subsidiary of LFE CORPORATION

1601 Trapelo Road Waltham, Massachusetts 02154 Phone: (617) 890-2000

INSULATION TESTING INSTRUMENTS

ASSOCIATED RESEARCH, INC.

Insulation Resistance Testers

Ranges from 100 to 10 million megohms at test potentials to 10 KV.

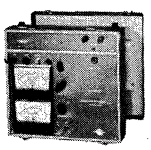
The MEG-CHEK® megohmmeter provides a wide selection of battery and line-powered instruments for accurate insulation resistance measurements of circuits, components, cables, motors, etc. They are direct reading and push button operated requiring no cranking or leveling.

Select from 17 models ranging from pocket-size to portable 10 KV with variable voltage. Some models combine megohm with ohm and AC-DC volt scales in one instrument. Five popular models are:

Model	DC Test Voltage	Max. Megohms	Features	Price
2000	500	100	Pocket-size	$ 95
2201	500	200	Includes 2K ohm and six AC-DC volt scales	165
2211	1000	2000	200 K ohm range	255
2850	500/50	10 Million	Constant test voltage through 6 decades	345
2955	0-2,500	50,000	Adjustable test voltage	890

Request MEG-CHEK Megohmmeter Bulletins by model number.

Portable DC HYPOTS® to 200 KV

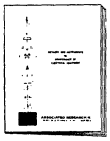


Output of the several portable DC HYPOTS is continuously variable from 0 to maximum with the voltage metered directly in the output. Leakage current measurements are on four range meters reading down to as low as 0.05 microamps. Features: 2% metering accuracies, electronic circuit protection, by-pass and metered return terminals, grounded steel cases, silicon rectifiers, plug-in high voltage leads, etc.

Model	Output Voltage	Output Current	Price
5205	0-5 KV	2.0	$ 550
5212	0-10 KV	2.0	675
5220	0-15 KV	2.0	735
5271	0-50 KV	2.5	2250
5321	0-100 KV	5.0	3115

Request Portable DC HYPOT Bulletins

Testing Manual Available



This 60 page collection of Bulletins covers specs, prices and applications of insulation resistance testers, AC HYPOT Juniors, portable and mobile DC test sets, corona and materials test equipment, kilovoltmeters, precision ohmmeter, current transformers, phase sequence indicators.

Request Manual 2900 on company letterhead

A-C HYPOT Jrs... to 10 KV, limited current

Portable a-c dielectric strength testers providing outputs continuously variable from 0-1500 V up to 10,000 V a-c. Use of neon breakdown and leakage current indicators in conjunction with collapsing field-type high voltage transformers assures rapid and safe production testing.

The leakage current indicator is adjustable from 0.3 to 3 ma. A 4½" kilovoltmeter provides high accuracy. Short-circuit current cannot exceed 18 ma.

Three popular models are:

Model	Output Voltage	Price
411	0-2,500	$175
404	0-4,000	190
422	0-10,000	260

HYPOT Jr. Automatic "Squawker" Models

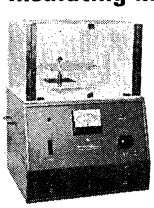
Available with output voltages from 0-1500 volts to 0-6000 volts a-c. Similar to the standard HYPOT Jr. models but include an audible signal unit and external control terminals.

DC and Combined AC/DC HYPOT Jrs.

offer same features as described above, plus test potentials to 5 KV.

Request AC & DC HYPOT Jr. Bulletins.

Insulating Materials Testers



A full range of testers for solid and liquid insulating materials to 100 KV and higher is available. Due to the rapid progress of insulating materials and testing techniques, new equipment is added whenever required to meet ASTM, MIL and Federal test specifications.

Model 4501 Materials Testing HYPOT 0-35 KV at 2 KVA

This popular model meets dielectric strength testing requirements of Specification D-149, ASTM Standards on Electrical Insulation Materials. Output continuously variable from 0-35 KV a-c at 2 KVA (intermittent rating). Magnetic breaker trips when specimen breaks down. Output termination in jacks at center of the lucite cabinet top accepts the interchangeable ARI materials testing fixtures. Optional features: interlocked clear lucite test cage and selection of ARI plug-in materials testing fixtures, automatic rate of rise, dual sensitivity circuit breaker, etc.

Request Insulation Materials Tester Bulletin

High Voltage Test Equipment to 500 KV AC and 1,000 KV DC

A full range of instruments for extra high voltage dielectric strength testing. AC or DC potentials at capacities of up to 150 KVA or more. Control and measurement features include: automatic rate of voltage rise, memory circuit to record breakdown voltage, output current metering, separate low voltage control and high voltage test cabinets and many others.

ARI has over 30 years experience in the design and manufacture of heavy duty very high voltage test equipment. All instruments are ruggedly constructed and fully tested in our own high voltage laboratory.

Corona Testing Equipment

New instruments detect, display and measure corona caused by voids, surface or other conditions in the insulation sample or the equipment under test.

Instruments include: specially constructed corona-free HYPOT test set, a pickup network to extract the true corona signal and the corona detection display module. Detector also incorporates a calibrator to make quantitative corona measurements down to 0.1 picocoulombs.

These modules are available as individual units or as a complete integrated instrument. Standard models with test potentials of 10 to 100 KV AC include these two popular models:

Model	Output KV	KVA Capacity	Cabinet Style	Price
4074	10	0.25	Bench	$2250
4309	35	1.0	Console	3950

Request Bulletin 4-1.9.

Mobile HYPOTS . . . to 150 KV DC

Heavy-duty mobile test sets for determining insulation leakage and dielectric strength of cables, bushings, switch-gear, transformers, motors and generators.

Outputs continuously variable from 0 to 45 KV and on up to 150 KV, with ratings of 2.5, 5, 10 ma. at full voltage.

Features include: 4½" kilovoltmeter connected directly across the high voltage output; three-range 4½" microammeter electronically protected against overload; zero return interlock; connector for remote safety interlock; fast-acting magnetic circuit breaker in output to protect high voltage circuits and external load; thermal overload breaker to protect input circuits; long-life silicon high voltage rectifiers; metered return and bypass return terminals for measurement of load (leakage) or bypass (guard) currents.

Request Mobile DC HYPOT Bulletin 5-1.16.

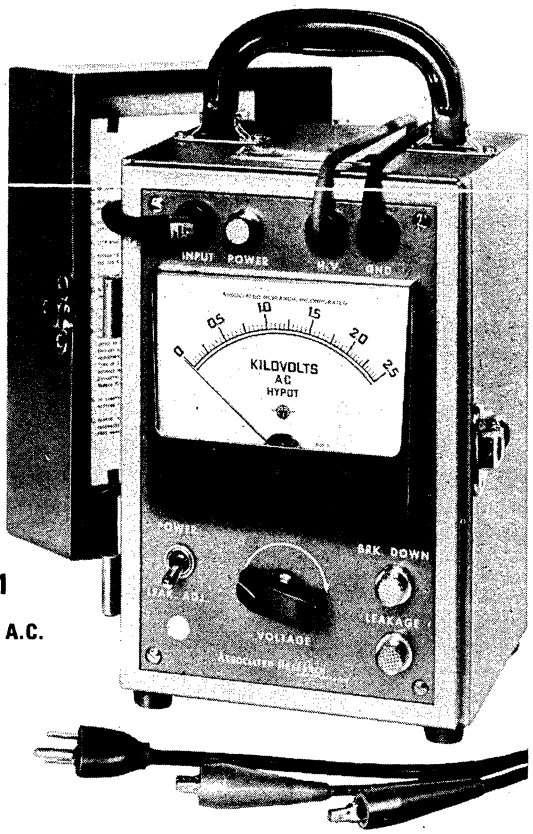
0025

ASSOCIATED RESEARCH, INC.
3773 W. BELMONT AVE., CHICAGO, ILL. 60618 • (312) 267-4040

ASSOCIATED RESEARCH, INC

INSULATION TESTING INSTRUMENTS

HYPOT® Junior BREAKDOWN TESTERS



Model 411
(illustrated)
0-2500 volts A.C. output

only **$175**

make faster, safer AC dielectric strength tests of electronic parts and components, small tools, appliances, motors, transformers, etc.

Simple to operate. Make breakdown, leakage and short tests to UL, CSA, ASTM, NEMA, IEEE, MIL and EASA standards. 115 vac, 50/60 cycle input. Continuously adjustable output. Included are: complete metering, controls, safety features, case with removable cover, test leads, line cord, instructions.

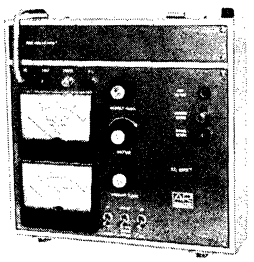
Visual Indicator Models . . . have neon "breakdown" light for breakdown, corona or arcing indication . . . and separate neon "leakage" light for leakage indication adjustable 0.3-3.0 Ma. 5 Models from 0-1500 to 0-10,000 volts output, priced from . . . . . **$165 to $260.**

Automatic "Squawker" models provide audible and visual test indications. 4 models from 0-1500 to 0-6000 volts output, priced from . . . . . **$265 to $290.**

Request Bulletin 4-1.3.

HYPOT® Juniors

with leakage current metering



Two new models incorporate three range micro-ammeters and guard circuits. Both feature:

- low AC leakage current measurement
- external guard circuit to eliminate stray leakage current
- accuracy of ± 3% F.S. on voltage and current ranges

Model No.	Output Voltage	Leakage Current Ranges	Price
4006	0-0.75/1.5 KV	0-50/500/5000 microamps	$415.00
4030	0-2/4 KV	0-50/500/5000 microamps	$495.00

Request Bulletin 4-1.10.

MEGOHMMETER Model 2850

measures insulation resistance to 10 million megohms

only **$345**

Advanced features:

- **constant test voltage over full range**
- **no overload damage**
- **positive line-voltage control**
- **maximum guarding flexibility**
- **latest tube-miniaturization techniques**

Versatile, accurate, reliable. Dual test voltage . . . 500 vdc and 50 vdc. 24" total scale length . . . 1 to 10,000,000 megohms in 6 decades. 115 vac, 50/60 cycle input. Measures resistance on printed circuits, transistor and miniaturized circuit components, cables, motors, etc. Measures leakage resistance of capacitors. Measures grounded and ungrounded sections of three-terminal resistors.

Also available: Model 2851 with 100 vdc and 500 vdc dual test ranges . . . . . only **$355.**

Request Bulletin 2-1.4.

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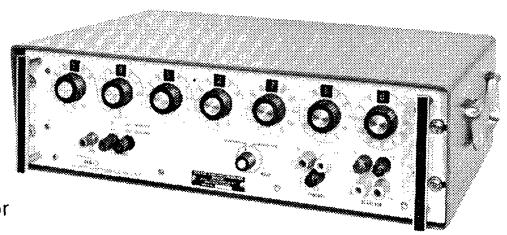
ASSOCIATED RESEARCH, INC.
3773 W. BELMONT AVE., CHICAGO, ILL. 60618 • (312) 267-4040

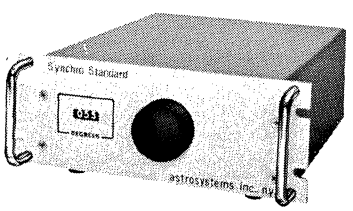
Advanced Test Instrumentation

Decade Synchro/Resolver Standards and Bridges



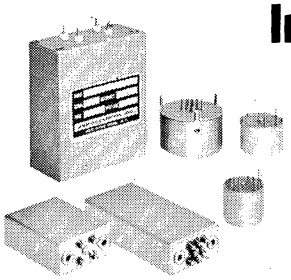
These devices are completely passive instruments for testing and simulating synchro/resolver systems to absolute accuracies of 2 seconds of arc. Units are available with 1° to .0001° resolution and feature direct angular readout. The units employ a unique toroidal ratio transformer technique to generate synchro and resolver voltages or discern synchro angle errors. Uses cover a wide range of applications for both laboratory and in-the-field use. Write for Data File No. 105.

Synchro and Resolver Standards and Bridges



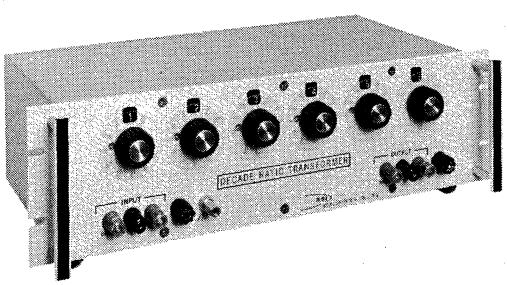
Synchro and Resolver Standards and Bridges test and simulate synchros, resolvers and servo systems quickly and economically. All units are accurate to 2 arc seconds, traceable to the National Bureau of Standards. Units are available with 5°, 10° and 15° resolution to cover a wide range of applications for both laboratory and system use. Write for Data File No. 105.

Instrumentation Transformers



Astrosystems high precision toroidal transformers are produced to accuracies of better than 0.5 parts per million. Available are matched high precision isolation transformers, bridging transformers, high precision voltage scaling transformers and Scott "T" transformers. Write for Data File No. 117.

Decade Ratio Transformers



Extremely precise and stable inductive voltage dividers, these units are suitable for use as laboratory standards, as well as for any application requiring highly accurate AC voltage measurement. Instruments can be precisely calibrated initially and will remain remarkably stable with respect to time, temperature, humidity, vibration and shock. Available in High Voltage, Universal, High Accuracy Laboratory Standard, and Thumbwheel models. Write for Data File No. 106.

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astrosystems, inc.

6 Nevada Drive / Lake Success, New York 11040 / 516/328-1600 / TWX 510/223-0411
West Coast: 4341 Commonwealth Avenue, Fullerton, California 92633 714/523-0820

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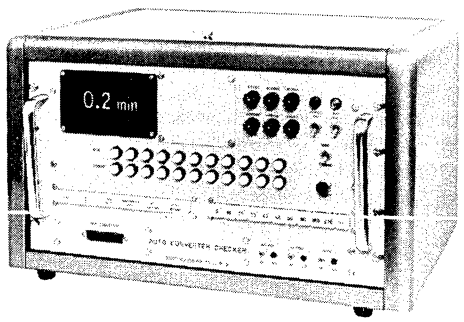
Automatic Test Instrumentation

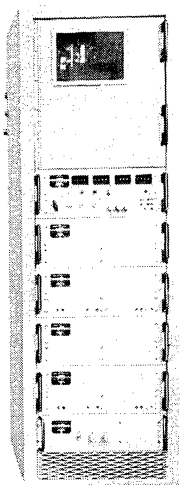


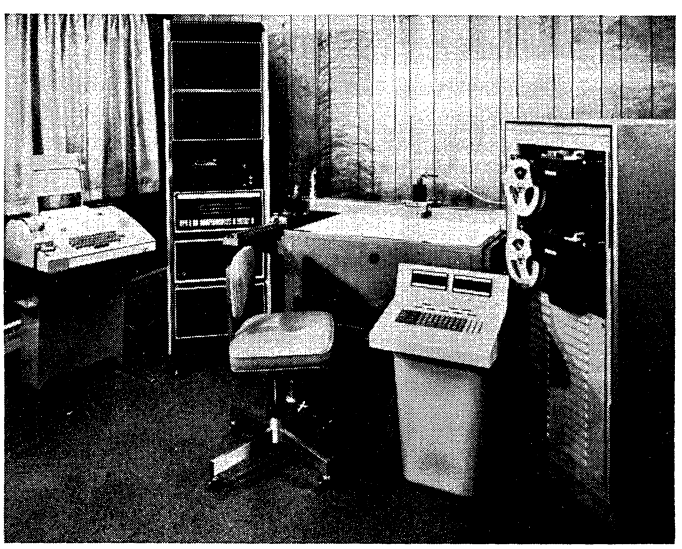
Automatic Converter Tester

Automatic Converter Testers are completely self contained devices for laboratory or production testing of all types of synchro, resolver and voltage digital conversion equipment. The units feature push button selection of tests such as accuracy, phase shift and transformation ratio, with an in-line decimal display of error in actual measurement parameters. Write for Data File No. 107.

Automatic Test Systems

Astrosystems designs and manufactures complete general purpose and special purpose automatic test systems. These units are constructed from standard building blocks and provide programming, stimuli, measurement and recording functions. Programming and data readout can be tape or computer controlled. Simple programming allows tests to be accomplished by relatively unskilled personnel. Data File No. 107.





Computer Controlled Circuit Test Systems

Astrosystems designs and produces automatic circuit test systems controlled by general purpose computers. These systems can be operated, controlled and programmed by test engineers and technicians unfamiliar with computers and computer terminology. A unique interactive communication system is employed which uses only English language and is completely unit-under-test oriented. The economical way to automate production testing, the systems perform go/no-go as well as diagnostic tests. Send for Data File No. 123.

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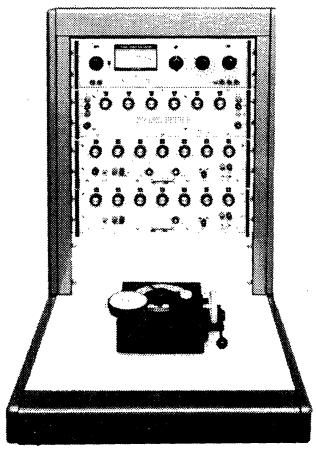
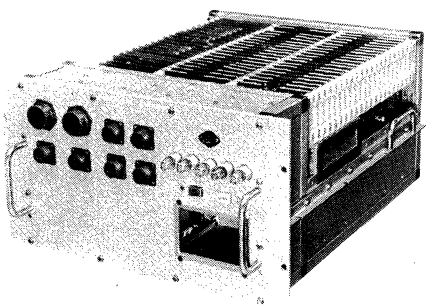
Automatic Test Instrumentation

Synchro/Resolver Test Stands



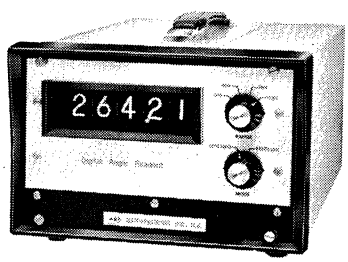
Astrosystems designs and produces standard and custom synchro and resolver testers. These devices measure synchro/resolver parameters such as accuracy, phase shift and transformation ratio. Indexing tables are also supplied as part of complete synchro/resolver and servo test systems. Options include error printout and computer control. Write for Data File No. 107.

Automatic Test Building Blocks



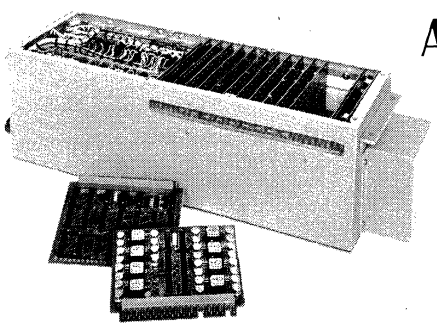
Building blocks are available for use in general purpose and special purpose automatic test systems. Devices include stimuli equipment such as synchro simulators, programmable AC voltage generators, programmable power supplies and automatic servo inputs. Measurement devices include voltage measuring blocks, response monitors and phase indicators. Write for Data File No. 107.

Automatic Synchro/ Resolver Bridge



The Automatic Synchro Resolver Bridge reads out synchro or resolver inputs on a direct in-line decimal display to an accuracy of 0.01°, completely automatically. This solid state readout eliminates the necessity for complex manual setting of synchro bridges and error detectors. BCD or binary electrical digital outputs are provided. Write for Data File No. 110.

Automatic Synchro/Resolver Converters



Automatic Synchro/Resolver Converters provide for programmed synchro/resolver outputs and measurement of synchro/resolver inputs in the same unit. These solid state devices are available with resolutions and accuracies to 16 binary bits (20 seconds of arc). Standards units cover the frequency range from 50Hz to 10K Hz without deterioration in accuracy. Write for Data File No. 107.

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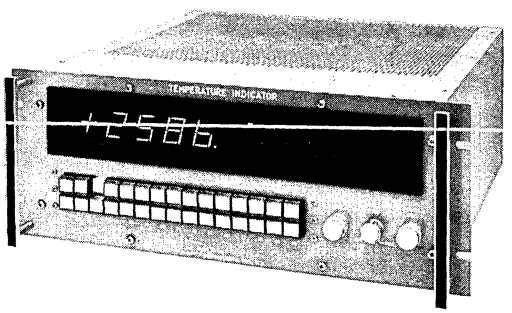
Process Control Instrumentation

Transducer Indicators



These solid-state multiplexed multi-channel Transducer Indicators are ideal for use wherever accurate readings must be obtained from transducers at a variety of remote locations and fed to an on-line computer for monitoring or automatic process control.

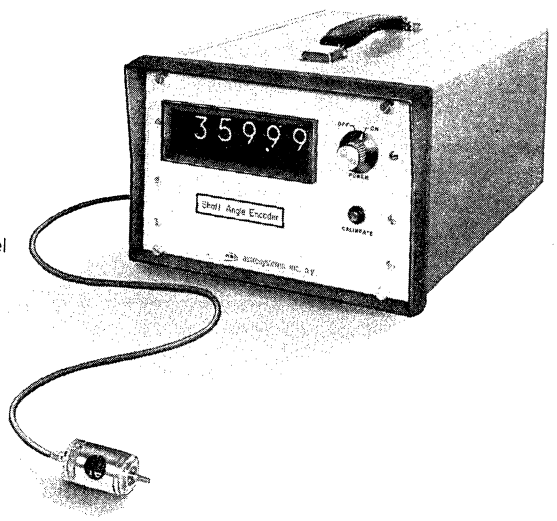
Inputs to the indicators can be obtained from thermocouples, strain gages, potentiometers, flowmeters, tachometers or any other type of DC or frequency transducer.

Input transducers can be scaled to read out in any desired engineering unit and each channel can have a different scale factor and engineering unit. Frequency multiplication is accomplished by a digital technique which is not effected by temperature or power supply variations. Accuracy is limited only by the resolution of the converter. The basic unit has a 4 to 32 channel capacity and can handle up to 200 channels through the use of an additional multiplexer chassis.

The unit can operate in both the automatic and manual mode simultaneously. It is possible to call up any desired channel for visual display while the unit continues to operate in the automatic mode without interruption. Designed for rack mounting, the unit weighs 40 pounds. Write for Data File Nos. 121, 131 and 132.

Shaft Angle Encoders

Unique, solid state encoders which are completely self-contained systems for transforming shaft rotations into a direct decimal visual display with a parallel digital output capable of feeding computers, printers and various types of off-line equipment. A magnetic transducer is used for long life and high reliability. Angle measurement is absolute and tracking, to high resolution and accuracy. Options include zero reset and a wide variety of accuracies, resolutions and scale factors. Write for Data File No. 114.



Data Logging Systems

High capacity, flexible data logging systems can accept many analog inputs of various types as well as digital inputs, and will print out at settable intervals all channels on an output device. The systems also contain a visual display which can be used to read out any selected channel. Printout devices of any type can be mini-Computer controlled. Write for Data File No. 133.

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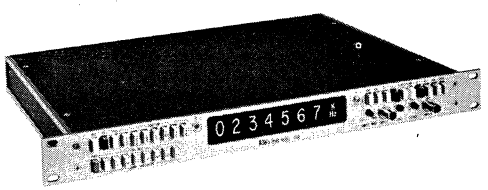
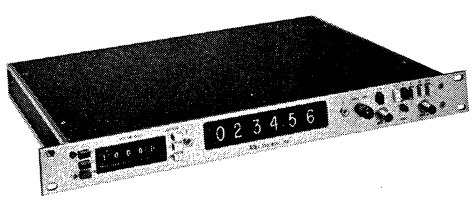
Atec sets the standard for Digital Counting Instruments...

Counters, Timers, Clocks, Totalizers, Comparators

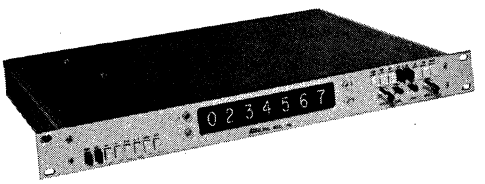
Precision and reliability in digital instrumentation at economical prices—that's Atec. *Versatility:* each instrument performs many functions. *Flexibility:* such features as extra digits, display storage, and high stability frequency standard may be added at any time. *Modern Design:* extensive use of IC's; standard plug-in modules; motherboard PC construction to minimize wiring. *Extra Features:* remote programming, BCD output at TTL levels, inline readout, and self-testing are user benefits from Atec digital counting / timing / totalizing / sampling / comparing instrumentation.



Universal Counter Model 2000 provides six measurement functions: frequency, period, multiple period, time interval, ratio, scale (totalize) at frequencies up to 12.5 MHz. Registers and displays five decimal digits (up to seven optional). Inputs from 0.01 V RMS to 125 V RMS, AC or DC coupling. Crystal-controlled 1 MHz oscillator as frequency standard with excellent time, voltage and temperature stability. Price: $850.



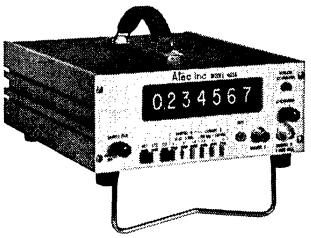
Variable Time Base or Rate Counter Model 2300 measures rate data over a wide range of counting intervals, 100 seconds down to 10 microseconds. Registers and displays four decimal digits (up to six optional). Rates to 12.5 MHz. Inputs from 0.01 V RMS to 125 V RMS. Frequency standard is 100 kHz crystal-controlled oscillator. Manual or remotely programmed control of gate time, multiplier, reset and storage. Price: $940.



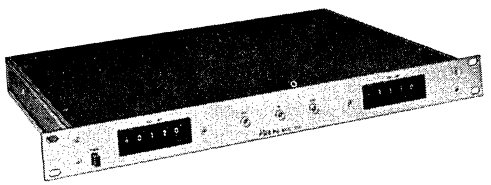
Bi-Directional Totalizer Model 2400 offers manual or remote selection of six operating modes: A+ adds pulses to register total at rates up to 10 MHz; A− subtracts pulses from register, 10 MHz maximum rate; other modes, 3 MHz maximum rate: A + B sums pulses at Inputs A and B and adds them to register; A−B adds pulses at Input A, subtracts at Input B; A quad B adds or subtracts pulses, depending on phase relationship; A as a function of B, pulses added or subtracted based on levels compared to threshold. Price: $895.

Time Interval Meter Ultra-precise resolution from 0.1 microseconds to 10^8 seconds is possible with Model 2503, used for such measurements as ballistic velocities, acceleration rates, nuclear phenomena, relay response times and many other transients. Inputs are adjustable for level, slope, polarity and coupling to trigger exactly at desired point on input waveform. Readout in milliseconds. Manual or remote programming. Price: $595.

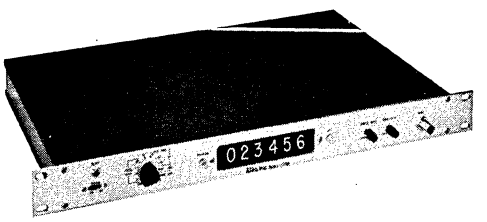
Universal Reciprocal Rate Meter Model 2310A is one of a family of instruments designed specifically for high speed, high resolution rate measurements of low frequency inputs. Multiple period measurement results are multiplied by a constant (K) factor for display directly in engineering units such as RPM, CFM, GPM, etc. Typical compute times are far less than one second. Other models monitor and control multiple flowmeter and other staging operations with the same speed and accuracy. Analog and digital electrical outputs are available. Price: $1575 (Single-Channel)



500 MHz Electronic Counter Model 4058 is an all solid-state frequency counter covering the entire range from 10Hz to 500MHz. Input sensitivity is 100mV RMS over the entire frequency range. A front panel lamp indicates when the maximum input is being exceeded. Three selectable gate times per input allow selection of various readout resolutions. Deluxe features such as a temperature compensated crystal oscillator, self-test, display storage, carrying strap, and "stand-up" bale are standard. Small and compact, the unit weighing only 8½ lbs. was designed primarily for fast and accurate frequency checks of transmitters and for field service. Price: $1445.

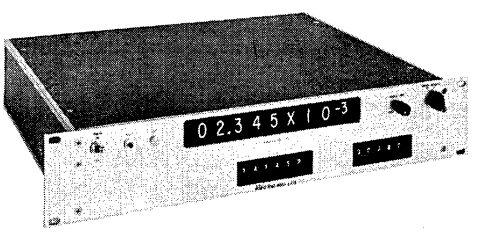


Digital Comparator Model 3200 is one of four comparators which generate output control signals ("Go-No-Go" or "High/Low/In" limits) based on input data and preset limit values. Measurement comparisons are made by parallel computation (as opposed to coincidence logic) permitting moving or static BCD inputs to be compared to preset limits. Models 3200 (dual limit) and 3201 (single limit) are priced at $625 and $425; Models 3202 (dual limit) and 3203 (single limit) provide algebraic comparisons and interface with bi-directional totalizers and digital voltmeters, and are priced at $825 and $525.



Counter/Timer Model 2200A is a general purpose counter/timer with a range of from 5 Hz to 35 MHz. Standard features include display storage, remote programming, BCD output and a crystal-controlled time base. Measurement functions include frequency, period averge, totalize and timing. The standard Model 2200A provides 5-digit readout but a sixth is available as an option. Price: $495.

Universal Preset Counter The Model 2304 measures period, batch, rate, a preset number, ratio, and it totalizes. Frequency response is from DC to 15 MHz. Front-panel preset switches allow the operator to vary the time base for rate measurements, or to preset the digits representing a "batch" size. The instrument can also be used to measure the time required for a selected number of events to occur. BCD output is provided. Price: $1090.



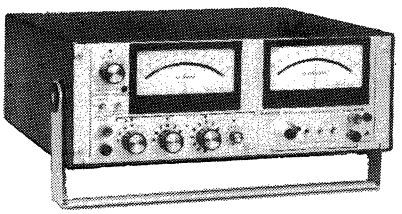
Computing Angle Indicator Model 4105 utilizes an optical shaft encoder to resolve angular position to a tenth of a degree, then multiplies the angle by a selectable K factor for solution of various functions. Any START angle can be referenced by thumbwheel switch selection. Digital electrical output is standard, while a bi-polar (0 to ±50mV) analog output with seven selectable full-scale settings is optionally available. Price: $1985

Densitometer Model 1117B, in conjunction with a digital density transducer, measures gas density in a sample chamber over the range 0.00001 lbs./ft³ to 10 lbs/ft³ with resolution of 0.00001 lbs/ft³. A multiple period measurement of the density transducer output is converted directly into engineering units by use of K and OFFSET factors. Crystal-controlled oscillator, BCD electrical output and storage are standard. Price: Approximately $2000 including transducer depending upon transducer housing.

Atec, Inc.

1125 Lumpkin St., Houston, Texas • Phone (713) 468-7971
Mailing Address: P. O. Box 19426, Houston, Texas 77024

BAFCO FREQUENCY RESPONSE ANALYZERS



Common features of BAFCO Frequency Response Analyzers include:
Low distortion (no sharp spikes) **calibrated** test signals (±30 ma.) —
Continuous and **simultaneous availability** of all **outputs** —
Automatic noise and **harmonic rejection** (≥ 40 db) resulting from **FOURIER** analysis of return signal.
Most models are complete in basic sizes of 5¼" high, 13" deep, and are portable and rack mounting.
There is a Bafco F.R.A. to meet your measurement needs.

ANALYZER TYPES	FREQ. RANGE	OPTIONS	APPLICATIONS	PRICE
SINGLE CHANNEL: MANUAL OPERATION, POINT-BY-POINT **910A** — Lowest cost one channel analyzer for the rapid and accurate measurement of frequency response. Results in Cartesian coordinates — in-phase and quadrature.	0.1 to 20,000 Hz	Carrier 50 to 10,000 Hz.	Passive and active networks, feedback control systems and components; audio systems and components.	**$1975**
910B — Identical to 910A with polar coordinate readout of phase and amplitude.				**2450-2875**
911A — Universal F.R.A.: very fast operation. Includes carrier and outputs of square and triangle waveforms. Direct reading phase and amplitude.	0.01 to 10,000 Hz	DC ~ Log Freq. DC ~ Amp Ratio (db ± 60).	Universal: all feedback control systems (DC and carrier) for very rapid results to 0.01 Hz. Portable for field use.	**3950**
911AD — Identical with 911A, but with digital readout of amplitude (direct reading) and phase (degrees).				**4450**
911A2D — Identical with 911A but with dual digital readout of amplitude ratio (db) and phase.				**5750**
SINGLE CHANNEL: MANUAL OPERATION, SWEEP FREQUENCY **911GO** — Sweep with direct plotting of amplitude (db) and phase vs. log frequency. Expandable to all 911G capabilities.	0.005 to 10,000 Hz	Expandable to all 911G options.	All feedback control systems and components for direct plot of results vs. log frequency.	**7250**
SINGLE CHANNEL: PROGRAMMABLE **911AC** — Digital computer programmable. Three 16 bit words program frequency, waveshape, amplitude of test signal and mode of operation. Program held until changed. Readout of phase and amplitude in two 16 bit words.	0.01 to 10,000 Hz	Program offsets, program carrier, front panel control and readout.	Digital computer testing of systems and components.	**7950**
911APD — Relay and DC voltage programmable. Front panel operation as 911AD. Remote programming on any one or more functions. Suitable for stepping switch program of fixed set of frequency response test points.		DC ~ Log Freq. DC ~ Amp Ratio (db ± 60).	Repeated frequency response testing from programmer.	**6450**
TWO CHANNEL: MANUAL OPERATION, SWEEP FREQUENCY **911G** — Lowest cost two channel F.R.A. Point-to-point measurement of amp ratio (db) and phase shift. Plots results vs. log frequency. Rapid at low frequencies.	0.005 to 10,000 Hz	Carrier. Hyperbolic sweep. Input filters, matched bandpass Multi (> 2) channel.	Point-to-point measurement directly in closed loop operation. Direct plot of result vs. log frequency. Applicable to all frequency response measurements.	**9250**
TWO CHANNEL PROGRAMMABLE, POINT-BY-POINT OR SWEEP **911GP** — Relay and DC voltage programmable: front panel operation as 911G. Any or all functions remotely programmable. Ideally suited to stepping switch command of repeated sequences of frequency response tests.				**11,300**
911G SERIES — MAJOR OPTIONS **OPERATION FROM TAPE** — Complete two channel F.R.A. from tape recorded frequency response test data. Plots amp ratio (db) and phase shift vs. log frequency from tape.			Multi-channel analysis from one test run such as modal analysis of large structures or autopilot system study. For Co and Quad response of structures down to 0.005 Hz.	**+2400**
COMPONENTS COMPUTER — Generates in-phase and quadrature components of Ch. #2 with respect to Ch. #1.				**+2250**
TWO CHANNEL SWEEP WITH AUTOMATIC GAIN CONTROL **912 — Mechanical Impedance Analyzer:** ≥ 60 db in each channel with ≤ 0.5 db error. Complete sweep controls with meter and DC outputs for plot of amp ratio (db) and phase shift vs. log frequency. Single 5¼" high unit.	1.0 to 20,000 Hz	Digital readouts.	Mechanical Impedance over ± 66 db with AGC. Switch for Ch. #2 / Ch. #1, ∫ Ch. #2 / Ch. #1, and Ch. #2 / ∫ Ch. #1.	**6250**
MAJOR OPTIONS — Track from sine wave; track from noisy reference; amplitude control of Ch. #1 thru shaker.				

Also available are F.R.A. systems that will: synchronize to mechanical drives; perform multi-channel analysis; are self checking, with printout of results and interfacing to computers.

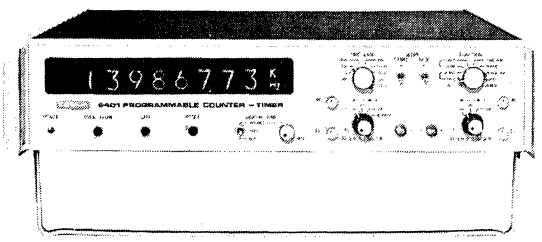
BAFCO, INC.
717 MEARNS ROAD
WARMINSTER, PENNSYLVANIA 18974
TELEPHONE: (215) 674-1700

Beckman®

ELECTRONIC INSTRUMENTS DIVISION

INSTRUMENTATION

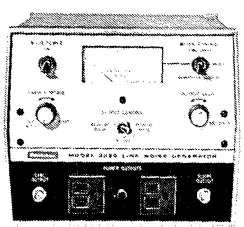
MODEL 6401/6401A UNIVERSAL COUNTER/TIMER



Model 6401 is a programmable 136 MHz counter/timer with two input channels, allows frequency ratio and time interval measurements between two signal sources. Either channel measures frequency, time interval, period, period average, and ratio. Inputs range: channel A, dc to 136 MHz; channel B, dc to 10 MHz. Accumulates random pulses as narrow as 4 ns width and separation. Trigger point monitor lamps visually indicate channel activity. Eight-digit display. Sensitivity: 100 mV rms. Provision for external recording. Frequency accuracy is 1 part in 10^8 for 24 hours. Operates at 120/240 Vac, 60 Hz.

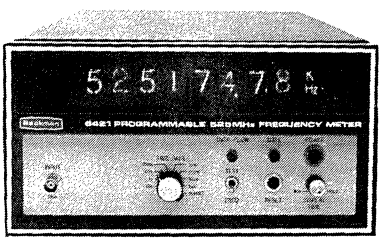
Model 6401A has the same specifications as 6401 with the added feature of 10 ns resolution on time interval and period measurements.

MODEL 3020 LINE NOISE GENERATOR



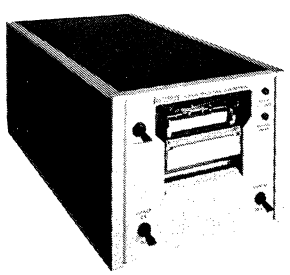
Line noise generator serves dual function: generates controlled line noise similar to rectifier or SCR noise on ac power lines, and measures noise up to 1 kW peak power. Operates from 120/240 V, 50-60 Hz, 60 W. Pulse amplitude continuously variable 0-600 V with rise time 1 μs. Positive or negative noise pulse positions manually adjustable through 360° of line cycle. Measures peak line or load noise. 1 μs width at ±5%. Rejection more than 40 dB between line and load. Manual or automatic control provided.

MODEL 6421 FREQUENCY METER



Direct counting 525 MHz frequency meter with all operating functions contact closure programmable this unit can be used as a bench instrument or an integral part of an automatic measuring system. An optional battery pack is available if portable operation is required. Measures frequency from 10 Hz to 525 MHz: Sensitivity 50 mV rms Input impedance 1 MΩ shunted by 12 pf: Measurement rate 0.1 Sec to 10 Sec: Gate selection 1 MSec to 10 Sec in decade steps: Stability 1 part in 10^6 per year. Power 115/230 V 50-400 Mz.

MODEL 1454 DIGITAL PRINTER



- 21 BCD Column Capacity
- Flexible Input Format
- BCD Column Expansion Capability
- Decimal Point, Column Suppression, and Red Print Control

Universal 21 column digital printer that accepts data in 1248, 1224, 1242 BCD or ten line decimal codes. Standard BCD column capacity is 7, expandable in seven-column increments to a maximum of 21 BCD columns. Input levels can be specified at IC levels, transistor levels, or vacuum tube levels. Printing rate is 3 lines per second in black and 2.8 lines per second in red. Ribbon and paper tape can be replaced without disassembly. Power requirements are 115/230 VAC, 50 to 100 Hz, 60 W (fused).

The Electronic Instruments Division of Beckman produces electronic instrumentation and components for a variety of industrial and space-defense applications.

Products include:

- Digital Frequency and Time Meters
- Digital System Elements
- Amplifiers
- Signal Conditioners
- Communications Test Equipment
- Electronic Counters
- Digital Printers
- Noise Generators

For complete information on our products, contact Technical Information Department:

BECKMAN INSTRUMENTS INC., ELECTRONIC INSTRUMENTS DIVISION
3900 RIVER ROAD, SCHILLER PARK, ILLINOIS 60176 • TEL.: (312) 671-3300
or check our listing in EEM for your local representative.

HELPING SCIENCE AND INDUSTRY IMPROVE THE QUALITY OF LIFE

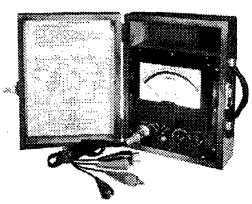
Beckman® ELECTRICAL TEST EQUIPMENT & POWER SUPPLIES

WHEATSTONE BRIDGE — Model RN Series

Universally use for the measurement of all types of resistance devices and circuits where high accuracy is required. Models available for performing Murray and Varley Loop tests.

Model	Total Resistance of Decade	Ration Dial Settings	Circuits
RN-1	9 × (1 + 10 + 100 + 1000)	.001, .01, .1, 1.0, 10, 100, 1000	—
RN-2	9 × (1 + 10 + 100 + 1000)	.001, .01, .1, 1.0, 10, 100, 1000, M10, M100, M1000	Murray & Varley
RN-3	10 × (1 + 10 +100) + 9 × (1000)	1/1000, 1/100, 1/10, 1.9, ¼, 1/1, 10/1, 100/1, 1000/1, M10, M100, M1000	Murray & Varley

LOW RESISTANCE OHMMETER — Model LRO-1

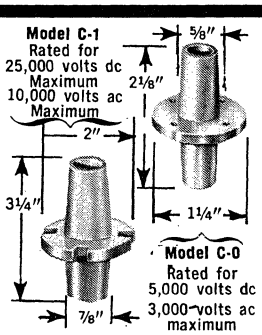


For measuring resistance of sensitive relay contacts, fuses, bus-bars and connections, rail joints, pipe or conduit, switch contacts, transformer windings, motor windings, bonding, grounding and similar applications. Current through the unknown resistance never exceeds 110 ma. Extreme accuracy. Self-contained, including 1½ V flashlight battery. Ranges: 0.1 ohm, 1 ohm and 10 ohms. 100 meter scale divisions. One scale division on 0.1 ohm range is 0.001 ohm. Accuracy ±½% based on full scale values.

HIGH VOLTAGE COMPONENTS

These high voltage connectors are sturdily constructed of Modified Diallyl Phthalate for superior arc resistance and low power factor. Highly temperature resistant, they will safely stand soldering iron temperatures for brief periods. Miniature physical size is combined with extra long air paths. Sealed center conductor will handle up to 20 amperes. Neoprene gasket included for mounting on oil-filled tanks. Easily mated with any standard banana jack for quick disconnect, or 10/32 machine bolt for permanent service.

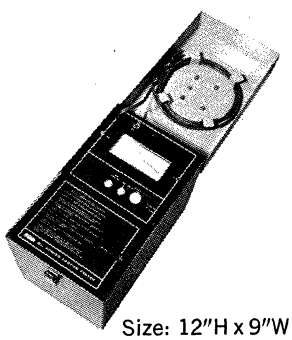
Available in 10 colors.



PF-1 OIL POWER FACTOR TESTER

A low-cost, portable, direct-reading instrument for measuring the percent power factor of insulating oils. Adjusts to 3 power factor ranges — 0-1%, 0-3% and 0-10% — which cover the widest range of insulating oils, from new-and-unused oils to "in-service" oils. It's rugged, operates on standard 110-volt current, and weighs only 37 pounds. Eliminates the need to bring samples back for laboratory evaluation on expensive equipment.

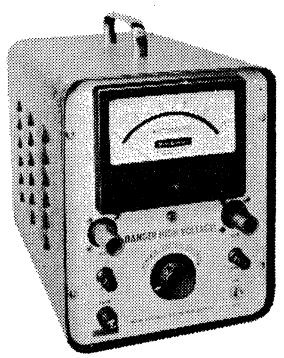
The PF-1 Tester is also fast and simple to operate. Does not require skilled operators. All calculations are eliminated since the instrument reads directly in "percent power factor." Usually, less than two minutes are needed for each measurement. Quick checks are possible on field transformers, capacitors, etc.



Size: 12"H x 9"W x 17"L

PORTABLE HIGH VOLTAGE DC POWER SUPPLIES

These general purpose supplies are particularly suited for laboratory or production line use to provide a convenient source of high voltage, low current dc power. Widely used for such applications as powering photomultiplier tubes, image intensifiers, condenser chargng, and routine insulation breakdown testing.
Voltage readings are indicated by a 6" precision mirror scale kilovoltmeter of 1% accuracy. Polarity is reversible from the front panel (patent applied for). An ac input protection fuse is included as well as a built-in limiting ballast lamp restricting maximum current output levels. These levels may be adjusted by changing ballast. A single control allows continuous adjustment of output voltage from zero to maximum rated voltage.
The output is unregulated (regulation is 20% for 10 to 100% loading). Current rating is 5 milliamperes. The ripple is 5% (rms) at full voltage and current load.



MODEL	OUTPUT VOLTAGE	OUTPUT CURRENT	DIMENSIONS H x W x D	NET WGT. (Pounds)	INPUT POWER REQUIREMENTS
6005-5MA-MS	0-5KV	5 MA	11" x 9" x 13"	17	115 V, 50 Hz, 100 watts
6010-5MA-MS	0-10 KV	5 MA	11" x 9" x 13"	23	115 V, 60 Hz, 100 watts
6015-5MA-MS	0-15 KV	5 MA	11" x 9" x 13"	23	115 V, 60 Hz, 150 watts
6025-5MA-MS	0-25 KV	5 MA	11" x 9" x 13"	34	115 V, 60 Hz, 150 watts

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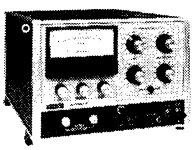
Additional Beckman Instrumentation in Section 2900

Beckman®

INSULATION TEST EQUIPMENT

WIDE RANGE MEGOHMMETERS Model L Series

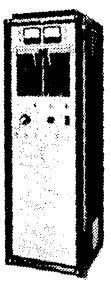


Including Digital Readout. Designed for laboratory and high speed testing of motor and transformer winding insulation, cable insulation, high value resistors, capacitor insulation, and for the measurement of surface and volume leakage of insulating materials. Meets requirements for testing insulation resistance in accordance with ASTM D-257, and Federal Spec. LP-406B, Method 4041.

Model	Test Voltage	Resistance Range Low	Resistance Range High	Power Cons.
L-6C	100 to 600*	1 meg.	100,000 meg.	80 w.
L-7	100 to 600*	1 meg.	$5x10^{13}$ ohms	75 w.
L-8	10 to 1000**	10^3	10^{14}	35 w.
L-9†	10 to 1000**	10^6	10^{14}	145 w.

*Continuously variable, built-in voltmeter for accurate setting.
**Continuously variable, selectable by switch.
†Features digital readout, automatic or manual range selection.

AC BREAKDOWN TESTERS Model PA Series



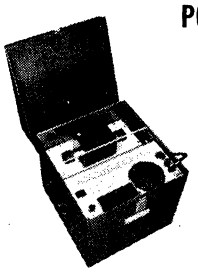
Type PA variable high voltage AC breakdown testers are designed to meet the requirements of ASTM specification D-149, and Federal specification LP-406, Method 4031, as well as all general purpose breakdown testing. Provided with motor-driven control of output voltage with any desired rise of secondary voltage. Available with wide variety of testing jigs.

PA-5-152	15,000 V. rms. 2KVA
PA-5-155	15,000 V. rms. 5KVA
PA-5-252	25,000 V. rms. 2KVA
PA-5-255	25,000 V. rms. 5KVA
PA-5-502	50,000 V. rms. 2KVA
PA-5-505	50,000 V. rms. 5KVA
PA-50-1005	100,000 V. rms. 5KVA

For even greater versatility, dual range units using multiple winding transformers are available on order. These provide two meters and a total of six scales. Typical dual-range models as follows:

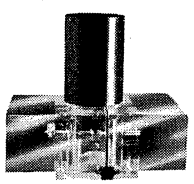
PA-5-252/052	25 kv or 5 kv rms. 2KVA
PA-5-502/102	50 kv or 10 kv rms. 2KVA
PA-50-5010/1510/510	50 kv or 15 kv or 5 kv rms. 10KVA

PORTABLE OIL TESTER — MODEL P-8



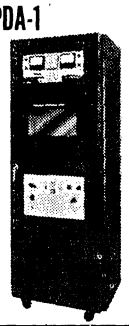
Provides three methods for determining dielectric strength and breakdown voltage of insulating liquids. All HV components housed within cabinet. Interlock system protects personnel. Meets requirements of ASTM specifications D-149 and D-877. Maximum test voltage: 50,000 volts. Accuracy: ±10% of voltmeter reading. Operates on 120 volts, 50/60 Hz, single phase.

JE ELECTRODE



Oil test electrode permits dielectric breakdown acceptance and evaluation tests on liquid dielectrics using the ASTM-1816 (VDE) method. Features adjustable, spherically-capped electrodes capable of testing with 0.080" spacing. The cell body is constructed from a solid block of lucite, eliminating mechanical or bonded fabrication and assuring virtual leak-proof operation. A motor driven stirrer provides constant mixing. When used in connection with Beckman's Model P-8 Portable Oil Tester, the new electrode provides a compact, portable, reliable 50KV oil test set capable of laboratory, production and in-field testing.

DIELECTRIC BREAKDOWN TESTER Model PDA-1



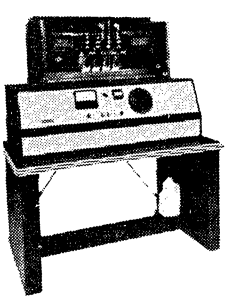
Designed to provide simple, safe, accurate means of determining dielectric strength and breakdown voltage in the laboratory or factory (conforms to requirements of ASTM specifications D-149 and Federal specification L-P-406 method 4031).

Push button selection — four different leakage current meter ranges (six operating modes) — enclosed test cubicle, fail-safe circuitry, interlocked doors and oil immersed gravity-drop shorting switch allows safe use by unskilled personnel.

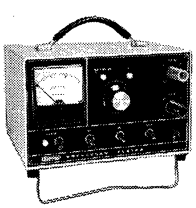
- Continuously adjustable (automatic or manual) test output voltage control uses full 100% rotation to allow fine control for critical testing (choice of AC or DC).
- Provides for transient suppression and introduction of non-linear resistance into transformer.
- Maximum versatility of test jig set-up using plug-in jigs or high voltage cable to external "hi-pot" testing circuits.
- Self contained unit — portable yet provides easy access to all parts for maintenance.

TRACKING and EROSION RESISTANCE TEST -- TERT-1

Evaluates relative track and erosion resistance of various materials using Liquid Contamination Inclined Plane method described in ASTM and IEEE specifications. Test represents service exposure evaluation of wide range of insulated material subject to AC surface current. Test conditions simulate water film on insulation surface in which ionizable and other contaminants may dissolve. Contaminant rate easily controlled to simulate different service stresses and outside conditions. Tests conducted on 2" x 5" specimen; actual test covers 1" x 2" track area. Test criteria is either "time to track a fixed distance at a fixed voltage," or "voltage to initiate tracking" — depending on specific service requirement evaluation.



VOLTAGE BREAKDOWN TESTER — Model P-2B

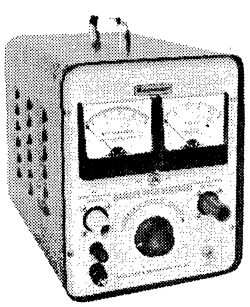


Furnishes adjustable ac or dc test voltage for determining capability or in flashtesting capacitors and insulating materials. Completely solid-state, no relays or circuit breakers. Continuously adjustable, metered output. Breakdown indication provided.

SPECIFICATIONS

Model	Voltage Range* ac (rms)	Voltage Range* dc	Input Power Required
P-2B	0-3000	0-4000	120/240 V, 50/60 Hz

* Metering Accuracy ±5% Full-scale.

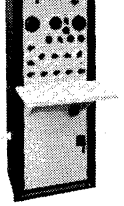


INSULATION TEST SETS

Used in testing insulation where AC voltages are desired. Dual instruments are also available which provide choice of AC or DC output. Includes kilovoltmeter, current meter and automatic overload limiter circuits. Metering accuracies are ±3%. The basic model number covers AC types. Add the prefix AC/DC to the basic model number for the dual output type.

Model	Type	Voltages	Current Meter
3000	AC or AC/DC	0 to 3,000	10 MA
1000	AC or AC/DC	0 to 10,000	10 MA
2500-DC	DC only	0 to 25,000	100 μA

HIGH VOLTAGE SCHERING BRIDGE — Model PS-1GP



Used to measure dissipation and capacitance of electric insulating material while subjected to high-voltage stress. From these two measured values and the dimensions of the sample and test electrodes, dielectric constant, loss factor, and other values may be calculated.

Exceptionally wide capacitance range from 0.0000025 to 1.0 mfd. Built-in shunts for testing large capacitances without additional equipment. Materials can be tested at operating value. Easy-to-operate, all controls located on front panel. High accuracy, plus or minus 0.2% capacitance accuracy and 2.0% or better tangent accuracy.

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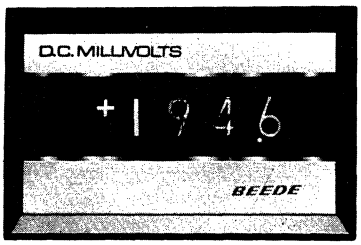
Additional Beckman Products in Power Supply Section 4000

BEEDE . . . Value by Design

DIGITAL PANEL METERS (Standard Units now stocked)*



The Beede Digital Panel Meter is a precision measuring instrument that displays an analog input signal as a digital readout. It is a single, complete unit (including power supply), requiring only signal and power connections for immediate use. It is designed to meet the needs of the manufacturer who plans to install the DPM as a component in the equipment he produces.

Beede's DPM is packaged in a rugged, dust-sealed, die-cast aluminum case with a completely enclosed wiring compartment. The case size is compatible with most known panel cutouts. The unit is equipped with screw terminals to permit connection by production personnel, the calibration adjustments are hidden from curious operators, and the meter is easily and securely installed or removed from the front of the panel to which it mounts.

The front panel appearance may be stylishly and conveniently customized to complement the appearance of your panel. The bezel color, and the company logo and scale identification printed on the decorative mask mounted behind the glass front will be tailored to provide your own proprietary appearance.

The standard models have been deliberately designed to fit into existing instrument circuits designed for pointer type panel meters, *without requiring modifications* to the existing circuit, simplifying the job of the design engineer changing over from pointer type panel meters to digital panel meters. Engineers will also appreciate the flexibility of being able to design a piece of equipment with one circuit, and the option of providing either a pointer type, or digital panel meter readout to their customers.

Beede supplies panel meters designed to customer specifications. Each unit shipped has been produced for a specific customer order, and the electrical range, readout and appearance have been engineered to meet the customer's requirements. A standard BCD (Binary Coded Decimal) Output option is available, and for special volume requirements, a wide choice of electrical and mechanical design options is also available.

SPECIFICATIONS:

Accuracy ±0.1% of reading ± one digit. This accuracy will be maintained over a temperature range of 20°F for 60 days without adjustment. Temperature coefficient: 0.004%/°F.

Temperature Range 14°F to 140°F operating. −20°F to 185° storage.

Input — Differential input isolated to ±300 VDC or AC (Peak). ±3.5 VDC or AC (Peak) when BCD utilized.

Optional Input Arrangements — Current Source for Resistance Measurement. Ratiometric Input.

Speed — 2 conversions/second (Standard). Other speeds available.

Resolution and Display — Three digits plus "1" over-range. Unit accurate to full 100% over-range. Automatic polarity indication. Three least significant digits extinguish for reading above 100% over-range. NIXIE[tm] display; ½ inch nominal character height. Three decimal point positions selected by grounding connector pins. Hold and/or blanking capability furnished as standard.

BCD Output Option — Three BCD 8-4-2-1 digits plus "1" over-range digit totaling 13 lines. Logic Levels: Standard TTL/DTL practice. End of Conversion, polarity signals and Trigger Input available.

Power Requirements — 105 to 125VAC, 57 to 63Hz, 3.5 watts nominal. Contact Beede for other input voltages and frequencies.

Termination — Standard unit without BCD Output option has nine, No. 6 screw terminals, and movable connector to select decimal point position. Units with BCD Output option have two, solder type, 30 pin edge connectors. Terminal Board cover supplied, providing a completely enclosed wiring compartment.

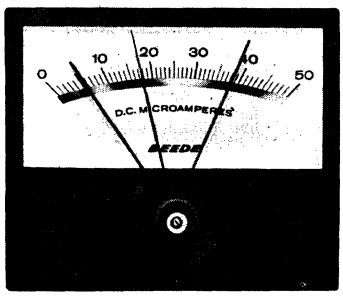
Mechanical Specifications — Die-cast aluminum, dust-sealed case. Die-cast aluminum front bezel with glass window and aluminum decorative mask. Amber polarizing filter. Captive front pulls out and swings to side for access to zero and span adjustments, and panel clamping arrangement. Front may be completely removed. Steel terminal board cover, screw fastened. Space available in case for customer specified accessory components.

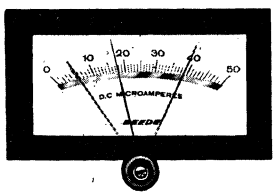
Also available as options: Plastic window; Red or neutral polarizing filter; Sealed case for JIC type applications; Shorter depth behind panel dimension.

Mounting — Panel mounting is standard. Installable and removable from the front of the panel with leads connected. Rugged clamping arrangement designed for panels up to ⅜ inch thick. Mounting arrangement for heavier panels, conduit mount and yoke mount with stand available as options.

*Write for Data Sheet DM-100

NON-CONTACTING CONTROL METER RELAYS (Standard Units now stocked)**





The Beede Control Meter Relay is an instrument that combines a permanent magnet-moving coil meter with an adjustable photoelectric sensor, switching circuit and output switch. As the indicated variable being monitored passes the adjustable set point, an output relay is either energized or de-energized. Units are available with either one or two adjustable set points. Beede has greatly simplified the design of the conventional non-contacting meter relay, significantly reducing the number of parts incorporated in the unit, resulting in price savings of up to 50% without a loss of quality features.

FEATURES

- **Optical, non-contacting control-continuous indication**
- **Wide variety of options available for easy, inexpensive customizing**
- **Inherently Fail Safe**
- **AC or DC power input**
- **Directive Drive Set Pointers**
- **Bulb Life in excess of 10 yrs.**
- **Meter movement and dial custom designed to your specifications if required**
- **Meter permanently free of static influence**
- **Attractive modern "Centurion" style case**
- **Large easy-to-read dial**

SPECIAL PYROMETER FEATURES

- **Models available from 0-300° F**
- **Electrical ambient temperature compensation**
- **Thermocouple break protection**
- **Internal potentiometer to compensate for external lead resistance**
- **Deadband externally adjustable**

SPECIFICATIONS

Accuracy ±2% or ±1%
ON-OFF operation or latching with manual reset
Output: 10 amp (resistive load) DPDT relay for each set point. Solid State Output available
Standard Deadband is 0.5%
Power Requirements 105 to 130 Volts AC. Other AC and DC power inputs available
Ambient Temperature 40° F to 165° F is standard

MOVEMENTS

MAG-BAND TAUT BAND
0-10 μA DC minimum range
MAG-B PIVOT AND JEWEL
0-50 μA DC minimum range
Size: 3″ and 4″

MODELS AVAILABLE

	3 INCH		4 INCH	
	Mounting	**Single Set Point**	**Double Set Point**	**Single Set Point**	**Double Set Point**
Complete Package	Front of Panel Behind Panel	MR-13-05 MR-13-06**	MR-23-05 MR-23-06**	MR-14-05 MR-14-06	MR-24-05 MR-24-06
Optical Element* Only	Front of Panel Behind Panel	MR-13-05-01 MR-13-06-01**	MR-23-05-01 MR-23-06-01**	MR-14-05-01 MR-14-06-01	MR-24-05-01 MR-24-06-01
Separate Control Package	Front of Panel Behind Panel	MR-13-05-02 MR-13-06-02**	MR-23-05-02 MR-23-06-02**	MR-14-05-02 MR-14-06-02	MR-24-05-02 MR-24-06-02

*Control meter without power supply, switching circuit and load relays.

**Contact factory for availability of 3″ Behind Panel Models.

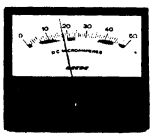
**Write for Catalog MR-4

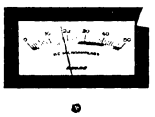
BUY VALUE BUY BEEDE

BEEDE ELECTRICAL INSTRUMENT CO., INC. Penacook, New Hampshire 03301
TWX No. 710-364-6977

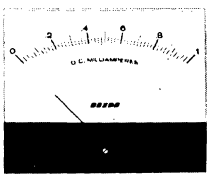
BEEDE . . . Value by Design

PANEL METERS

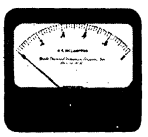




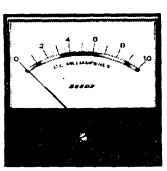
• **CENTURION LINE** — A fine line of meters of modern clean design constructed of durable molded phenolic permitting rugged handling. Front of panel mounting models available in 4″ and 3″ cases, behind-the-panel model available in 4″ case only. Illuminated models available in 4″ size.



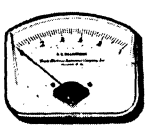
UNIVERSAL LINE — Large 6″ and 8″ clear plastic cases with flat fronts suitable for front of panel mounting or flush mounting behind panel. Back lighting possible with these models; available clear or painted at the bottom. Beede high torque movements are especially suited for these larger cases.



TRADITIONAL LINE — The Traditional meter look is available in various rectangular and round phenolic cases.



DESIGNER LINE — Featuring a clear picture frame design, this line offers a wide selection of sizes. 2″, 3″, 4″ and 6″ in both front and behind-the-panel mounting. The front-of-panel models are available with a painted front or clear front featuring the floating oval escutcheon name plate. Illumination is available in behind panel mounting models.



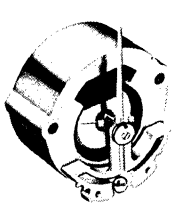
PANORAMA LINE — This "Wider Than Higher" look design is popular for applications requiring curved lines and soft corners to match instruments having similar features. Available in 3″, 4″ and 7″ cases.

CLEAR FRONT LINE — The Clear Front Styling is designed for general purpose meter applications. Available in 1″, 2″, 3″ and 4″ cases.

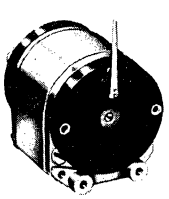
EDGEWISE — Designed for applications requiring minimum panel space. Available as a single unit or as a stacked double unit in one case.

250° LINE — Beede's famous 250° movement is available in a switchboard style presentation in brass, chrome or black lacquer case with glass front.

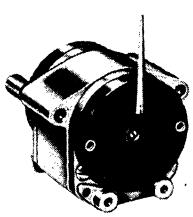
METER MOVEMENTS



250-A

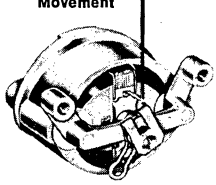


250-S

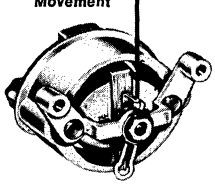


250-SR

MAG-B Taut-Band Movement



MAG-B Pivot and Jewel Movement



Illustrated here are a few of Beede's high torque meter movements. A broad line of standard Beede meter movements is available in a complete range of sensitivities and electrical characteristics including ½% accuracy taut band movements with individually calibrated scales. These meter movements are used in the panel meter case models described above, or are installed in special customer cases, or are supplied separately for customer installation.

METER MOVEMENTS
MAG-BAND TAUT BAND . . . Self-shielded, high-torque, excellent balance and no drift. Maximum sensitivities: 0-5 μA DC; 0-5 MV DC ± 1% OR ±2% accuracy.
MAG-B . . . Rugged, high-torque, self-shielded pivot and jewel movement. Maximum sensitivities: 0-50 uA DC; 0-20 MV DC ± 1% or ± 2% accuracy.
250°MOVEMENT — A fine tracking, sturdy, self-shielded 250° movement.

CUSTOM METER DESIGN

Beede specializes in custom designed meters to meet exacting customer requirements.

Beede has application experience and an in-depth knowledge of the technology of most meter-using industries.

BEEDE

BUY VALUE BUY BEEDE

ELECTRICAL INSTRUMENT CO., INC. Penacook, New Hampshire 03301

TWX No. 710-364-6977

BELL INC. INSTRUMENTS

GOLD SEAL GUARANTEE
All ceramic encapsulated transverse probes guaranteed one year against breakage

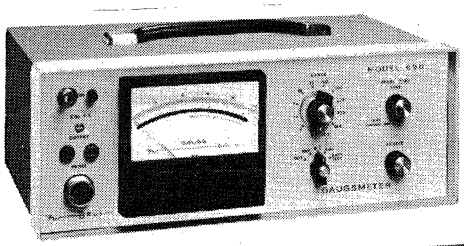
GAUSSMETERS

- ***0.5% Accuracy to 10 kG ● 1.0% Accuracy to 30 kG***
- ***0.3% Built-in Calibration Accuracy***
- ***1000 X Scale Expansion (with automatic zero center readout)***
- ***Temperature Compensated Probes***
- ***100 kG Probe Capability***
- ***1 Volt and 5 Volt FS Calibrated Output***
- ***AC and DC Magnetic fields***

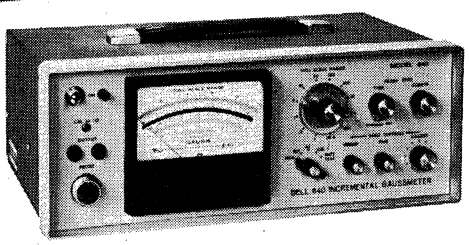
Bell Gaussmeters, in a wide range of standard, in-stock models are suited for use in a broad spectrum of both industrial and laboratory applications. Industrial applications include: magnet processing, charging, stabilizing, testing, sorting, classifying magnets; evaluation of magnetic structures, tachometers, pm motors, TV focusing yokes, tape heads and all types of magnetic materials.

In Laboratory: mass spectrometer field monitoring; electron beam focusing magnets; field monitoring and control of large electromagnets; and magnetic ink paper and tape, evaluation and test.

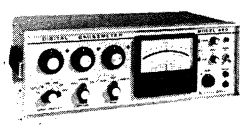
Special Modifications:
If your specific application for a magnetic field sensing instrument cannot be met with a standard BELL Gaussmeter our engineers will be glad to study your needs and recommend an instrument with necessary modifications.



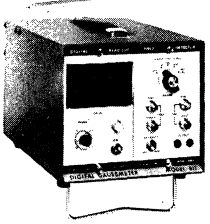
MODEL 620



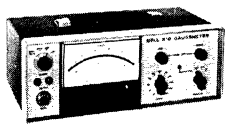
MODEL 640



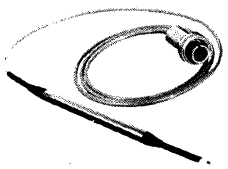
MODEL 660
● Digital and Analog Readout ● 2 Parts in 10^5 Resolution FS



MODEL 811
● Digital Readout ● Modular Construction ● 100 PPM/°C Stability ● 0.25% Accuracy to 100 kG ● 1.0 Volt FS output with 2X overranging capability ● B C D Output Computer Compatible



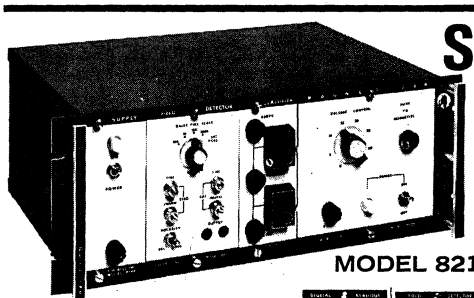
MODEL 610
● Low Cost ● General Purpose ● 1.5% FS Accuracy to 10 kG



Suitable Probes for all purposes*

Bell probes are available in a wide range of types: transverse types in thicknesses from 0.006 and widths from 0.040; axial types in outside diameters from 0.062; for industrial use in ruggedized design, encapsulated in brass or aluminum; in hand held models and for fixture mounting.

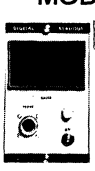
Self-contained Modular Components



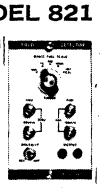
MODEL 821

BELL'S new modular instrument design makes it now possible to improve many process control functions with the noncontacting detection capabilities of magnetics. Application flexibility is added to recognized high field measuring performance. By varying the combination of modules instruments can be tailored — and at a later date expanded — for such applications as: Magnetic Field Measurement; Electromagnet Field Control; Permanent Magnet Inspection and Classification; Automatic Magnet Processing; Noncontact Position Sensing; Material Thickness Monitoring; Material Hardness Testing; Weld and Sheet Edge Tracking; and many others.

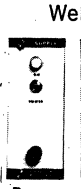
Hardness Tester
A system composed of BELL Modules for making a nondestructive test by the residual flux technique. Composed of a field detector, magnetizer, classifier and power supply modules mounted in a rack bin.



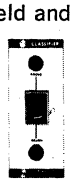
Digital Readout



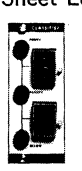
Field Detector



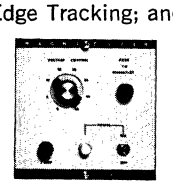
Power Supply



2 Level Classifier

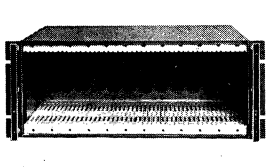


3 Level Classifier



Magnetizer

Bench Cabinet with Power Supply



Rack Bin

*Probes: A wide variety of standard and special probes is available.
Write for a complete catalog or assistance with your application.

Specifications subject to change without notice.

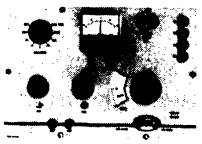
Leaders in Hall Effect Components, Instruments and Systems

BELL INC.
4949 Freeway Drive East Columbus, Ohio 43229
614-888-7501 TWX: 810-337-2851

Biddle Instruments Preserve Accuracy For Years

PORTABLE POTENTIOMETERS

Bulletin 72-6 EEM



72-3110

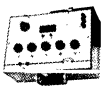
72-310

Cat. No.	Ranges	Limit of Error	Price
72-310	0-11.1 0-111 mV	0.05% + 5μV	$347.00
72-312	0-0.182 0-1.82	0.05% + 5μV	347.00
72-314	−11 to +111 mV	0.05% + 20μV	352.00
72-316	Any single Range −300° to +3000°	0.2% of span	315.00
72-318	Any two ranges	0.2% of span	394.00
72-3110	−11.1 to +111.1 mV	±0.03% +2μV without RJC ±0.03% +4μV with RJC	625.00
72-3112	−0.0111 to +0.1611 V	±0.03% +2μV	
	−0.111 to +1.611V	±0.03% +20μV	705.00

PORTABLE WHEATSTONE BRIDGES

72-430 Price: $278.00

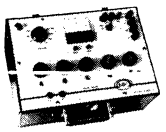
Range: 0.1Ω to 11MΩ
Limit of Error: ±0.1%
Det. Sens. 8μV Div.
Model 72-432 has capability of Varley and Murray Loop tests.



72-434 Price: $762.00

Range: 0.1Ω to 11MΩ
Limit of Error: ±(0.03% to 0.0005Ω)
Det. Sens. 0.5μV Div.
Bench and Rack Models Available

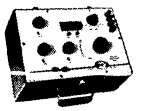
HIGH PRECISION KELVIN BRIDGE



72-439
Price: $800.00

7 Ranges 0.01μΩto 1111.1Ω
Limit of Error: ±(0.3% of reading +0.03μΩ)
Det. Sens. 0.5μV Div.
Features 5-dial in-line readout.
Compact Kelvin Bridges also available—$305.00

RESISTANCE TEMPERATURE BRIDGE



72-490 Price: $735.00

Range: 0 to 1111.1Ω
Limit of Error: ± (0.03% of reading + 0.0025Ω)

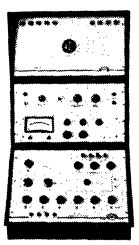
STRAIN GAGE BRIDGE

72-4010 Price: $447.00

Range: Resistance 0 to 111.1Ω
Ratio .5 to 1.111
Rheostat 0 to 211.1Ω
Limit of Error: Resistance and Rheostat ± 0.01Ω
Ratio ± 0.01%

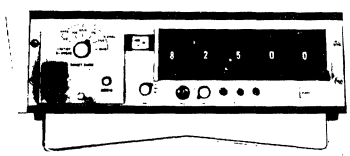
For information on above instruments request Bulletin 72-7 EEM

LABORATORY AND CALIBRATION INSTRUMENTS



71-131

A complete line of voltage, current, and resistance measuring instruments. Available as individual modules for complete measuring systems. Ranges: Voltage—mV to 1,500 volts; Current—0.075 to 15 amperes; Resistance—0.0001 to 1 × 11^9 ohms. Accuracies from 2 ppm, depending on range and parameter selected. Request Series 71 Bulletins.



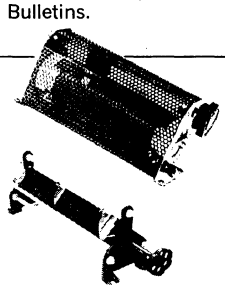
73-603

MENTOR RESISTANCE TRIM/TESTERS

Designed for controlling resistance trimming equipment used in adjusting thin and thick film resistors. These instruments are adaptable to all type systems including abrasive, laser and ultrasonic. Featured are extremely rapid measurement response time, multispeed control, and measurement of resistance and voltage ratio in addition to absolute resistance. File 73 EEM.

BIDDLE RHEOSTATS

Lubri-tact and carbon pile rheostats. Seventy-six standardized ratings available in 8″, 10″, 16″ and 20″ sizes. A variety of special non-inductive, double and graded types and Compression Carbon Rheostats also available. Write for Bulletin 41-EEM.



FRAHM® RESONANT REED FREQUENCY METERS

Bulletin 32-EEM

2½″, with metal case.

3½″, GE style case

3½″, Plastic case.

RESISTANCE STANDARDS

Resistance values 1 ohm to 1 megohm.
Accuracy: 0.001% Certified directly to N.B.S.

Bulletin 71-5.

SOLID STATE NULL DETECTOR

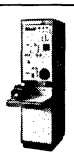
A 4μV per division zero center meter driven by a solid state high gain differential amplifier, powered by two mercury batteries.

Bulletin 72-8 EEM.

COMPRESSED GAS CAPACITORS

For use as reference standards of capacitance and as precision ac voltage dividers.

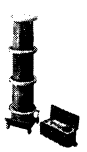
Bulletin 85 EEM.



CORONA MEASURING EQUIPMENT

A fully programmable Corona Test set keyed to digital print out.

Bulletin 66 EEM.



50/100/150 kv

DIELECTRIC TEST SETS

Safe, rugged equipment for supplying and measuring both ac and dc voltages from 5kv to 150kv.

Bulletin 22 EEM.

015R

JAMES G. BIDDLE CO.

Meeting the Test for 75 Years—1895-1970

PLYMOUTH MEETING, PENNSYLVANIA 19462

(215) 646-9200

BIRD *Quality Instruments for RF Power Measurement*

50 ohms nominal

THRULINE® RF DIRECTIONAL WATTMETERS

MODEL	CONNECTORS	PLUG-IN ELEMENTS FREQUENCY (MHz)	PLUG-IN ELEMENTS POWER RANGES (Watts)	U.S. PRICE
43	QC (1)	For CW, FM and TV (black level)		$100
4311	QC (1)	For Peak, Pulse, SSB, AM, TV, CW and FM		575
Order one or more elements with your Thruline Wattmeter to suit your frequency and power ranges.		2-30	50, 100, 250, 500, 1000, 2500, 5000	30 each
		25-60, 50-125, 100-250, 200-500, 400-1000	5, 10, 25, 50, 100, 250, 500, 1000	30 each
		Elements, low power (1, 2.5W) narrow band		50
		Elements, 950-1260MHz (1, 2.5, 5, 10, 25 etc. to 5000W		75
		Elements, high frequency to 2300MHz (1, 2.5, 5, 10, 25W)		75
		Elements, peak only to 10kW, 25-1000MHz in five bands		75
		Low Pass Filters, cutoff 76, 160 or 400MHz, QC Conn.		45
		CC-1 Cowhide Carrying Case for 43, 4311		17.50
		EC-1 Element Case for 12 spares		12
4310	QC (1)	For Peak, Pulse, SSB, AM and TV		249
		Elements (4310) Choices from 50W-10kW, 2-1260MHz		50
4111	UHF, N, BNC	25-175MHz Mini-	150/50W	115
4112	N, UHF, BNC	2- 30MHz Monitor®	200/20W	115
4113	N, UHF, BNC	2- 30MHz Pocket	1000/100W	115
4115	N, UHF, BNC	450-470MHz Meter	50/5W	115
4501	7/8 EIA Fl.	Rigid Line Wattmeter		135
		Uses Elements listed for Model 43		see above
4712	1 5/8 EIA Fl.	Rigid Line Wattmeter		206
		Elements (4712) Choices from 25W-25kW, 2-1000MHz		50
460	3 1/8 EIA Fl.	Rigid Line Wattmeter		235
4805	3 1/8 Unfl.	Rigid Line Wattmeter		165.75
		Elements (460, 4805) Choices from 1-100kW, 2-1000MHz		50
4902	6 1/8 EIA Fl.	Rigid Line Wattmeter		600
		Elements (4902) Choices from 2.5-250kW, 2-1000MHz		50
4521	QC (1)	Panel-mounted, one meter-one socket		115
4522	QC (1)	Panel-mounted, one meter-two sockets		160
4526	QC (1)	Panel-mounted, two meters-two sockets		200
3122	QC (1)	Special meter: simultaneous forward/ reflected power and VSWR, panel mtd. two sockets.		200
		These four models use Elements listed for Model 43		see above
4320/21		Amps for adding PEAK READ to CW Thrulines		300

WATTCHER® RF POWER MONITOR/ALARM

MODEL		U.S. PRICE
3127/28	Fwd/refl. Wattmeter. Has alarm or Xmitter shut-off with high VSWR. Requires Line Section, Elements, etc. Choices from 0.45 to 2300MHz, 1W to 250kW.	$ 425

TERMALINE® HI-POWER RF CALORIMETERS

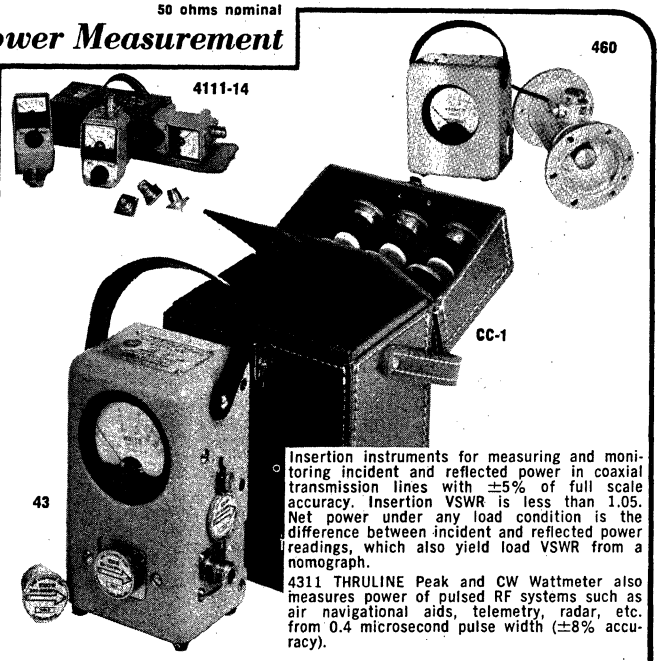
MODEL	POWER	FREQ. (GHz)	VSWR @ 1GHz	ACCURACY	U.S. PRICE
6020/23	1kW	dc-3.5	1.1	±1.3% to ±3%	$ 895
6070/71	5kW	dc-2	1.1	±1.5% to ±3%	1275
6032	10kW	dc-1.4	1.1	±1.5% to ±3%	1850
6042/6542	15kW	dc-1.5	1.1	± 1% to ±2%	2350
6052/6552	25kW	dc-1.5	1.1	± 1% to ±2%	2950
6062/6562	50kW	dc-1.5	1.1	± .5% to ±1.5%	3550

TERMALINE® RF ABSORPTION WATTMETERS

MODEL	POWER SCALES	FREQUENCY (MHz)	CONNECTOR	U.S. PRICE
6254	25, 50, 100, 250, 500mW, 1 or 2W	30-500	BNC/F	$ 125
611 †	0-15/60W	30-500	N/F	190
61 †	0-.5/80W (19 choices)	30-500	N/F	220
6154	0-5/15/50/150W	25-1000	N/F	265
67 †	0-25/100/500W	30-500	QC (1)	350
694	0-1000W	2-30	QC (1)	385
6835	0-120/600/1200W	30-500	QC (1)	485
Water-cooled:				
67C †	0-100/500/2500W	30-500	QC (1)	390
† Special calibration 500-1000MHz available at time of order				25

COAXWITCH® COAXIAL SELECTOR SWITCHES

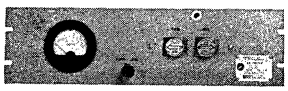
MODEL	FUNCTION	U.S. PRICE	MODEL	FUNCTION	U.S. PRICE
7422	1P2T	$75	718	1P8T	$ 89
7441	1P3T	80	7181	1P10T	120
7431	1P4T	80	72-2	2P2T	80
74	1P6T	75	72-R	2P-Rev	75



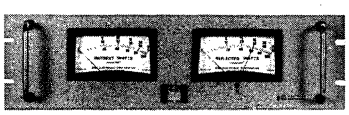
Insertion instruments for measuring and monitoring incident and reflected power in coaxial transmission lines with ±5% of full scale accuracy. Insertion VSWR is less than 1.05. Net power under any load condition is the difference between incident and reflected power readings, which also yield load VSWR from a nomograph.

4311 THRULINE Peak and CW Wattmeter also measures power of pulsed RF systems such as air navigational aids, telemetry, radar, etc. from 0.4 microsecond pulse width (±8% accuracy).

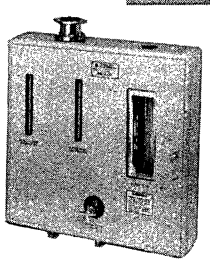
3122 VSWR + Wattmeter



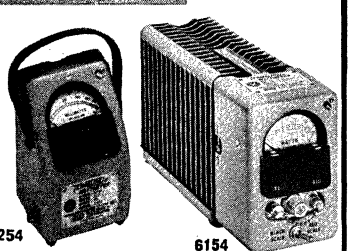
4521 Panel-mounted "43" type



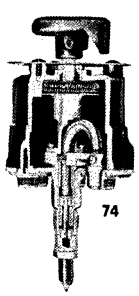
3127
3128



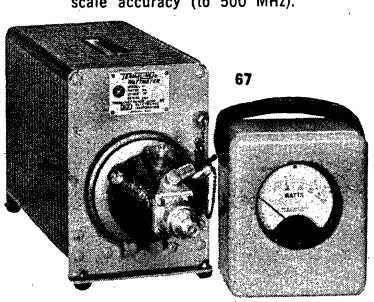
6032, -42, -52, -62



Direct reading instruments for absorbing and measuring RF power. The load section of the TERMALINE Wattmeter serves as a dummy load. The indicating meter is calibrated to read RF power directly in watts with ±5% of full scale accuracy (to 500 MHz).



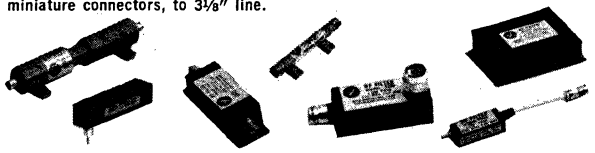
74



67

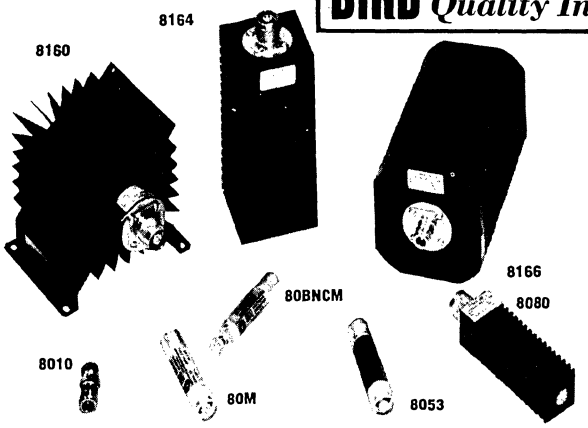
COAXIAL RF FILTERS

Custom engineered or field-proven designs. High rejection attenuation filters available with Low-pass cut-off from 16 to 2700MHz (about fifty designs at 400MHz). Hi-pass cut-off frequencies from 30 to 1000MHz, Band-pass as narrow as 5% of center frequency. Sizes from ¼ cubic inches, with subminiature connectors, to 3⅛" line.

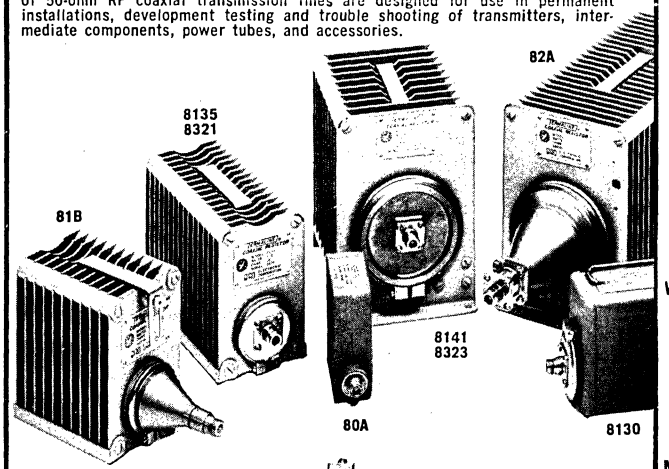


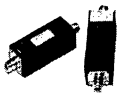
50 ohms nominal

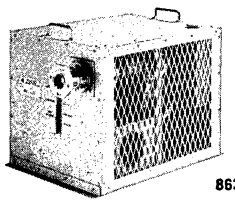
BIRD *Quality Instruments for RF Power Measurement*



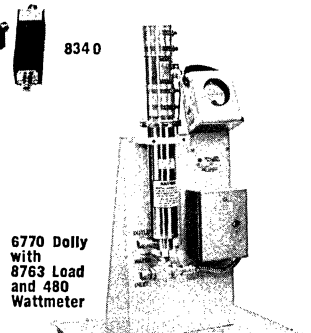
TERMALINE RF Coaxial Load Resistors for accurate, non-radiating termination of 50-ohm RF coaxial transmission lines are designed for use in permanent installations, development testing and trouble shooting of transmitters, intermediate components, power tubes, and accessories.







No external water supply is needed for the new 10kW Self-Cooling MODULOAD™ RF Load Resistor Module. In a scant three cubic feet of space, the integral heat-exchanger permits continuous 10kW dissipation in 5° to 45°C ambients (−20° to +20°C with anti-freeze).



TERMALINE® RF COAXIAL LOAD RESISTORS

Air Cooled, Dry Dielectric

MODEL	POWER	FREQ.	VSWR @ 1GHz	CONNNECTOR	U.S. PRICE
8010, 8011	2W	0-4GHz	1.04	N/F, N/M	$ 25
80F, 80M	5W	0-4GHz	1.1	N/F, N/M	25
80CF, 80CM	5W	0-4GHz	1.1	C/F, C/M	30
80 BNC/F, -/M	5W	0-4GHz	1.1	BNC/F, BNC/M	30
8052, 8053	10W	0-4GHz	1.1	N/F, N/M	35
8080	25W	0-3.5GHz	1.1	QC (3)	45
8085	50W	0-3.5GHz	1.1	QC (3)	59
8160	100W	0-2.5GHz	1.1	QC (3)	105
8164	100W	0-2.5GHz	1.1	QC (1)	105
8166	150W	0-2.5GHz	1.1	QC (1)	120

Air Cooled, Liquid Dielectric

80A	20W	0-3.5GHz	1.1	N/F	30
8130	50W	0-4GHz	1.1	QC (1)	49
81B	80W	0-4GHz	1.1	N/F	65
8135	150W	0-4GHz	1.1	QC (1)	75
8141	250W	0-2.5GHz	1.1	QC (1)	110
8201	500W	0-2.5GHz	1.1	QC (1)	165
82A	500W	0-3.5GHz	1.1	QC (1)	185
8401	600W	0-3GHz	1.1	QC (1)	185
8251	1000W	0-2.5GHz	1.1	QC (2)	295
8833	1000W	0-2.5GHz	1.1	QC (2)	365
8890**	2500W	0-2GHz	1.1	QC (2)	450
8891**	2500W	0-2GHz	1.1	3⅛ EIA Fl.	475
8892**	2500W	0-2GHz	1.1	1⅝ EIA Fl.	460
**BA-88 Blower for doubling power (intermittent duty)					275
**Overtemperature Thermoswitch					30

Water Cooled, Air Dielectric

8710	1kW	0-3.5GHz	1.1	N/M or F	200
8720	5kW	0-2GHz	1.1	1⅝ EIA Fl.	325
8736	10kW	0-1.4GHz	1.1	1⅝ EIA Fl.	950
8742/8542	15kW	0-1.5GHz	1.1	3⅛ EIA Fl.	1400
8752/8552	25kW	0-1.5GHz	1.1	3⅛ EIA Fl.	2000
8762/8562	50kW	0-1.5GHz	1.1	3⅛ EIA Fl.	2600
6770 Dolly for mounting 10kW to 50kW Loads.					125

MODULOAD™ Self-Cooled Load Systems

8632	10kW	0-1.4GHz	1.1	3⅛ EIA Fl.	2350
8641/2	20kW	0-1.3GHz	1.1	3⅛ EIA Fl.	3300

TENULINE® ATTENUATORS

MODEL	POWER	FREQUENCY	VSWR	ATTEN.	CONNECTORS	U.S. PRICE
8340-060, -010, -020	25W	0-500MHz / to 1000MHz	1.1 / 1.15	6dB / 10, 20dB	QC (1) in, (1) out	$ 90
8341-060, -010, -020	*40W	0-500MHz / to 1000MHz	1.1 / 1.15	6dB / 10, 20dB	QC (1) in, (1) out	85
8321	50W	0-500MHz	1.1	30dB	QC (1) in, (1) out	125
8323	100W	0-500MHz	1.1	30dB	QC (1) in, (1) out	165
8322	200W	0-500MHz	1.1	30dB	QC (1) in, (1) out	225
8325	500W	0-500MHz	1.1	30dB	QC (1) in, (1) out	400
8327**	1000W	0-500MHz	1.1	30dB	QC (2) in, (1) out	500
8329**	2000W	0-500MHz	1.1	30dB	QC (2) in, (1) out	600
BA-88 Blower for 4000W int. duty (8329).					—	275

*When bolted to heat sink. **Overtemperature Thermoswitch. 30

QC-TYPE CONNECTORS (Quick Change) Adaptable to particular TERMALINE, THRULINE, and TENULINE units, these connectors may be quickly changed in the field. Connector types available are: Female or male BNC, TNC, N, C, SC, HN, LC, UHF, LT, 7/8" and 1⅝" EIA Flanged.

Prices are subject to changes without notice. F.O.B. Cleveland, Ohio. Normally supplied: (1) Female N, (2) Female LC, (3) Male N.

OTHER BIRD INSTRUMENTS THRULINE® RF DIRECTIONAL POWER SENSORS • SENTRILINE® FILTER-COUPLERS COAXIAL RF FILTERS • NEW: VSWR/WATTMETERS •

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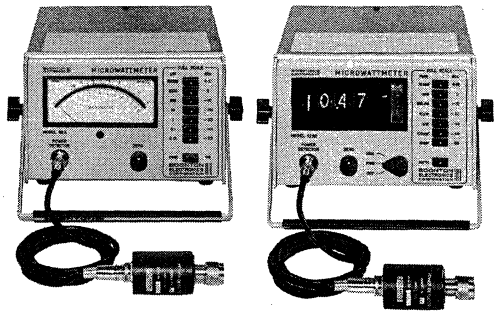
BOONTON ELECTRONICS CORPORATION

Newly Available Instruments

RF MICROWATTMETERS



Model 42A Model 42AD

Model 42 Series

The new Model 42A and 42AD Microwattmeters are exceptionally sensitive programmable MF to K band (200 kHz to 12.4 GHz) power meters that virtually eliminate zero drift and temperature stability problems.

Three coaxial power detector heads, two 50 Ω and one 75 Ω, are available. Each measures the full power range of from 1 nW to 10 mW with an overload rating of 0.3 W cw. The 75 Ω head for CATV applications has a frequency range from 200 kHz to 1 GHz.

Long-term absolute accuracy of the combined instrument and power detector is specified to allow the power meter to be used without frequent calibration checks.

Analog and digital readout versions are available. Digital readout of dBm is optional on the Model 42AD.

The dc output on both versions and the additional BCD outputs on the digital version are standard.

Base prices: Model 42A, $650.; Model 42AD, $1100.; power detectors $175. to $275.; options additional.

General Specifications

Power Range:
1 nW to 10 mW (−60 to +10 dBm).

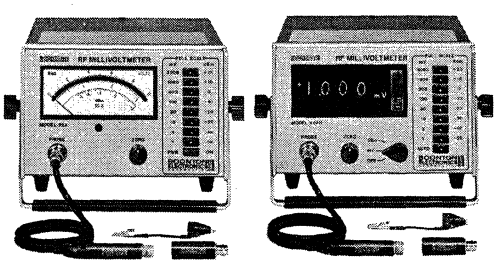
Frequency Ranges:
200 kHz to 12.4 GHz (Standard Head).
200 kHz to 7 GHz (Low-cost Head).
200 kHz to 1 GHz (CATV Head).

Accuracy:
Basically ±0.5% fs ±0.2 dB to 0.4 dB depending on frequency.

Model 42A—Analog Version:
4½″ taut band meter; two scales, power and dBm; dc output. Options: logic-level programming; reverse scales.

Model 42AD—Digital Version:
3½ digit power readout plus vertical edge meter for analog readout of dBm. Display period 250 ms; encode period 10 ms. BCD outputs; linear dc output. Options: logic-level programming; autoranging; digital dBm readout.

RF MILLIVOLTMETERS



Model 92A Model 92AD

Model 92 Series

These three programmable rf millivoltmeters offer an unrivaled choice of features and options to satisfy almost any application.

Analog and digital readout versions are available with digital readout of dBm optional.

All are equipped with linear dc output, and BCD outputs are included as standard on the digital version.

Eight line contact-closure programming is standard with logic-level programming and autoranging (92AD only) being optional.

Accuracy is the best ever offered for an rf millivoltmeter and the Boonton reputation for low-noise, drift-free operation is maintained.

One independent control calibrates each range making service adjustment an easy matter.

All units are supplied complete with rf probe, probe tip, and 50 Ω BNC adapter, and use the standard line of Boonton rf voltmeter accessories.

Base prices: Model 92A, $750.; Model 92AD, $1200.; options additional.

Two vacuum tube rf millivoltmeters, Models 91DA and 91H, are available. Both have similar voltage and frequency ranges to the 92 series. Basic accuracies are; Model 91DA, ±2% fs; Model 91H, ±3% fs.

General Specifications

Voltage Range:
100 μV to 3 V (300 V with divider).

Frequency Range:
10 kHz to 1.2 GHz.

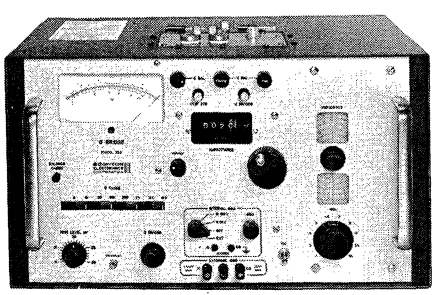
Accuracy:
Basically ± (1% fs +1% rdg.).

Model 92A—Analog Version:
Two scales, voltage and dBm. Options: logic-level programming and many scale variations.

Model 92AB—Battery Version:
16-hour rechargeable Nicad batteries. Other specifications and options as Model 92A.

Model 92AD—Digital Version:
3½ digit voltage readout plus vertical edge meter calibrated in dBm. Display period 250 ms; encode period 10 ms. BCD outputs standard. Options: logic-level programming; autoranging; digital dBm readout.

Q BRIDGE



Model 35A

This revolutionary, non-resonant, three-terminal bridge measures capacitance and its Q directly over a wide frequency range to Q values as high as 10,000. The low test signal level may be set by a calibrated front panel control, and complete facilities for dc bias of the test component are provided. Measurements on a variety of capacitors and solid state devices such as high Q varactors, diodes, ceramic and monolithic capacitors are now possible. The Model 35A is also a unique new tool for studying the frequency characteristics of many other components and materials.
Price: $4500.

General Specifications

Q:
5 to 10,000; accuracy, generally ±10% to ±30%.

Capacitance:
2 to 1000 pF; accuracy, generally ±0.5% to ±2%.

Test Signal:
Frequency, 100 kHz to 50 MHz; level, 10-30 mV rms.

Range Extensions:
0.002 to 2 pF; 1000 pF to 0.25 μF.

Indirect Measurements:
Inductance; rf resistance.

Route 287 at Smith Road., Parsippany, New Jersey 07054 ▪ Tel.: (201) 887-5110 ▪ TWX: 710-986-8241

All prices are fob Parsippany, New Jersey, and do not include applicable federal, state, or local taxes. Prices and specifications are subject to change without notice.

BOONTON ELECTRONICS CORPORATION

Condensed Listing of Instruments

RF ADMITTANCE BRIDGES

Measures two-terminal shunt capacitance and conductance from 1-100 MHz. Resolves low conductance values making loss measurements possible on many high Q diodes, varactors, and capacitors. Bridge balances accurately with the low test levels required for measurement on most solid state devices. Internal and external dc bias is standard on all models.

Prices: Model 33A/1, $3150.; Model 33B/1, $3750.; Model 33C/1, $3350.; Model 33D/1, $4000.

MODEL 33A/1
Capacitance: 0-150 pF (30 pF at 100 MHz); resolution, 0.02 pF; basic accuracy, ±0.3%.
Conductance: 0-25 millimhos; resolution, 0.5 micromho; basic accuracy, ±2%.

MODEL 33B/1
Capacitance: 0-150 pF (30 pF at 100 MHz); resolution, 0.02 pF; basic accuracy, ±0.3%.
Conductance: 0-5 millimhos; resolution, 0.1 micromho; basic accuracy, ±2%.

MODEL 33C/1
Capacitance: 0-15 pF; resolution, 0.002 pF; basic accuracy, ±1%.
Conductance: 0-25 millimhos; resolution, 0.5 micromho; basic accuracy, ±2%.

MODEL 33D/1
Capacitance: 0-15 pF; resolution, 0.002 pF; basic accuracy, ±1%.
Conductance: 0-5 millimhos; resolution, 0.1 micromho; basic accuracy, ±2%.

CAPACITANCE/ INDUCTANCE METERS

Direct-reading, three-terminal measurements of capacitance and two-terminal measurements of inductance are made substantially independent of the loss of the test sample. Analog and digital versions are available. Completely linear dc outputs on the analog versions and BCD outputs on the digital version are provided for converter and systems applications. Low test level and provision for dc bias of the test make these meters ideal for measurements on semiconductor devices.

Prices: Model 71A, $1050.; Model 71CR, $1200.; Model 700C, $2600.

MODEL 71A
Capacitance: 1 pF fs to 1,000 pF fs; basic accuracy, ±1%.
Inductance: 1 μH fs to 1 mH fs; basic accuracy, ±1%.
Test Signal: Frequency, 1 MHz; level, 15 mV rms.

MODEL 71CR
Capacitance: 10 pF fs to 10,000 pF fs; basic accuracy, ±1%.
Inductance: 10 μH fs to 10 mH fs; basic accuracy, ±1%.
Test Signal: Frequency, 100 kHz; level, 15 mV rms.

MODEL 700C
Capacitance: 10 pF fs to 1,000 pF fs (plus 40% over-range); basic accuracy, ±0.25% ±5 digits.
Inductance: 10 μH fs to 100 μH fs; basic accuracy, ±1%.
Test Signal: Frequency, 1 MHz; level, 15 mV rms.
Readout: 4½ digit; BCD outputs.
DC Bias: Internal: 0-1.4; 0-14; 0-140 V. External: ±200 V.

CAPACITANCE BRIDGES

Boonton Electronics specializes in three-terminal capacitance bridges for measuring the lower capacitance values at higher frequencies up to 1 MHz. All provide accurate and precise measurements of capacitance and conductance at low test levels; and contain means of supplying dc bias to the component under test. The three-terminal arrangement allows remote measurement at the end of coaxial leads without incurring error. Major applications are for measurements on semiconductor devices, capacitors, and materials.

Prices: Model 74D, $2450.; Model 75C, $2800.; Model 75D, $2150.; Models 77B and 77B-S1, $2850.

MODEL 74D
Capacitance: 0.0002 pF to 0.11 μF; basic accuracy, ±0.1%.
Conductance: 0.001 micromho to 1,000 micromhos; basic accuracy, ±5%.
Test Signal: Frequency, 100 kHz; level, 1 mV to 4 V.

MODEL 75C
Capacitance: 0.0002 pF to 1,000 pF; basic accuracy, ±0.25%.
Conductance: 0.001 micromho to 1,000 micromhos; basic accuracy, ±5%.
Test Signal: Frequency, 5-500 kHz; level, 1 mV to 3 V.

MODEL 75D
Capacitance: 0.00005 pF to 1,000 pF; basic accuracy, ±0.25%.
Conductance: 0.01 micromho to 1,000 micromhos; basic accuracy, ±5%.
Test Signal: Frequency, 1 MHz; level, 1 mV to 0.3 V.

MODEL 77B
Automatic high-go-low decision for capacitance. Nominals to 1,000 pF; tolerance set to ±0.25% accuracy. Test frequency, 1 MHz. Manual mode as 75D. Model 77B-S1 100 kHz version also available.

INDUCTANCE BRIDGES

These unique bridges measure series inductance to low values with fractional percent accuracy over wide frequency ranges. Series resistance is also measured. There are no false balances or sliding nulls. The inductance readout vernier has an effective scale length of 200 inches for finest resolution. Each bridge is complete with built-in oscillator and detector. Accessory mu jig allows measurement of permeability and Q of toroidal cores.

Prices: Models 63H and 63M, $2950.; Model 63L, $3200.

MODEL 63H
Inductance: 0.2 nH to 110 mH; basic accuracy, ±0.25%.
Series Resistance: 0.2 mΩ to 11 kΩ; basic accuracy, ±3%.
Test Signal: Frequency, 5 to 500 kHz; level, 3 V max.

MODEL 63M
Inductance: 2 nH to 1.1 H; basic accuracy, ±0.25%.
Series Resistance: 2 mΩ to 110 kΩ; basic accuracy, ±3%.
Test Signal: Frequency, 1 to 100 kHz; level, 5.5 V max.

MODEL 63L
Inductance: 20 nH to 11 H; basic accuracy, ±0.25%.
Series Resistance: 5 mΩ to 110 kΩ; basic accuracy, ±3%.
Test Signal: Frequency, 0.4 to 40 kHz; level, 5.5 V max.

DC METERS

These sensitive, stable dc meters measure voltage and current over exceptionally wide ranges. Linear dc output is virtually drift free for recorder or plotter applications. A unique switching arrangement on the Model 95A is simple and convenient with illuminated windows displaying the range in use.

Prices: Model 56A, $585.; Model 95A, $625.

MODEL 56A
Null Detector: Ranges, ±1 pA to ±10 μA es.
Input Resistance: 10MΩ all ranges.
Noise: <0.1 pA p.p.
Hunt Mode: 60 dB compression.

MODEL 95A
Voltage: ±10 μV to ±1,000 V es; accuracy, ±3% es.
Current: ±1 pA to ±1 A es; accuracy, ±4% es.
Input Resistance: 10 MΩ all voltage ranges.
DC Output: 1 V into 1,000 Ω.

AUTOMATION PRODUCTS DIV.
BOONTON ELECTRONICS CORP.
1279 U.S. Route 46, Parsippany, N.J. 07054
Tel: (201) 335-9550 / TWX: 710-986-8241

Boonton Electronics Corporation also produces a line of high speed, automatic test equipment and systems primarily intended for manufacturing test, incoming inspection, and process control.

In addition to a broad line of standard instruments in the areas indicated to the right, our Automation Products Division provides application engineering and a quick-response shop capability for equipment modification, interface service and system integration.

- Resistance Trimming Bridges
- Resistance Scanning Systems
- Capacitance Limit and Sorting Bridges
- Resistance Limit and Sorting Bridges
- Varactor Test Systems
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All prices are fob Parsippany, New Jersey, and do not include applicable federal, state, or local taxes. Prices and specifications are subject to change without notice.

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CALIFORNIA INSTRUMENTS COMPANY

a division of AIKEN INDUSTRIES, INC.
5150 Convoy Street, San Diego, Cal. 92111 / (714) 279-8620

DIGITAL MULTIMETER-COUNTER

MODEL 8420

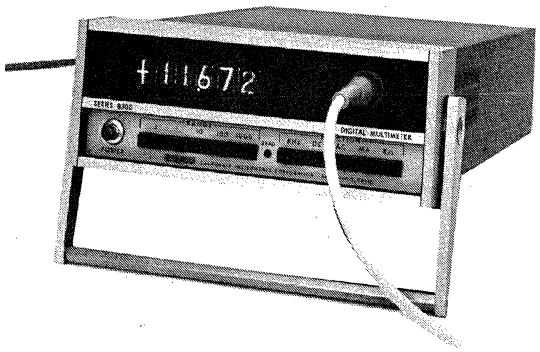
$695

4½ Full Digits
Counts to 10 MHz
4 Functions

	Range	Resolution	Accuracy
DC Volts	1, 10, 100, 1000	100μV	0.01%
AC Volts	1, 10, 100, 1000	100μV	0.1%
Ohms	1KΩ thru 10MΩ	100mΩ	0.02%
Freq. Counter	10KHz thru 10MHz	1Hz	0.02%

- **Automatic Polarity**
- **10 Megohm Input Impedance**
- **True (non-blinking) Electronic Storage**

DIGITAL MULTIMETERS AND OHMMETERS



- **4½ FULL DIGITS**
- **BCD OUTPUTS**
- **HIGH NMR and CMR**
- **RESOLUTION: 1/12,000**

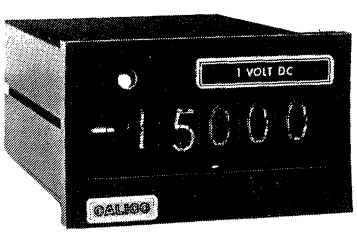
MODEL 8300 Multimeter

- **DC and AC Volts**
- **DC and AC Current**
- **Ohms**
- **Ratio**
- **Frequency**
- **Automatic Polarity**

MODEL 8303 Ohmmeter

- **One-Ohm Full-Scale**
- **9 Ranges to 100 Megohm**
- **100μΩ Resolution**
- **10μ Watt Dissipation on lower ranges**
- **4-Wire Kelvin Input**

DIGITAL PANEL METERS



2⅛"H x 3⅜"W x 5¼"D

- **AUTOMATIC POLARITY**
- **BCD OUTPUTS (8-4-2-1)**
- **INPUT IMPEDANCE: 10 Megohms**
- **PROGRAMMABLE DECIMAL POINTS**
- **FITS STANDARD PANELMETER CUTOUT**

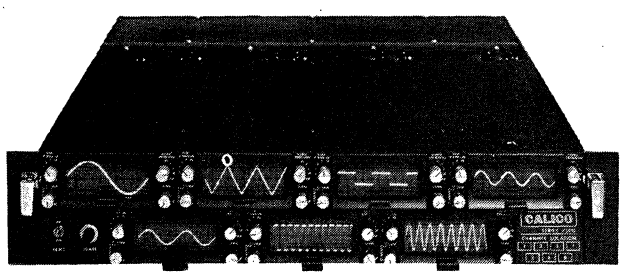
MODEL 8440 4½ Digits

- **Accuracy:** 0.01%
- **Resolution:** 1/15,000
- **Isolated Output Ground**
- **Ranges:** 1.5, 15, 150 VDC

MODEL 8430 3½ Digits

- **Accuracy:** 0.1%
- **Resolution:** 1/1999
- **Small, Compact**
- **Ranges:** 1.999, 19.99, 199.9 VDC

7-CHANNEL MONITOR OSCILLOSCOPE



MODEL 7500

For multi-track analog tape recorder monitoring or any multichannel monitoring application.

- **Response:** DC to 10MHz
- **Sensitivity:** 50 mv/in. to 10 v/in.
- **Sweep Speeds:** 10Hz to 100KHz with X10 vernier
- **CRT:** 1" x 3" rectangular
- **Internal-External (+) and (−) Triggering**
- **Accuracy and Linearity:** 3%
- **AC-DC Mode Coupling**
- **Dual-Channel Selectable Inputs**
- **Single-Channel Displays, X-Y's and Specials Available**

ADVANCED PULSE GENERATORS

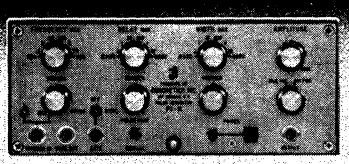
Chronetics' Pulse Generators represent the most versatile and wide-range instruments in the pulse generator field. Eleven standard models, all solid state, meet most user requirements.

Repetition rates from 0.1 Hz to 100 MHz, output amplitudes from 0 to ±100 volts or ±2A, rise/fall-times of less than 2 ns, wide dynamic ranges, high duty cycles, bipolar outputs, etc. are all available on standard instruments.

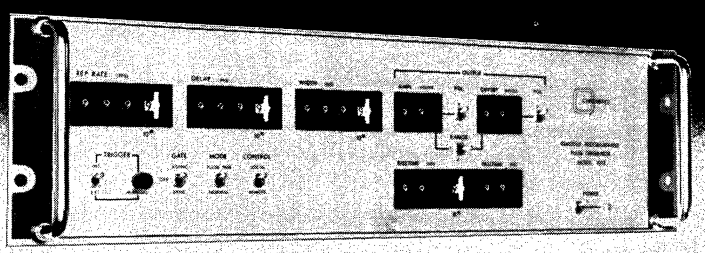
Chronetics Pulse Generators are exceptionally flexible. Most provide single or double pulses of either polarity, single-shot, pulse bursts. Bipolar outputs and current/voltage modes are available. Usually prf, amplitude, risetime and falltime, width, delay and DC-offset are independently and continuously variable.

Price/performance engineering makes Chronetics Generators best buys in the pulser field. Prices begin as low as $375* for the compact, rugged and high-performing PG-11. Sales/Service is on a world-wide basis with more than 45 field offices to respond promptly to any need.

Compare Chronetics performance.



PG-11 $375*



MODEL 1012 FULLY PROGRAMMABLE $4000!*

SUMMARY DATA

MODEL	CLOCK PRF	AMPLITUDE[2]	Z OUT	RISE/FALL TIME	WIDTH	DELAY	DUTY CYCLE (MAX)	DC OFFSET
PG-2	1 Hz-10 MHz 20 MHz Max.[1]	10 mV-10V + or —	50 ohms	<10 ns-20 ms[4]	< 35 ns-200 ms	0-200 ms	100%	±5V
PG-11	<10 Hz-> 20 MHz 30 MHz Max.[1]	0-15V + or —	50 ohms	5 ns	25 ns-10 ms	20 ns-10 ms	85%	
PG-13A	1 Hz-25 MHz	100 mV-100V + or —	50 ohms or 1K, min.	<10 ns-50 ms[4]	10 ns-500 ms[5]	15 ns-500 ms	10% @ 2A 50% @ 1A 100% @ < 0.5A	±5V ±100 mA
PG-14	1 Hz-50 MHz	100 mV-20V + or —	50 ohms or 10K, min.	2 ns-50 ms[4]	<5 ns-500 ms	10 ns-500 ms	100%	±5V ±100 mA
PG-16	1 Hz-100 MHz	100 mV-20V + or —	50 ohms or 10K, min.	2 ns-50 ms[4]	< 5 ns-500 ms[5]	10 ns-500 ms	100%	±5V ±100 mA
PG-32A	0.1 Hz-10 MHz 20 MHz Max.[1]	20 mV-20V[3] + and — 2 Channels	50 ohms or 500 ohms	5 ns-1 sec[4]	< 30 ns-1 sec[5]	50 ns-1 sec	100%	To 10V To 400 mA
PG-32N	0.1 Hz-10 MHz 20 MHz Max.[1]	20 mV-35 V dual Neg. 2 Channels	50 ohms or 500 ohms	5 ns -1 sec[4]	< 30 ns-1 sec[5]	50 ns-1 sec	100%	To 10V To 400 mA
1012	10 Hz-9.99 MHz 20 MHz Max.[1]	0-9.9V[2] + or —	50 ohms	5 ns-9.9 ms	40 ns-9.9 ms	0-9.99 ms	85%	±9.9V

* F.O.B. MT. VERNON, N. Y., DOMESTIC

Notes:
1. Effective PRF in double pulse mode
2. Max. Range into 50-ohm loads
3. Separate or combined (bipolar) channels; same polarity on Special Order
4. Variable linearly — 100:1 dynamic range. Separate control of Rise and Fall Times
5. Independent control Pulse 1 /Pulse 2 (double pulse mode)

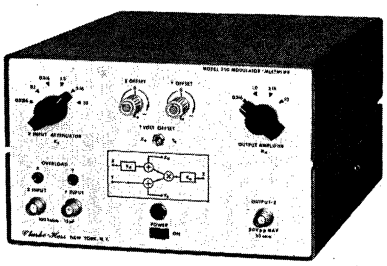
CHRONETICS

U.S.A.: 500 Nuber Avenue, Mt. Vernon, New York (914) 699-4400 TWX 710 560 0014
Europe: 39 Rue Rothschild, Geneva, Switzerland (022) 31 81 80 TELEX 22266

3 in 1

MULTIPLIER MODULATOR AMPLIFIER

The Model 200 is a unique, ready-to-use four quadrant multiplier with self-contained power supply, wide band power amplifier, (50 ohm, 20 V pp), input amplifiers (100 kohm, 20 pF), input and output attenuators, dc offset controls, calibrated dc for gain settings and individual overload indicators for each channel.



as a MULTIPLIER the maximum error on either channel is less than 1% of full scale. Identical channel amplifiers minimize channel phase and gain deviations. Less than nsec. difference in channel delays.

as a MODULATOR the Model 200 will provide 98% AM MODULATION with carriers up to 8 MHz and 99.5% AM MODULATION below 4 MHz. As a SUPPRESSED CARRIER MODULATOR, carrier suppression below 40 dB is achieved from dc to above 2 MHz.

as a gain controlled AMPLIFIER the Model 200 allows amplitude programming of any oscillator, signal generator, or FM generator. Provides 40 dB of voltage gain with less than 1% distortion from dc to over 2 MHz.

Price: $455.00

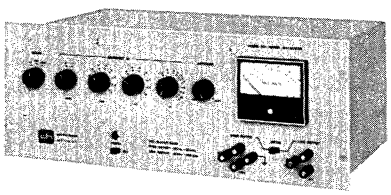
unique instrumentation

WIDEBAND WATTMETERS

Various models cover the ranges.

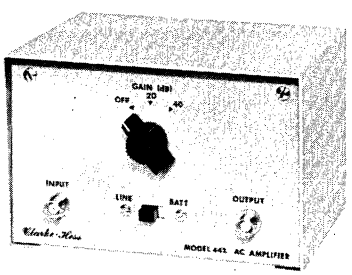
Frequency:	dc to 10 MHz
Power:	10 mw to 20 kW
Current:	1 mA to 100 A
Voltage:	100 mv to 1 kV

Power Factors from 0 to 1.
Digital or analog outputs.
Floating current input terminals.
Accuracy 2% to 4%. Line or battery operation. Prices from $600 to $2900.



POWER OSCILLATORS
Sine Wave

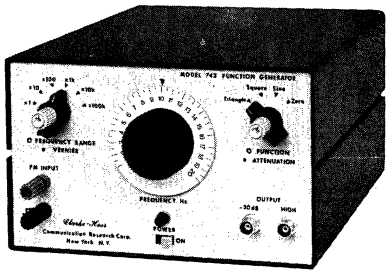
Low distortion, digitally selected sine waves from 100 Hz to 200 kHz. 100 V rms to 40 kHz, open circuit. (50 V rms into 600Ω) 10 V rms to 200 kHz. Transformer coupled metered outputs.
Model 933. Price: $750



DECADE AMPLIFIER
Battery Line/Operation

FET Input, Low Distortion, Low Drain, Low Noise, 5 Hz to 2 MHz, 20 dB or 40 db Amplifier or Pre-Amplifier. Internal Mercury Cells. Model 442. $157 ($169 with batteries)

function generators

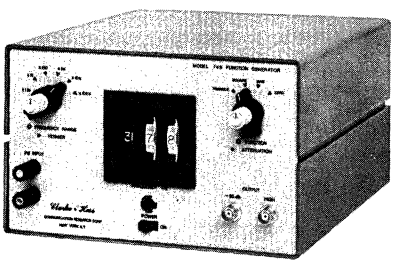


Model 743
DIAL CONTROLLED

Sine, Square, Triangle, Tone Burst, Phase Lock Synchronization, Wide Range, low distortion VCF and/or FM 1 Hz to 2 MHz dial controlled. Sweeps to twice upper dial frequency. Uncalibrated frequencies from 1 mHz to 1 Hz through Low Frequency Expand Switch. Sine Wave Distortion −46 dB. Extremely constant amplitude response. Price: $365.00

AUXILIARY PLUG-IN SWEEP UNIT

Uses oscilloscope sawtooth to convert function generators into wideband sweep generators. Eight ranges. $35.00



Model 745
DIGITALLY CONTROLLED

Outmodes all pushbutton oscillators. Digitally settable from 0.01 Hz to 1.1 MHz. Typical resettability is 0.1%. Three digit thumbwheel switch frequency control. Except for frequency accuracy, range, and resettablity, other characteristics are similar to Model 743. Price: $475.00

Computer Controlled or Programmable versions of most of these instruments are available. Other products include programmable low distortion, highly stable, constant amplitude, sine wave generators; tracking filters; low pass filters with adjustable shapes and bandwidths; and FM threshold extending devices such as Phase or Frequency Locked Loops.

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COMMUNICATION RESEARCH CORP.

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Curtis

ELAPSED TIME INDICATORS

... Smallest size, lowest cost, AC or DC, any voltage

How they work — The patented Curtis Ampere Hour Meter is basically a mercury microcoulometer fabricated from precision bore, glass capillary tubing filled with two columns of mercury separated by a small electrolyte gap. Application of pure or pulsed DC signals to electrodes inserted in the mercury causes mercury at the anode to be electrochemically transferred across the gap to the cathode at a time rate proportional to the current. The gap moves along the tube length as a function of the current-time integral. A constant-current supply provides a precision timing device.

TYPICAL APPLICATIONS

Warranty — Low-cost meters for warranty of equipment based on both actual usage, and calendar period.

Reliability Engineering — Provides mean-time-to-failure or sub-system replacement time without costly, unreliable logging.

Test Equipment Utilization & Calibration — Provides calibration on actual hours of use with savings up to 50% compared to calendar-basis programs. Substantial savings in capital investments can be realized with accurate utilization data on test instruments, tools and equipment.

Curtis Instruments, Inc.
200 Kisco Avenue, Mount Kisco, N.Y. 10549
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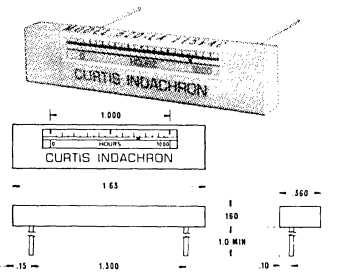
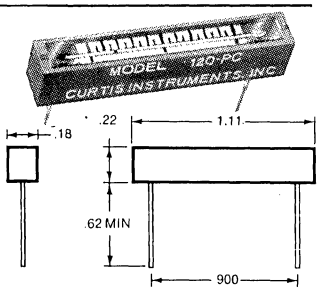
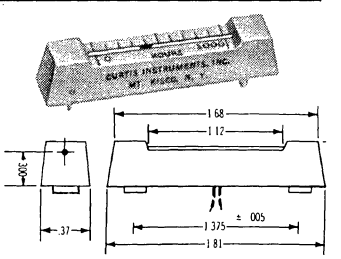
L Series Curtis Indachron®
Used on OEM equipment as a very low-cost means of validating warranties and for P.M. scheduling. Under $2.00 each in production quantities. AC and DC Models. Various time scales and electrical ratings. Can be mounted on printed circuit cards or direct to chassis with adhesive strips.



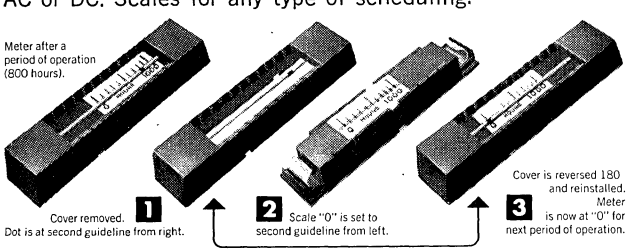
120-PC Series
Radial leads for installation directly on printed circuit cards for "mean-time-to-failure" or preventative maintenance scheduling. Can be instrumented from available DC voltages for any time scale by use of series resistor. Full scale of .65 inches = 4.16 milliamp-hours.



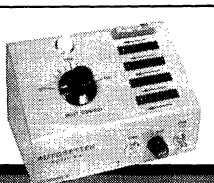
150-S Series
Operates directly from DC voltage with calibrating series resistor: full scale of 1 inch in 10 divisions = 10.4 milliamp-hours. Stud mounting, plug-in or printed card configurations. Fully reversible, no threshold.



CP-3 Series
New low cost monitor for P/M scheduling and other applications requiring a simple means of reset to zero in the field. AC or DC. Scales for any type of scheduling.

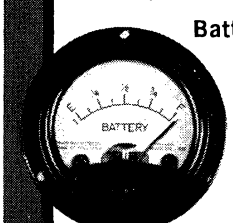


Curtis Autosetter
For automatic resetting of 150-S series indicators.



Military Units
Provides lowest power, lowest weight, smallest size and lowest cost for ground and airborne applications. Meets MIL 1-81219.

CURTIS INFINITE MEMORY INTEGRATORS



Battery "Fuel" Gauges
Meter displays % of discharge (amp-hrs. remaining in rechargeable battery systems). Typical of applications for Curtis 921 Millivolt Integrator.

Ampere Hour Meter and Controller Model 926-A For large rechargeable stationary battery systems. High and low level detectors. Adjustable charge/discharge ratio to compensate for battery losses.

Powered from battery system. Available in panel and bulkhead mountings. Also model for remote panel meter display.

Bipolar Integrator Model 922
A portable instrument integrates positive and negative signals to 100 MV. Readout on 4½" taut band meter. Permanently stores recorded integral until reset. Accuracy: ±2%; Typical linearity: ½%. 115 VAC/60 Hz.

read about it -

Write for Catalog

Digital Panel Meters

Whatever your requirement, check the Datascan line of Uni-polar with and without under-range "zeroing" capability — Bi-polar — Auto polarity — 2½, 3½, 4½ digits. New flush mount bezel or standard bezel.

Special industrial OEM applications: *■ Dual Ranges ■ Industrial Packaging ■ PH Meters ■ Temperature Measurement Units ■ Preset Controllers ■ Ratiometers ■ LVDT Readouts ■ Accumulators ■ Event Counters ■ Frequency Counters ■ Repacking To Replace Analog Meters*

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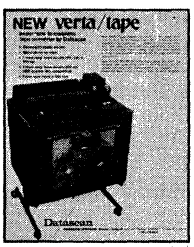


Convert Paper Tape to Mag Tape — Off Line with Verta-Tape —

converts coded information from 5, 6, 7 or 8 channel paper tape to 64 character magnetic tape code set.

- *stand alone terminal*
- *7 track mag. tape density 220, 556 or 800 bpi*
- *9 track mag. tape density 800 bpi (IBM System 360 compatible)*
- *paper tape input at 500 cps*

Write for Bulletin

High Speed Paper Tape Reader

. . . for reading 5, 6, 7 or 8 channel tapes

- *speeds to 500 cps, bi-directional*
- *stop-on-a-character*
- *photo-electric reading*
- *heavy-duty construction and components*
- *available as rack mounted or with 1000 cps spooler or fanfolding equipment*

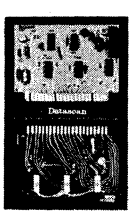
Write for Bulletin

Save with Mini-Computer Interfaces (Paper Tape Input)

for PDP-8 I and L; HP 2114, 15, 16;Nova and Super Nova . . . *about half the customary prices.*

- *PC board plugs directly into computer*
- *complete with 500 cps bi-directional paper tape reader, connecting cable and interface card*

Get your free copy.



Logic Card Handbook

There are hundreds of pages in our new I.C. LOGIC CARD HANDBOOK to help you lower costs . . . DTL, HTL (for high noise environment) and TTL circuits you don't have to design — plus function cards, accessories and systems.

Write for complete information or demo.

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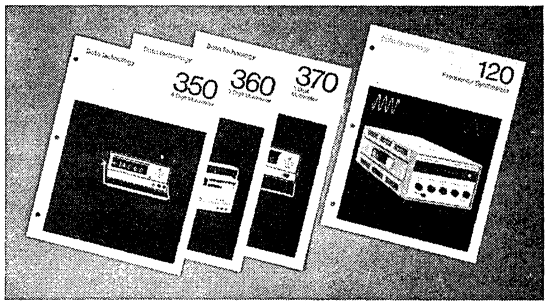
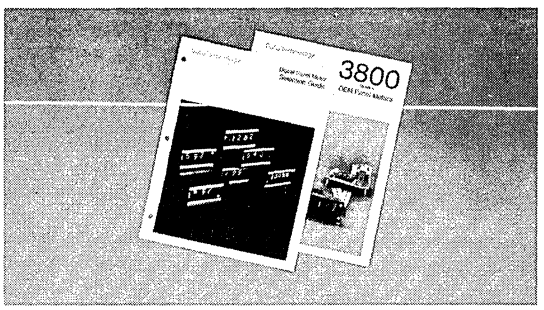


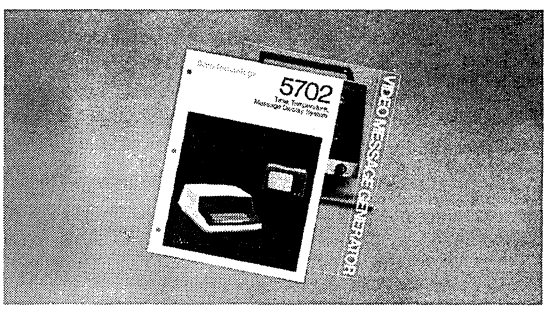
DIGITAL TEST INSTRUMENTS

Three 4-page brochures describing the Data Technology **Model 370** 5-digit multimeter, the **Model 350** 4-digit multimeter, and the **Model 360** 3-digit multimeter. Prices range from $345.00 to $1450.00.
A 4-page brochure describes the **Model 120** Frequency Synthesizer with a range of 1 Hz to 1.999999 MHz in 1 Hz increments. Priced at $1995.00.

DIGITAL PANEL METERS

A 12-page **Digital Panel Meter Selection Guide** that describes the **340 Series** of three- and four-digit standard panel meters and a 4-page brochure describing the **NEW 3800 Series** of two- and three-digit modular panel meters for OEM applications. Prices range from $95.00 to $525.00.



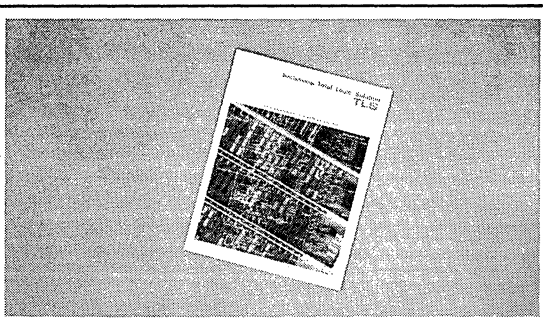


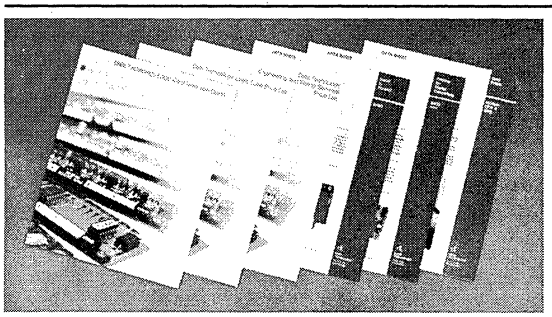
VIDEO DISPLAY SYSTEMS AND CHARACTER GENERATORS

A 4-page brochure describing the Data Vox **Model 5702** Time, Temperature, Message Display System and a 2-page data sheet describing the Data Vox **Model 5401** Video Message Generator; both for CATV and MATV applications.

COMPUTER AIDED DESIGN & AUTOMATED MANUFACTURING SERVICES

A 22-page brochure describing Data Technology's Total Logic Solution to your digital logic problems. **TLS** is a combination of product and service that dramatically reduces product development time and cost. TLS starts with your logic diagram and ends four to six weeks later with wired hardware and complete documentation. In between, the computer-aided design program checks your logic drawings for loading errors and missing signals and eliminates the thousand and one headaches associated with building a system to a tight schedule.





LOGIC CARDS

A 12-page **Logic Card Selection Guide** with a series of back-up data sheets describing the most complete line of digital logic cards in the industry including DTL and TTL cards, complex function cards (MSI), and analog cards (A/D, D/A, sample and hold, multiplexers); plus a complete selection of complementary hardware and accessories. Write today for the Selection Guide.

Data Technology

Write for literature today.

Data Technology Corporation / 1050 East Meadow Circle, Palo Alto, California 94303 / Tel: (415) 321-0551 TWX: 910-373-1186

DIXSON INSTRUMENTS

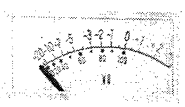
ELECTRICAL INDICATING PANEL METERS

The meters and accessory products described in these pages have been designed for commercial and military applications. All meters are permanent magnet moving coil, rugged pivot and jewel construction. Standard accuracy on both AC and DC meters is ±2% of full scale at 25°C. Higher or lower accuracies are available. All AC meters are rectifier type instruments.

SPECIAL METER DESIGNS: VU AND DB METERS • HIGH RESISTANCE VOLTMETERS • SPECIAL ACCURACY ON CALIBRATION AND RESISTANCE • SUPPRESSED ZERO RANGES • EXPANDED SCALE AC & DC VOLTMETERS • CUSTOM SCALE / CASEFRONT MARKINGS AND LOGOS • MIRRORED SCALE . . . For your special application — DIXSON Engineers are always ready to assist you on custom design requirements.

1½" METER

MODEL 120K



- **Behind panel mounting**
- **Designed specifically for illumination**
- **Self-contained VU and DB meters**
- **Self-shielded**

CASE: Plastic fronts are acrylic — treated to remain dust and static free, in a choice of colors.
SIZE: PANEL CUTOUT 1.52 inches wide by .735 inches high.
SCALE LENGTH: Scale is 1.82 inches over a scale deflection of 86°.
DIAL: Custom dials with or without mirror.
ZERO CORRECTOR: Front screwdriver adjust.
SHIPPING WEIGHT: Approximately 4 ounces.

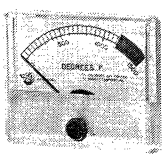
MODEL 120T

- **Unlimited range selection**
- **Maximum readability**
- **Minimum space**
- **Colored casefronts**

CASE: Plastic fronts are acrylic — treated to remain dust and static free, in a choice of colors.
SIZE: Casefront is 1.75 inches wide by 1.58 inches high.
SCALE LENGTH: 1.82 inches over a scale deflection of 86°.
DIAL: Custom dials with or without mirror.
ZERO CORRECTOR: Front screwdriver adjust.
SHIPPING WEIGHT: Approximately 4 ounces.

2½" METER

MODEL 220S

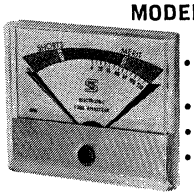


- **Bezel for behind panel mount**
- **Shadow free dial**
- **AC and DC ranges**
- **Consistent accuracy**

CASE: Plastic fronts are acrylic — treated to remain dust and static free, in a choice of colors.
BEZEL: Attractive matte black finished bezel for behind the panel mount. (Optional)
SIZE: Casefront is 2.65 inches wide by 2.25 inches high.
SCALE LENGTH: Scale is 2.15 inches over a scale deflection of 100°.
DIAL: Custom dials in color with customer's name or logo.
ZERO CORRECTOR: Front screwdriver adjust.
SHIPPING WEIGHT: Approximately 8 ounces.

3½" METER

MODEL 320T

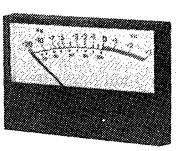


- **Bezel for behind panel mount**
- **Colored casefronts**
- **AC and DC ranges**
- **Long term stability**

CASE: Plastic fronts are acrylic — treated to remain dust and static free, in a choice of colors.
BEZEL: Attractive matte black finished bezel for behind the panel mount. (Optional)
SIZE: Casefront is 3.5 inches wide by 3 inches high.
SCALE LENGTH: Scale is 2.93 inches over a scale deflection of 100°.
DIAL: Custom dials in color with customer's name or logo.
ZERO CORRECTOR: Front screwdriver adjust.
SHIPPING WEIGHT: Approximately 11 ounces.

4" METER

MODEL 330T

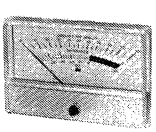


- **Low profile styling**
- **Crisp modern appearance**
- **Beautiful matte black case**
- **Designed for illumination**

CASE: Matte black finish "Picture Frame Cover" with clear glass window. Light diffusing lenses molded in the back for illumination.
SIZE: Casefront is 3.95 inches wide by 2.6 inches high.
SCALE LENGTH: Scale is 3.04 inches over a scale deflection of 100°.
DIAL: Custom dials in color with customer's name or logo.
ZERO CORRECTOR: Front screwdriver adjust.
SHIPPING WEIGHT: Approximately 11 ounces.

4½" METER

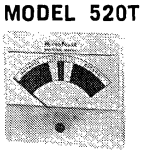
MODEL 430T



- **Space saver**
- **15% longer scale — 40% less space**
- **Minimum height**
- **Maximum readability**

CASE: Plastic fronts are acrylic — treated to remain dust and static free, in a choice of colors.
SIZE: Casefront is 4.50 inches wide by 2.9 inches high.
SCALE LENGTH: Scale is 3.67 inches over a scale deflection of 100°.
DIAL: Custom dials with or without mirror.
ZERO CORRECTOR: Front screwdriver adjust.
SHIPPING WEIGHT: Approximately 11 ounces.

MODEL 520T



- **Bezel for behind panel mount**
- **Mirrored scale**
- **Colored casefronts**
- **Perfect for multi-scale dials**

CASE: Plastic fronts are acrylic — treated to remain dust and static free, in a choice of colors.
BEZEL: Attractive black matte finish for behind the panel mount. (Optional)
SIZE: Casefront is 4.67 inches wide by 4.15 inches high.
SCALE LENGTH: Scale is 4.18 inches over a scale deflection of 100°.
DIAL: Custom dials with or without mirrored scales.
ZERO CORRECTOR: Front screwdriver adjust.
SHIPPING WEIGHT: Approximately 14 ounces.

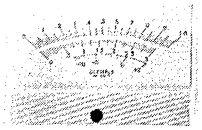
DIXSON INC
METER DIVISION

P.O. BOX 2111 GRAND JUNCTION, COLO. 81501, PH. (303) 242-8863

DIXSON INSTRUMENTS

ELECTRICAL INDICATING PANEL METERS

6" METER



- Space saver
- 15% longer scale — 40% less space
- Minimum height
- Mirrored scale

MODEL 630T

CASE: Plastic fronts are acrylic — treated to remain dust and static free, in a choice of colors.

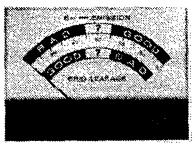
SIZE: Casefront is 6.0 inches wide by 3.79 inches high.

SCALE LENGTH: Scale is 4.57 inches over a scale deflection of 100°.

DIAL: Custom dials with or without mirrored scales.

ZERO CORRECTOR: Front screwdriver adjust.

SHIPPING WEIGHT: Approximately 13 ounces.



- Bezel for behind panel mount
- Extra long scale
- Great multi-scaled meter
- Maximum readability

MODEL 620T

CASE: Plastic fronts are acrylic — treated to remain dust and static free, in a choice of colors.

BEZEL: Attractive black matte finish for behind the panel mount. (Optional)

SIZE: Casefront is 6.0 inches wide by 4.31 inches high.

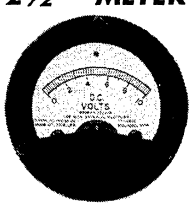
SCALE LENGTH: Scale is 5.08 inches over a scale deflection of 100°.

DIAL: Custom dial with or without mirrored scale.

ZERO CORRECTOR: Front screwdriver adjust.

SHIPPING WEIGHT: Approximately 14 ounces.

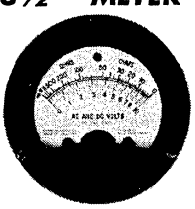
2½" METER



MODEL 200R

- Conforms to MIL-M-10304
- Sealed and ruggedized
- Type MR26

3½" METER



MODEL 300R

- Conforms to MIL-M-10304
- Sealed and ruggedized
- Type MR36

CASE: Meter case is metal conforming to MIL-M-10304.

SIZE: Model 200R casefront is 2.69 inches round, Model 300R casefront is 3.49 inches round.

MOUNTING: Interchangeable with MIL-M-10304 round ruggedized meters.

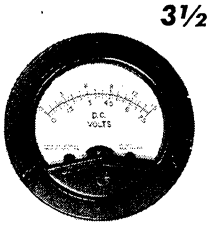
SCALE LENGTH: Model 200R — 1.76 inches, Model 300R — 2.35 inches over a scale deflection of 90°.

DIAL: Standard ranges per MIL-SPEC and custom scales.

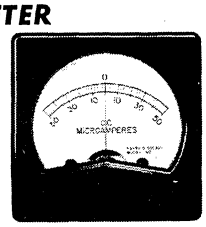
ZERO CORRECTOR: Front screwdriver adjust.

SHIPPING WEIGHT: Model 200R — 10 ounces, Model 300R — 13 ounces.

3½" METER



MODEL 300



MODEL 310

- Durable phenolic case
- Meets specification MIL-M-6B
- Commercial application
- Military application

CASE: Durable molded phenolic, with clear glass windows, Two case styles.

SIZE: Model 300 casefront is 3.51 inches round, Model 310 casefront is 3.0 inches square.

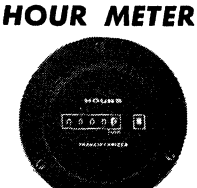
SCALE LENGTH: Scale is 2.35 inches over a scale deflection of 90°.

DIAL: Custom dials in color with customer's name or logo.

ZERO CORRECTOR: Front screwdriver adjust.

SHIPPING WEIGHT: Approximately 10 ounces.

HOUR METER — 2½" MODEL 400



- Instant start and stop
- Works on Neg. or Pos. ground systems
- Polarity protected
- Easy to read digital counter
- Built to withstand high vibration, extreme temperatures
- Easy to install — 2 wire connection

Model 401 — 11-15 Volts D.C. for 12 volt systems.

Model 402 — 22-30 Volts D.C. for 24 volt systems.

Model 403 — 36-42 Volts D.C. for 36 volt systems.

ACCURACY: 2% at 25°C.

SIZE: Casefront is 2.30 inches round.

SHIPPING WEIGHT: Approximately 4 ounces.

PORTABLE INSTRUMENT

- Low center of gravity
- Recessed meter
- Zero corrector
- All plastic case
- D'Arsonval movement

CASE: Impact-Resistant all plastic case prevents breakage, reduces electrical shock hazard. A low center of gravity with shock base makes the unit "Tip-proof". Meter is recessed inside of case to prevent scratches and breakage.

SIZE: Case is 3.75 inches wide by 4 inches high.

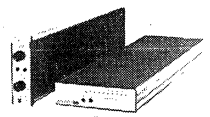
SHIPPING WEIGHT: Approximately 13 ounces.

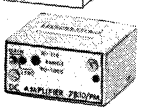
DIXSON INC
METER DIVISION

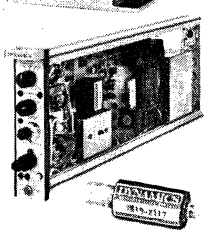
P.O. BOX 2111 GRAND JUNCTION, COLO. 81501. PH. (303) 242-8863

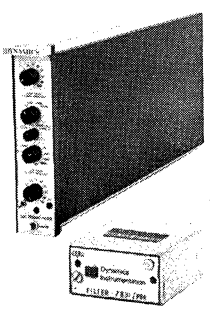
Dynamics Instrumentation

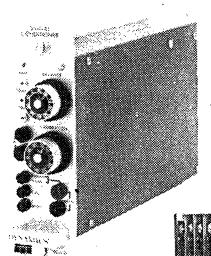
Dynamics Instrumentation (a Multitech Company) unique system capabilities include the ability of utilizing the complimentary "in-house" technologies of Instrumentation, Amplifiers, Filters, Hybrid Microelectronics, Data Communications, Industrial Controls, Graphic Displays, Optics and Magnetics. Typical of Dynamics Instrumentation's manufacturing capabilities is signal conditioning systems, similar to the 64 channel, one cubic foot, avionics package pictured at the bottom left. The standard product line also includes A/D, D/A Converters and Multiplexers. Specialty products include Galvanometer Control Panels, Digital Isolation Switches, Micromultimeters and a wide variety of data shaping equipment. Inquiries for O.E.M. and G.S.A. information are invited.

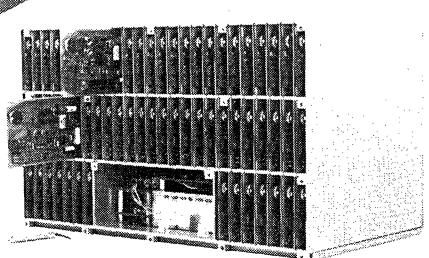












Model 7703/QJ Airborne Signal Conditioner

DIFFERENTIAL DC AMPLIFIERS

	GAIN RANGE	ACCURACY	CMR	f. RESP.	NOISE	LIN.	PRICE
AUTO-PROG 7511	1-3300	.01%	120 dB	50 KHz	4 μVRTI	.01%	$835.00 + Options
GEN. PURPOSE 7520	1-3300	.01%	120 dB*	100 KHz	7 μVRTI	.01%	$375.00 + Options
HIGH PERFORM 7514	0.1-3300	.01%	120 dB	100 KHz	7 μVRTI	.01%	$370.00 + Options
WIDE BAND-WIDTH 7575	0.2-1250	1%	120 dB	1 MHz	1.5 mVRTO	.01%	$835.00
LINE ISOLATION 7504	1-33	0.1%	90 dB	100 KHz	1 mVRTO	.005%	$395.00
MINIATURE 7830	10-1000	1%	90 dB	30 KHz	5 μVRTI	.02%	$175.00

*±300V Capability

GALVANOMETER DRIVER

DC COUPLED 7202	0.1-330	1%	—	35 KHz	3 mVRTO	0.1%	$205.00 + Options

CHARGE AMPLIFIERS

	GAIN RANGE	ACCURACY	T.S. RANGE	f. RESP.	NOISE	CALIB	PRICE
AUTO** 7306/PD	5-5000 mV/pC	1%	Adjustable	80 KHz	.01 pCb	2 LOCAL 2 REMOTE	$825.00
GENERAL 7306**	1-3000 mV/pC	1%	1-15 pC 10-150	20 KHz	.009 pCb	4 modes	$445.00
MINIATURE 7307	2-50 mV/pC	Adjustable	—	30 KHz	.008 pCb	—	$495.00

TRI-MODE AMPLIFIER — DIFF. dc, CHARGE, ac LINE

	GAIN, dc	GAIN, CHARGE	CMR	f. RESP.	NOISE, dc	NOISE, CHARGE	PRICE
7350**	1-1000	0.1-1000 mV/pC	120 dB	60 KHz	7 μVRTI	.01 pCb	$625.00 +Options

**Available with remote line amplifier

ELECTRONIC FILTERS — dc COUPLED

	GAIN	f. L.P.	f. H.P.	Z (INPUT)	TERMINAL SLOPE	OUTPUT CAPABILITY	PRICE
GENERAL 6364	1	dc-1 MHz	dc-1 MHz	100 MΩ	36 dB/oct	±10v ±100 mA	$750.00 + Options
MINIATURE 7831	1	1-50 KHz	1-50 KHz	1 MΩ	24 or 36 dB/oct	±10v ±10 mA	$150.00
PROGRAMMABLE 7812/PL	1	1-20 KHz	1-20 KHz	10 MΩ	18dB/oct	±10v ±10 mA	$600.00

BRIDGE POWER SUPPLIES — SIGNAL CONDITIONERS

	CONSTANT VOLTAGE	CONSTANT CURRENT	LINE REGULATION	RIPPLE	NOISE	CALIB	PRICE
7803	1-16v	—	.01%	100 μV p-p	8 μV p-p	Local, Remote	$225.00
7827	1-16v	0.1-12v	.01%	0.5 μA p-p or 5 μV p-p	5 μV p-p	Local, Remote	$275.00
AIBORNE 7803/QM	10v	—	.02%	200 μV p-p	5 μV p-p	—	$275.00

a MULTITECH company

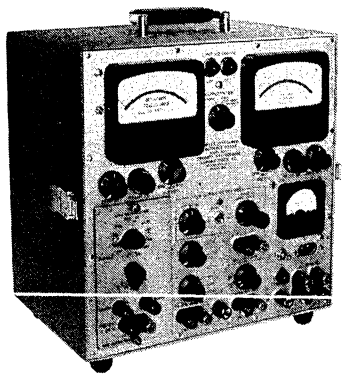
Dynamics Instrumentation

583 Monterey Pass Road, Monterey Park
California 91754 Telephone: (213) 283-7773

DRANETZ
ENGINEERING LABORATORIES INCORPORATED
PLAINFIELD, NEW JERSEY 07062 • TEL. (201) 755-7080

SERIES 100

COMPLEX IMPEDANCE, ADMITTANCE AND TRANSFER FUNCTION METERS

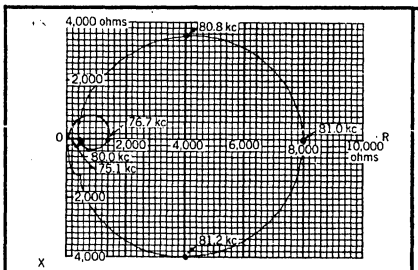


MEASURE...
RECORD...
PLOT...

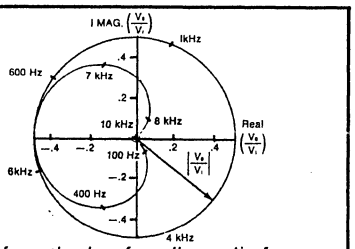
$$Z = R + jX = |Z| \angle\theta z \qquad Y = G + jB = |Y| \angle\theta y$$

$$\frac{V_0}{V_i} / = \left|\frac{V_0}{V_i}\right| \cos\theta + j \left|\frac{V_0}{V_i}\right| \sin\theta = \left|\frac{V_0}{V_i}\right| \angle\theta$$

NO BRIDGE BALANCE — LOW AND HIGH LEVEL — BROAD FREQUENCY RANGE



Complex impedance plane plot of piezoelectric ceramic disk. (Plotted on X-Y recorder in 20 seconds.)

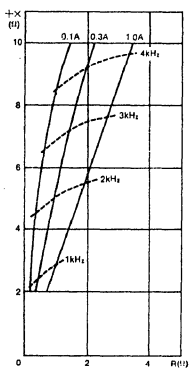


Locus of complex transfer voltage ratio for a passive band-pass filter (400-7000 Hz). Vertical component is imaginary and horizontal component is real part of output-to-input ratio.

Series 100 instruments, comprising a main frame and plug-in, provide a direct measurement of two terminal and four terminal devices. Standard plug-ins below (or special units which can be provided) cover a broad range of measuring conditions, including levels to 9000V peak, frequencies to 300 kHz, and impedances from 0.1 ohm to 40 megohms. In addition, a unique differential [1] technique, which provides high bridge accuracy without balancing and which eliminates cable effects, is particularly useful for unusual laboratory and production component test problems.

APPLICATIONS

- Production Testing
  Capacitors, inductors, transformers
- Linear Network Design
  Filters, amplifiers, linear IC's
- Acoustic and Electromechanical Analysis
  Transducers, arrays, interacting fields
- Linear and Non-linear Device Design
  Piezoelectric, dielectric, magnetic devices



Complex impedance loci of non-linear inductor (core material: grain oriented 3.5% silicon-iron) at various levels of current. Curves show increasing loss and decreasing permeability with increasing frequency, and also increasing loss and increasing permeability with increasing current.

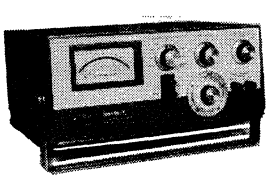
PLUG-INS

Model 100-PA-	Measures	Freq. Range	Linear Ranges, Full Scale 1, 2.5, 5, etc. sequence	Voltage Across or Current Through Unknown (RMS)
1001A	Z & Y	100 Hz to 200 kHz	10 Ω to 50 kΩ 10 μ to 50 kμ℧	0-45 mV in Z mode; 3 V in Y mode
1004	Z	100 Hz to 200 kHz	1 Ω to 5 kΩ	0-45 mV
1008	Y or △Y[2]	100 Hz to 100 kHz	100 μ℧ to 500 m℧	3 V
1009	Y or △Y[2]	100 Hz to 10 kHz	0.025 μ℧ to 10 kμ℧	3 V
1010A	Z	100 Hz to 75 kHz	1 Ω to 10 kΩ	31.6 A, 3.16 kV max
1011B	Y or △Y[2][3]	100 Hz to 75 kHz	10 to 10^6 μ℧ or pF	31.6 A, 6 kV max
1012A	Y	100 kHz to 300 kHz	25 μ℧, 2.5 m℧, 250 m℧	3 V
1013	V_0/V_1	100 Hz to 200 kHz	Gains of 0.01 to 10 k	Input: 0.3 to 300 mV Output: 3 mV to 30 V

For further details on Series 100 write for bulletin 100
(1) Patents #3,267,355 and #3,275,933.
(2) Differential admittance.
(3) Also used for capacitance and dissipation factor measurements up to 9 kV peak.

SERIES 320

VECTOR IMPEDANCE AMPLITUDE METER



FEATURES:

- Direct reading of amplitude of impedance or transfer function
- Wide frequency range of 5 Hz to 500 kHz
- Wide impedance range of 1 to 10^7 ohms
- Impedance angle measurements (when Series 301 Phasemeter is used)
- Self contained oscillator

Series 320 Vector Amplitude Impedance Meters provide rapid, accurate direct measurements of impedance or transfer function. At premarked frequencies, inductance and capacitance are read from panel meter and a db scale facilitates Q measurements. Coupled with Series 301 phase meter, direct reading of impedance angle can be made easily.

SPECIFICATIONS

Frequency Range: 5 Hz to 500 Khz
Impedance Range: 1Ω to 10 MΩ, in 7 ranges
Inductance Range: 1 μh to 100,000 h, in 11 ranges
Capacitance Range: 0.1 pF to 10,000 μF, in 11 ranges
Amplitude Accuracy: 20 Hz to 100 kHz, better than 5% of reading; for frequency extremes, better than 7% at 5 Hz and 10% at 500 kHz.
Phase Accuracy: 20 Hz to 100 kHz, better than 2½°. Low frequency: 5 Hz, better than 4°. High frequency: 500 kHz, better than 5° at 10 to 10^6 ohms; for other values of Z, better than 10°.
Oscillator: 5 Hz to 500 kHz, 5 ranges, 3 V rms approx., ±3% frequency accuracy.
Signal across unknown: Below 1 kΩ, <35 mV rms. Above 1 kΩ, approx. 3 V rms.
AC Outputs: Two, for connection to Series 301 Phase meter.
AC Power Input: 115 v, 50-400 Hz; other voltages available.
Size: Portable (320, 320A) 7″ x 16½″ x 11½″. For 19″ rack mount specify 320R or 320AR.
Weight: 18 pounds; shipping, 27 pounds.

APPLICATIONS:

- Rapid production and incoming inspection of resistors, capacitors and inductors
- Filter and network design and testing
- Amplifier impedance measurements
- General purpose signal generator

OPTIONAL FEATURES

(Specify Model 320A or 320AR)

(1) DC output 0 to +1 V proportional to |Z| below 1 k ohms, proportional to 1/|Z| above 1 k ohms.
(2) DC output 0 to +1 V proportional to freq. dial position.
(3) AC output for use by counter for accurate freq. measurement.
(4) External oscillator input for use with special signal sources.

See Section 4900 for our pages on Synchro Converters.

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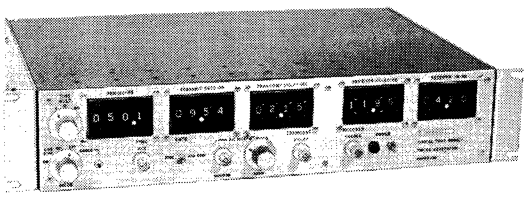
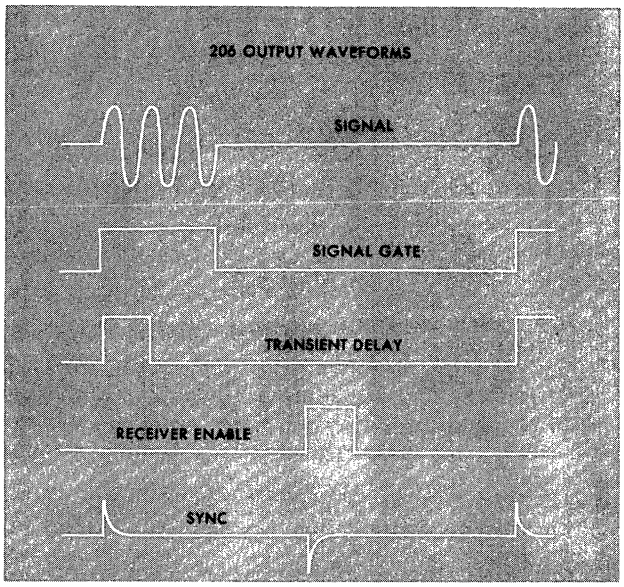
SERIES 206

DIGITAL GATING/TIMING GENERATOR





Series 206 GATING/TIMING GENERATORS gate the output of an a-c signal generator and provides a single signal burst or repetitive signal bursts, with turn-on and turn-off times coincident with zero crossings of the input signal to minimize switching transients.

Internal or external triggering initiates an accurate sequence of pulses for: (1) turning on the signal at its first positive going zero crossing; (2) turning off the signal at the first positive going zero crossing following a precise time interval; (3) delayed triggering of oscilloscopes or other devices; (4) gating detectors or receivers after a precise time interval; (5) delayed triggering of Dranetz Series 215 AC Sampling Voltmeters or Series 202 CW/Pulse Vector Component Computer systems.

APPLICATIONS:

- Automatic a-c testing of components and circuits.
- Testing of data communications systems, modems, multiplexers and switching circuits.
- Calibration of underwater transducers under tone burst conditions.
- Measurement of propagation and reflections in acoustical fields.

FEATURES:

- Wide frequency range of 50 Hz to 3 MHz.
- Provides zero-crossing turn-on and turn-off of a-c signals, single or repetitive gating.
- Provides three additional independently selectable timing pulses for controlling gated detectors and receivers.
- Digitally-controlled timing from front panel controls.
- Remote programming option.

SPECIFICATIONS

MODES OF OPERATION:
CW
Gated: (for CW, FM or Phase-shifted signals).
Single shot or repetitive gating of AC signals.
Repetitive gating using internal timing oscillator (with or without sync. to 60 Hz power line).

SIGNAL CHANNEL:
Frequency range: 50 Hz to 3 MHz.
Input: — Sinusoidal signal, 1 V rms ±10%.
Impedance—10 kΩ shunted by 100 pF.
Output: Level — Adjustable from 0.1 to 1 V rms into 75Ω load over full frequency range; adjustable from 0.5 to 5 V rms into 10kΩ up to 2 MHz.
Distortion — Less than ½% from 50 Hz to 0.5 MHz; <1% to 3 MHz.
Input to output isolation: >60 dB to 0.5 MHz; noise typically 60 dB down.
Types of gating: Zero crossing turn on and zero crossing turn off; less than 1.5° or 25 nsec coincidence error. Non-synchronous turn-on and turn-off.

EXTERNAL TRIGGER:
Pulse or square wave input, ±5 V into 3 kΩ load, transformer input, rise time 50 μsec max, duration 50 μsec. min.

GROUNDING:
Separate chassis, circuit and power line grounds.

CONNECTIONS:
Connections on rear; monitor outputs on front.

CONTROLLED TIMING:
Repetition Period: 100 μsec to 99.99 sec.
Signal On-Time: 10 μsec to 9.999 sec.
Transient Delay Pulse: 10 μsec to 9.999 sec.
Receiver Delay: 10 μsec to 9.999 sec.
Receiver On-Time: 10 μsec to 9.999 sec.

OUTPUT CONTROL PULSES:
Sync. Output: +5 V pulse at signal turn-on followed by −5 V pulse at delayed receiver turn-on.
Signal gate output (for use with commercial E-I Normalizers): +10 V rectangular wave, having leading edge coincident with signal turn-on and lagging edge coincident with signal turn-off.
Signal transient delay output: +10 V rectangular wave having lagging edge coincident with setting of Transient Delay Control.
Receiver enable output: +10 V rectangular wave having leading edge corresponding to Receiver Delay Control, and pulse width corresponding to Receiver On-Time Control.

INPUT POWER:
105 - 125 V 50 - 60 Hz, 40 watts.
SIZE: 3½" high x 17" wide x 15½" deep (with hardward for mounting in standard 19" relay rack).
WEIGHT: 20 pounds; shipping, 20 pounds.

PROGRAMMABLE UNIT MODEL 206A
Parallel BCD rear panel inputs for each timing control. Remote operation on zero position of manual controls. Switch closure to ground or application of 0 to +0.8 V dc is binary one; open circuit or application of +2 to +5 V dc is binary zero. For switch closure, Model 206A produces 3.2 mA dc max. For manual setting of controls, rear connectors produce BCD outputs corresponding to control positions.

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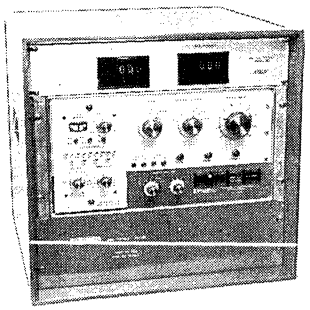
SERIES 202

HIGH SPEED STROBING VECTOR COMPUTING SYSTEMS

For pulsed or CW measurements of Complex Impedance, Admittance, Phase, Transfer Function and Power



FEATURES:

- Computing time less than 1 cycle after sample
- Computes real and imaginary components, phase and magnitude
- Measures CW, gated CW or rapidly varying AC signals
- Selectable sampling times — 0.5 to 500 ms
- Single burst measurements — sample and hold outputs
- Analog and Digital readouts
- Plug-in concept for broad versatility
- Internal delay to eliminate transients
- Differential measurements for high accuracy

APPLICATIONS:

- Automatic high speed testing of components
- Measurement of electro-acoustic transducers under low and high power
- Use as phase-lock detector for low level signal bursts
- Analysis of acoustical fields
- Measurement of real and imaginary input power

The 202 Vector Computing System provides real time computation of vector components, phase and magnitude, requiring only a single sample of the AC test signal and AC reference for measurement. Direct reading digital and analog displays are produced, with provision for connection to X-Y or strip chart recorders or digital computers.

Consisting of a Model 202 or 202A Main Frame, a selectable plug-in and a readout unit, this system can be used for direct computation of impedance, admittance and transfer function under a wide range of voltages, currents and frequencies.

Its rapid computing speed is designed for simultaneous graphic recording of all four outputs, and is particularly useful for frequency plotting or complex immittance plane recording. Yet its sample and hold outputs are excellent for single burst measurements. Measuring on external command, this system is well suited for automatic high speed testing of components as well as complete network analysis.

VECTOR COMPUTER MAIN FRAMES 202 and 202A

Heart of a 202 system is the Vector Computer[1] Model 202 or 202A. The Model 202 accepts two normalized AC signals from the plug-in, producing DC voltages proportional to real and imaginary components. In addition, the Model 202A also produces simultaneously DC voltages proportional to magnitude and phase. Utilizing a unique sampling and integrating technique, effects of noise and harmonics are considerably reduced as compared to systems which utilize peak reading techniques for magnitude and zero axis crossings for phase.

PLUG-INS:

Plug-ins 202-PA-2505 and 202-PA-2506 are for general purpose use, and complement each other to cover a frequency range of 100 Hz to 10 MHz. Each consists of a plug-in section and a probe unit, with 10 ft of cable. Model 202-PA-2505 measures up to 5,000 V rms, and is completely programmable by computer. Model 202-PA-2506 covers the complete 150 kHz to 10 MHz band without frequency band switching.

Both units are capable of the unique Dranetz differential admittance measurement as well as impedance and transfer function. Both plug-ins also provide auto-ranging of the DVM's on the Model D12 readout.

READOUTS:

Two panel readouts are available. Model D10 provides two 5" analog meters, mounted with accessory circuits, on a 5¼"-high panel for 19" rack mounting. Model D12 (shown in photo) consists of two direct reading digital meters, with BCD outputs mounted on a 3½"-high panel for 19" rack mounting; 3½ digits; operates from 115 V 60 Hz power; TTL, DTL, 8421.

MAIN FRAME SPECIFICATIONS

Repetition Rates:

A. On CW, automatic recycling at approx. 10 samples/sec.

B. On gated AC, externally triggered, from 100 samples/sec to 1 sample per 200 seconds.

C. Single pulse operation.

Sampling Times: selectable from 0.5 to 500 ms; 4 - 8 cycles min.

Hold Times: up to 3 minutes.

Inputs:

A. Signal power: see E-I limits, plug-in chart, below.

B. Command (not required for CW). 5 V pulse or gate into 3 kΩ, related to turn on of signal source.

DC Outputs (all simultaneous):

A. (202 and 202A): 0 to ±5 V fs, proportional to real and imaginary components.

B. (202A only): 0 to ±1.80 V proportional to 0 to ±180°. 0 to 1 V fs proportional to magnitude.

Delay: 10 μsec to 1 sec.

Monitor & Command Outputs:

Signal or pulse outputs for AC signal monitoring and sampling time presentation, Z axis scope intensification, scope synch, pen lift, out-of-limit disabling, and blanking.

Front End Plug-Ins:

Accommodates all Dranetz Series 202-PA-plug-ins directly and all Dranetz 100-PA-plug-ins by use of adapters 202-PAR-2501 and 100,713.

Readout Compatibility:

Compatible with analog DC meters (e.g. Dranetz Model D10), Digital meters (e.g. Dranetz D12), oscilloscopes, X-Y recorders and A-D converters.

Input Power: 105 - 125 V, 60 Hz, 120 watts max.

Mechanical:

A. Size: 8¾" high x 17" wide x 18" deep (will fit into 24"D hatch). Carrying handles and slides for 19" rack mounting.

B. Weight: 56 pounds; shipping 95 pounds.

PLUG-IN SPECIFICATIONS

Model	Measuring Function	Freq. Range	Z - Y Ranges	E-I Limits	Nominal Accuracy[2]	Operation	Probe Size
202-PA-2505	Impedance, Differential Admittance and Transfer Function	50 Hz to 300 kHz	Z: 1 to 10^5 Ω Y: 10 to 10^6 μ℧	1 - 5000 V rms 10 mA - 30 A rms	±2° phase ±2% fs Amplitude	Manual and Programmable	3½"x12"x12"
202-PA-2506		150 kHz to 10 MHz	Z: 2.5 to 10^4Ω Y: 10 to 25 k μ℧	1 - 100 V rms 1 mA - 1 A rms	±2° phase ±2% fs Amplitude	Manual	3"x4"x6"

(1) Patent 3,549,874. (2) In differential mode, accuracies to 0.1° and 0.2%.

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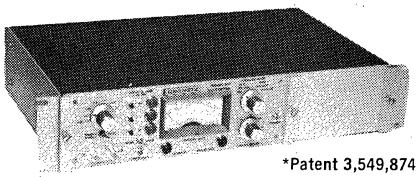
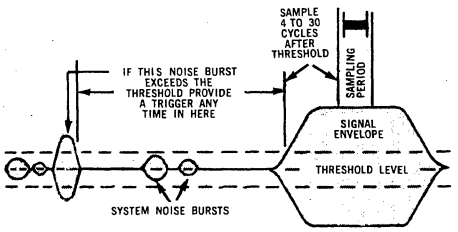
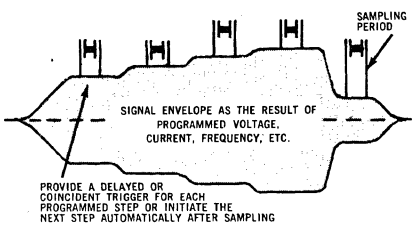
SERIES 215
HIGH SPEED AC SAMPLING VOLTMETER*



*Patent 3,549,874





Measures average value of signals in sampling periods as short as 100 μsec.

FEATURES:

- Selectable sampling periods
- Internally delayed or externally triggered sampling for measurement of any selected portion of signal waveforms
- Excellent noise discrimination during signal measurement
- Can be triggered externally or by internal sensing of signal
- Sample and hold d-c output for DVM or a-to-d conversion and automatic print out
- Frequency range of 100 Hz to 1 MHz
- Sampling rates to 2,000 per second
- For use to 5,000 Vrms, 50 Amps rms with available probes

APPLICATIONS:

High speed component testing; analysis of time varying or transient effects; measurement of direct or reflected acoustical signals; and measurement and control of signal burst levels applied to radiators or receivers (when used with Dranetz Series 501 Servo Control Unit).

Series 215 is a true averaging AC voltmeter for rapid sampling and analysis of complex A-C signals in the form of single transients, repetitive voltages or multiplexed signals. Its unique integrating design makes possible averaged measurements within a time as short as one cycle and provides discrimination against background noise and spikes better than peak-detecting or rms instruments.

SPECIFICATIONS

Frequency Range: 100 Hz to 1 MHz

Input Impedance: 1M ohm, shunted by 50 pF.

Input Signal Levels: 6 voltage ranges, 0.1 to 5 Vrms, fs.

For extended ranges use one of the following probes:

Tektronix Models: P6006 (1-50 Vrms), P6007 (10-500 Vrms), P6013 (100-5,000 Vrms);

Dranetz Models: TR2004 (1-50 A rms), TR-2005 (0.1-5A rms), Threshold adjustable 4-20% fs.

Input Circuit Configurations: single ended, floating ground; differential.

Repetition Rates:

CW: 10 samples/sec with internal generator

Gated AC: 1 sample/2.5 sec to 1,000 samples/sec, without internal delay; with internal delay, 20 msec minimum off-time required between pulses.

Triggered Input: square wave, pulse or step, ±5 V peak.

Single Shot: Output changes to 99% of change from previous reading. Drift less than 1% FS/minute.

Sampling Periods: 0.1, 1 and 10 msec. Requires min of 1 full cycle.

Delay Control to Mask Transients: External or Internal. Controlled on internal, 4 to 30 Hz delay, selectable, below 0.5 MHz; 6 to 60 μsec delay above 0.5 MHz.

Accuracy: ±2% at reading, ±½% fs, single ended input.

Monitor and Control Outputs: Synchronizing pulse (+10 V, 39kΩ) for external equipment; Monitor output: 2 V p-p with 0.5 V pedestal indicating sampling time.

Output Indication: Panel meter calibrated in rms. DC output 0.5 V fs, drives > 10 k ohm load.

Indicating lamps: For overload, correct sampling and sampling period.

Input Power: 115 V, 50-60 Hz, 18 watts.

Size: 3½" high x 17" deep x 17" wide, equipped for 19" rack mounting.

Weight: 20 lbs; shipping, 30 lbs.

SERIES 501A
SERVO CONTROL UNIT

FEATURES:

- Precision control of signal level
- Broad frequency range of 100 Hz to 1 MHz
- Wide dynamic range of 60 dB
- Ground isolation of signals

APPLICATIONS:

- For CW and gated CW control
- Measurement of complex impedance and admittance under high power
- Constant level control for acoustical calibrations
- Vibration amplitude control for mechanical impedance measurements
- Parameter control in programmed industrial process systems.

Series 501A Servo Control Unit maintains the level of a signal at a precise value, regardless of fluctuations in source level or load. By proper scaling of signals the unit will control voltage, power, acceleration, velocity, displacement, pressure or other physical functions. The 501A's servo system senses the voltage at a sampling point, compares it with an internal reference voltage and controls the position of a precision potentiometer, to adjust the voltage to a predetermined level.

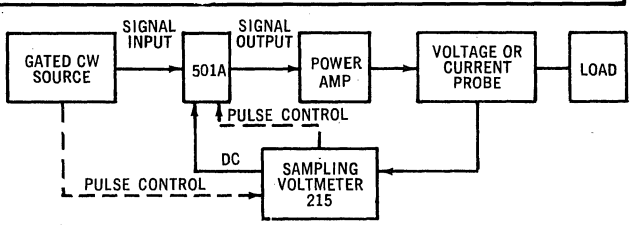
SPECIFICATIONS:

Modes of Operation:

(1) CW (2) CW or Gated CW when used with Dranetz Model 215

Frequency Range:

(1) CW: 100 Hz to 100 kHz (2) CW or Gated CW with Dranetz Model 215: 100 Hz to 1 MHz



CONSTANT VOLTAGE OR CURRENT CONTROL FOR GATED CW SYSTEM

Signal Input: Voltage level, 3 v rms max. Input impedance, 2 kΩ, approx. Leads: 2 wire, single-ended, both isolated from ground.

Signal Output: Level: From 0 to 60 dB below input level. Input impedance of equipment following (e.g., power amplifier) should be 10kΩ or higher. Input leads to amplifier: 2 wire, single-ended.

Feedback Control Voltage or Current: CW (w/out Model 215), between 0.5 and 5 V rms into 50,000 ohms. CW or Gated CW (w/Model 215): Same current and voltage range as 215 with or without probes. (See above).

Control Characteristics: Dynamic range: 60 dB. Level control — Maintains feedback control voltage within ±2% up to 500 kHz for change in input signal or power amplifier load of ±30 dB. Response time — Approx. 0.5 sec.

Oversignal Protection: Automatic signal cutoff for over-level signals.

Power Required: 115/230 v, 60-400 Hz, 0.6 Amps rms.

Size: 7" high x 16½" wide x 11½" deep equipped for mounting 19" rack. **Weight:** 25 lbs.; shipping, 40 lbs.

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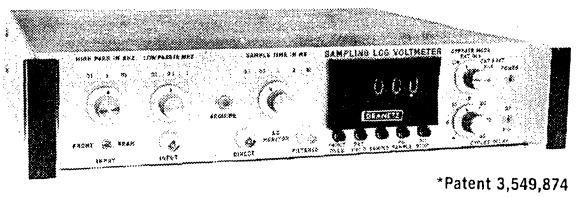
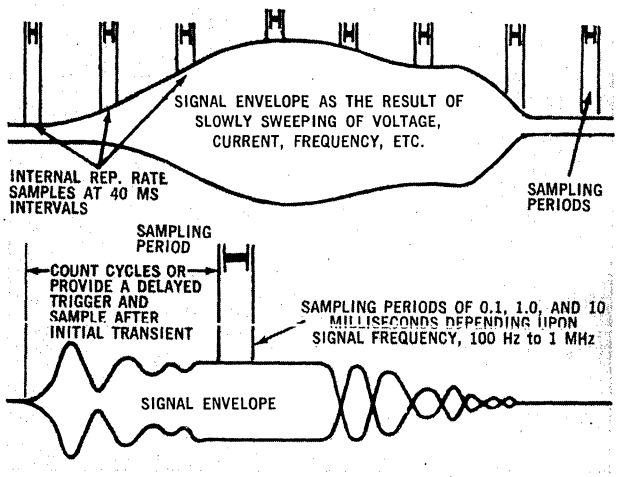
SERIES 220
HIGH SPEED LOG SAMPLING VOLTMETER *

Direct digital readout of CW, Gated AC, or rapidly varying AC signals



*Patent 3,549,874



FEATURES:

- Frequency range - 100 Hz to 1 MHz
- Sample and hold output - analog and digital outputs
- Single or repetitive measurement to 1000 samples per second
- Sampling times down to 100 μsec
- Output independent of sampling time or duty cycle
- 84 dB dynamic range - 300 μV to 5 V (to 5 kV with voltage probes)
- Logarithmic digital display and BCD outputs
- Complete programmability for either remotely controlled or computer controlled test systems
- Rejects unwanted signals up to 50 dB higher than desired signal

APPLICATIONS:

- High speed component testing
- Analysis of time-varying or transient effects
- Measurement of direct or reflected acoustical signals
- Measurement of signal burst levels applied to radiators or receivers.

The Model 220 Sampling Voltmeter is a gated, average responding voltmeter for measuring amplitude of AC signals during a short sampling time. Measurement can be made of rapidly varying CW signals, gated AC signals (tone bursts), or single shot AC signals. Measurements are made at any predetermined time in a selected period which can be as short as 1 cycle of the signal.

Sample and hold output circuitry, combined with internal logarithmic conversion, provide several simultaneous outputs: a digital panel meter reading directly in DBV (ref: 0 DBV = 1 V rms), a linear DC output, two logarithmic DC outputs, and a logarithmic digital output (BCD code) corresponding to the digital panel meter reading. Provision is made for insertion of an external DC signal which allows both the digital display and BCD output to correspond to other logarithmic parameters without effecting instrument calibration.

This instrument combines internal low and high pass filtering, a unique average responding detector, and logarithmic conversion to offer an exceptionally wide dynamic range, high sensitivity, wide frequency range, short sampling time and low susceptibility to noise and signal distortion compared to peak responding and rms AC instruments.

SPECIFICATIONS

Signal Frequency Range: 100 Hz to 1 MHz.

Accuracy: ±0.3 dB to 200 kHz, ±0.5 dB 200 kHz to 1 MHz.

Resolution: Analog output - infinite Digital readout and output: 0.1 dB.

Dynamic Input Range: −70 to +14 dBV (ref. 0 dBV = 1.0 V rms) (0.3 mV to 5 V rms).

Input Circuit Configuration: Single ended, front and rear panel input jacks (BNC)

Signal Input Impedance: 1 megohm

Output Indication: (1) Digital panel meter: −70 to +14 dBV, ±199.9 dB max. indication with external DC scaling input (2) DC analog outputs, Zo = 600Ω, drives 10kΩ min. load resistance:

A. Log, 0.05 V/dB, +0.0 to +4.2 V out.

B. Log, 1 mV/dB −70.0 mV to +14.0 mV (0 V dc out ref 1 Vrms in).

C. Linear, +0.5 to +5 V dc.

(3) BCD outputs, 12 lines (8-4-2-1 BCD) TTL, DTL compatible logic

Repetition Rate: Internal trigger generator approx. 10 samples/second. External trigger: 1 to 4 ms required between samples for analog DC outputs depending upon sample time; 10 msec min repetition rate for digital display and BCD outputs.

Sampling Period: Periods approx. 0.1, 0.3, 1, 3 and 10 msec. Requires min of 1 full cycle.

Filters: 0.1, 1 and 10 kHz high pass; 0.01, 0.1 and 1 MHz low pass.

Sample and Hold Facility: Output transfers from level to level without discharge. DC outputs drift less than 0.2 dB per minute after last sample. Digital output can be programmed for infinite hold.

Trigger Input (to initiate sampling): Square wave, pulse, or step, ±5 V peak, rise time < 50 μsec (10-90%) transformer input, ungrounded, input impedance approx. 5k ohms.

Delay Control to Mask Signal Transients: Below 0.5 MHz, selectable cycle count 4 to 300 cycles; above 0.5 MHz, selectable time delay of 8 to 600 μsec.

Monitor and Control Outputs: (1) Synchronizing pulses for external equipment. (2) AC monitor outputs: Filtered and unfiltered signal level approx. 2V pk-pk; filtered output has 0.5 volt pedestal indicating sampling time. (3) Fault indicating signals available at rear panel.

Visual Indicators: For overloads, correct sampling, sampling period, low and high pass filter selection, incorrect sampling and loss of signal input.

Compatibility: Compatible with Dranetz Gating/Timing Generator 206, and other pulse generators.

Programmability (rear connectors): Compatible with DTL and TTL; also operable by remote contact closures. Filter selection, sample period, timing and other functions are programmable.

AC Input Power: 115/230 V, 50-60 Hz, 35 watts

Size: 3½" high x 17" deep x 17" wide equipped for 19" rack mounting.

Weight: 25 lbs.; Shipping, 35 lbs.

See Section 4900 for our pages on Synchro Converters.

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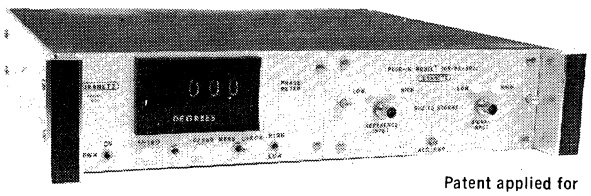
SERIES 305 HIGH ACCURACY PHASE METERS



Patent applied for

FEATURES:

- No operating controls
- Excellent stability — no adjustments
- 0.1° accuracy independent of input voltage
- Versatile plug-in concept
- Rejects harmonics, distortion and noise
- Digital readout and outputs

Series 305 Phase meters represent a totally new concept in the measurement of phase angle. A precision phase angle measurement requires only connection of the signals and reading the 4 digit display. The 305 senses signal frequency and adjusts its output time constant for maximum speed commensurate with low ripple. Its unique design locks out high frequency noise. This instrument is also insensitive to waveform distortions which can cause errors of as much as 0.6° per % distortion in other instruments.

Three main frames provide a selection of outputs suited to the individual need. Three standard plug-ins cover a frequency range of 2 Hz to 10 MHz. Special plug-ins can be furnished on request.

SPECIFICATIONS — SERIES 305 MAIN FRAMES

MODEL 305 PHASE TO DC CONVERTER

Analog Output: −1.800 to +3.600 Vdc; 10 mV/degree sensitivity
Output Impedance: < 50 ohms
Accuracy: See plug-in accuracies below
DC Resolution: Infinite
Recommended Output Devices: Recorders, DVM's, A-D Converters, etc.
Time Constants: Automatic, 10 ms > 5 kHz, 50 ms > 500 Hz, 350 ms > 50 Hz, 700 ms > 2 Hz.
Repeatability: 0.03° short term
Output Stability: Less than ±0.1° per month
Operating Modes: Zero to +360° and 0 to ±180°. Automatic switching at < −160°, > +160°, < +20°, and > +340°
Self Check: −180°, Zero, +180°, and +360°
Error Rejection: False triggers due to high frequency noise are locked out for signal to noise ratios better than 10:1. Errors and fluctuations due to waveform disynmetry or low frequency noise reduced by at least 10:1
Remote Opn.: Over-ride for Operating Mode and Time Constant; provision for miscellaneous plug-in controls (when applicable)
Grounding: Independent grounds for signal, chassis, and power line
Input Power: 115/230V, 50-400 Hz — ½ amp.
Size: 3½" rack/portable package, 16" depth
Weight: 20 lbs.; shipping 30 lbs.

MODEL 305A PHASE METER

Same as Model 305 with the addition of 3½ digit readout: 0 ±180.0° indication with −180° offset for coverage of +180° to +360°. ±0.2° accuracy (add to basic accuracy).

MODEL 305B PHASE METER

Same as Model 305 with the addition of full 4 digit readout: −180.0° to +360.0° indication. ±0.15° accuracy (add to basic accuracy). 1248 BCD Outputs TTL and DTL Compatible. Read and hold on command.

SPECIFICATIONS: SERIES 305 PLUG-INS (specifications apply to combined plug-in and main frame)

Model	Frequency Range	Input Levels (Independent)	Input Z(1)	Accuracy(2) (w/Independent Levels Unless Otherwise Indicated)
305-PA-3001	2 Hz to 700 kHz	10 mV to 300 V rms up to 10 kHz, and up to 50 V rms up to 700 kHz; can be extended to 40 kV rms with Tektronix probes. Each channel has automatic gain ranging, and lamps which indicate when level is below 50 mV and above 50 V rms.	1 megohm shunted with 40 pF	±0.1°, 50 mV to 50 V rms from 5 Hz to 50 kHz; typically ±0.25° at all other levels from 5 Hz to 500 kHz.
305-PA-3002	2 Hz to 700 kHz	10 mV to 3 V rms(3); can be extended to 3 kV rms with Tektronix probes. Fixed gains.	1 megohm shunted with 40 pF	±0.1°, 50 mV to 500 mV rms from 50 Hz to 50 kHz; typically ±0.25°, 10 mV to 3 V rms from 5 Hz to 100 kHz, and 10 mV to 500 mV rms from 100 kHz to 500 kHz.
305-PA-3005	200 kHz to 10 MHz	1 mV to 3 V rms; manual level controls in 10 dB steps. Lamps indicate when inputs are out of range or when level controls are improperly set.	50 ohms	**Broadband:** With equal inputs above 10 mV rms: ±0.4° from 200 kHz to 4 MHz; ±1° from 4 MHz to 10 MHz. With independent levels above 10 mV rms: ±1° up to 4 MHz and ±2° up to 10 MHz. (At any single frequency, above 10 mV rms: ±0.3° at any frequency from 200 kHz to 10 MHz at any fixed levels.)

(1) Input isolation: precision broadband isolation voltage and current transformers can be provided for use up to 500 kHz, covering 50 mV to 5000 V rms and covering 1 microamp rms to 100 amps rms.
(2) For sinusoidal signals; can be used with square wave inputs over limited frequency range. Contact plant for further information.
(3) Can be provided for use over equivalent dynamic range at other levels.

SERIES 301 LOW COST PHASE METERS

FEATURES:

- 70 dB input level range
- 1° accuracy, 0.1° resolution
- 5 Hz to 0.5 MHz frequency range
- 0° to 360° phase range
- 0 to 3.6 vdc analog output

Series 301 Phase Meters are low cost, direct-reading instruments for measurement of the phase difference between two sinusoidal signals.

Phase angle is indicated by a large taut band meter with mirror scales of 0 to 36, 0 to 90, 0 to 180, and 0 to 360 degrees. The 70 dB input range of the 301 is achieved without range switching. Operating controls include an input reversal switch and an "Add 180°" switch which allows the operator to avoid the 0°/360° discontinuity. Model 301A also produces a DC voltage output proportional to angle.

SPECIFICATIONS

Frequency Range: 5 Hz to 500 kHz
Input Impedance: 100 KΩ
Absolute Accuracy (independent input levels):
±1°, 45 Hz to 40 kHz, inputs > 200 mV
±1.5°, 7 Hz to 100 kHz, inputs > 200 mV
±2°, 5 to 7 Hz and 100 to 200 kHz
1° additional for each additional 100 kHz
Minimum Input Levels: 1 V rms, 5 Hz to 30 Hz
300 mV rms to 50 mV rms, 30 Hz to 200 Hz
50 mV rms, 200 Hz to 50 kHz
50 mV rms to 500 mV rms, 50 kHz to 500 kHz
Maximum Input Levels: 160 V rms
Panel Meter:
6" taut band movement; 0.5% fs linearity (add to accuracy)
Rectangular Wave Output: 1.5 V p-p, 5 nsec rise time
DC Output (Model 301A or 301AR only):
0 to +3.6 Vdc for 0 to 360°; Z out less than 50Ω
AC Power Input: 115/230 V, 50 to 400 Hz, 0.4 Amps rms
Case: 7" x 16½" x 11½". For 19" rack mount specify option R
Weight: 18 lbs.; shipping, 27 lbs.

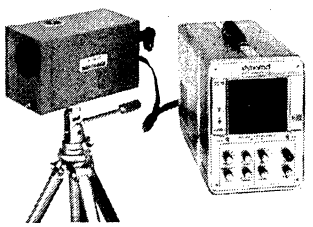
SERIES 302 PHASE METERS

Series 302 Phase meters have all of the features and specifications of Series 301A instruments with the addition of an easy to read 3½ digit Digital Display. Display ranges are 0 to 180° and 0 to 360°, with resolution up to 0.1° on the 180° range.

dynarad™ INC.

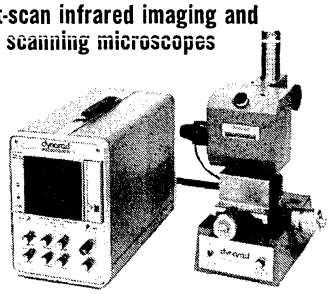
is first in infrared instrumentation to solve thermal measurement problems

fast-scan infrared cameras — model 200 series



Offers the lightest, smallest, lowest cost general purpose infrared imaging system available. The equipment measures the temperature of a target within a 10° x 10° field-of-view and presents these measurements on the face of a cathode ray tube at an effective frame rate of 60 frames per second thus providing a real-time television-like display. Temperature differences, from background, as low as 0.2°C with precise accuracy are achieved. Many variable and optional features are available including higher spatial resolution for long ranges, narrow fields-of-view, variable and multiple detector systems and choice of detectors. Instantaneous and continuous measurement of the thermal behavior of target areas is easily performed thus dispensing with the tedious thermocouple type of sensors used in process control. Other applications include target signature recognition and identification, CO_2 laser imaging, as a night vision device, fault location in electronic circuit boards, fire detection, power utility line inspection, personnel intrusion, exotic material security, ecology measurements. The system is available in various configurations such as a line scanner or combination thereof.

fast-scan infrared imaging and line scanning microscopes

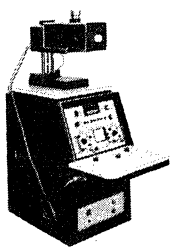


Dynarad's Model 301 Infrared Imaging Microscope and Model 500 series infrared line-scanning microscopes are the only general purpose devices of their type. The scanners measure the temperature of a target within a scan line and present these measurements as a flicker-free analog trace on the face of a cathode ray tube at a rate of at least 60 lines per second. The difference in the four models lies either in the width of the scan line or the repetition rate and whether a complete image is presented or not. Each system provides a spot size of 0.001 inches and is in two separate packages: an optical scanning detection head and a display unit. The display allows the use of an intensity marker for accurate temperature measurement of the object surface. The optical scanning and detection head weighs under 10 pounds and is only 180 cubic inches. This head is mounted on a stand allowing for both coarse and fine focusing adjustments. A coaxial viewing channel is provided within the optical head for focusing and general target observation. An x, y micro-positioner mounted on the base of the stand allows for orientation of the target field. The infrared microscopes were developed to portray and examine the temperature distribution over the surface of transistors and integrated circuits for fault location and to perform failure analysis investigations.

MAC-IRIS

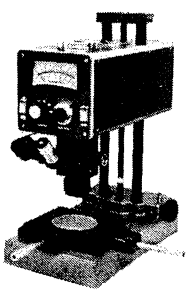
A SUBSIDIARY OF DYNARAD, INC.

infrared scanner — model 802



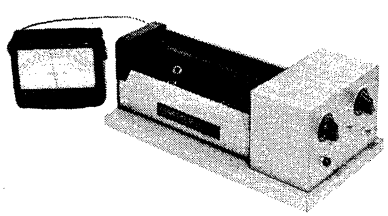
The MAC-IRIS Model 802 system consists of an infrared camera and microscope combined in a single instrument. It performs many useful functions ranging from basic research to the resolving of thermal problems connected with but not limited to product reliability, quality control, failure prediction, and non-destructive testing and evaluation of semiconductors, printed circuit boards, and integrated circuits. This versatile precision instrument presents real-time, TV-like thermal profiles (images) and line scan capabilities. It offers continuously variable scanning rates in both the vertical and horizontal direction — slow rates for the highest possible definition of targets and faster rates for real-time viewing and following thermal transients. The Model 802 contains variable fields-of-view in both the IR camera and microscope modes of operation thus affording the equipment to adapt to the target's dimensions. The system's display modes are normal picture presentation, up to seven separate isothermal lines or bands, a vertically displaced oscilloscope line trace representing target radiant intensity. The target radiant intensity could also be displayed on a meter or digital readout.

high speed thermal microplotter — model 725



The MAC-IRIS Model 725 is a high precision infrared microscope for non-contactive temperature measurements of microcircuits. It is ideally suited for non-destructive analyses in the fields of semiconductors and IC chip product reliability and quality control. Some of its salient features are thermal resolution of 0.2°C from below ambient to 250°C, response time of 0.5 milliseconds, choice of direct or differential readout, a chopper-stabilized amplifier for drift-free performance, built-in illuminated visual channel, choice of 10X, 15X, 36X and 74X objectives, choice of manual or automatically scanned substages, and an optional temperature calibration source ranging from ambient to 600°C.

ir decade calibration source — model 905



The MAC-IRIS (a subsidiary of DYNARAD, Inc.) Model 905 Decade Black-Body Calibration Source as a standard provides continuous black-body infrared radiation over any decade temperature range from 0°C to 350°C and is extendable to 600°C. This self-contained, unique design permits precise calibration of infrared radiometric equipment in the laboratory and in the field. Absolute temperature measurements from 0.05°C to 35°C differentials can be readily and precisely controlled in ten equal steps in conjunction with an L & N potentiometer with an ice point reference or with a point source black-body.

infrared spatial resolution chart

The MAC-IRIS's resolution chart is a standard for calibrating the spatial resolution in infrared scanning devices. As an analogy, the MAC-IRIS resolution chart is to the IR scanning device industry as the RETMA resolution chart is to the television industry. The unit consists essentially of a temperature controlled back plate and a front plate containing milled cutouts of specially designed geometrical shapes.

dynarad™ INC.

1416 PROVIDENCE HIGHWAY • NORWOOD, MASSACHUSETTS 02062 • (617) 762-7930

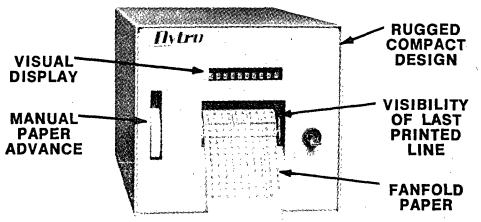
MAC-IRIS A SUBSIDIARY OF DYNARAD, INC.

2628 BAYSHORE FRONTAGE ROAD • MOUNTAIN VIEW, CALIFORNIA 94040 • (415) 969-3545

address-o-print™ Dytro logmatic® pdvm®

Lister Printer

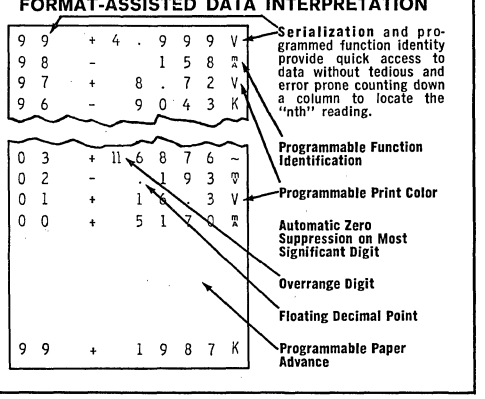
SERIES 1000



- Digital Lister Printer—DVM Compatible
- Unique Echo-Check Feature for Reliable Printed Data
- Designed for OEM Use
- Direct Interface, No User Added Circuitry Needed
- Includes Power Supplies
- 10 Column Capability—2, 10 or 12 Elements per Column
- Parallel BCD Entry—Parallel Decimal, Excess 3, Excess 3, Gray and Serial Codes Available
- Counting Capability
- Floating Decimal Points
- Programmable Print Color and Paper Advance
- Auto Zero Suppression
- Overrange Digit
- Clock Option, Clock Printout on Each Print Line, Example: 11:59+937 V.
- Decimal Readout, one of ten Contact Closure for Each Decade
- Programmable Function Identification (+, —, V. MA, MV, etc.)
- Serialization (Log Identifying Digits)
- Easy Paper Loading
- Reliable Data • Extended Life • Shortened Cycle Time

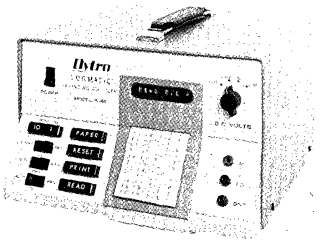
(Address-O-Print Averages 1/2 Cycle per Printout vs. Full Cycle for Incrementing Type Printers)

FORMAT-ASSISTED DATA INTERPRETATION



Printing Digital Voltmeter

SERIES 8040



- **CONVERTS** 0-1100 Volts DC in 3 ranges into 4 digits (plus overrange) and autopolarity. AC and Resistance options
- **IDENTIFIES** Two additional digits indicate which of 100 readings has been made.
- **DISPLAYS** all eight data elements: logging numbers, polarity, reading, and range (decimal point).
- **PRINTS** the complete display, in single or multiple copies, on command or automatically.

- Available in OEM Versions
- 2, 3 and 4 digits
- Card/Ticket PDVM's
- Up to 5 Digit Ratio Capability
- Hi/Lo Limit Checking
- Self Check Mode
- Manual/Auto Print
- Scanner/Multiplexer Available
- Clock for Auto/Read and Printout
- BCD and 10 Line Codes Available as Outputs
- Rack Mounting Versions Available
- Reset/Preset of Log Digits
- Inkless Printing
- Paper Tape Punch (ASCII) Ability
- Complete Data Logging Systems Using the 8040 PDVM Available, Tailored to Specific Customer Needs

PDVM APPLICATION AREAS:

- Automatic Potentiometer Checker
- Pollution Monitoring Data Loggers
- Medical—Clinical Lab Equipment
- Process-Control Monitoring
- Ships Data Logger

OEM DIGITAL CASSETTE TAPE SYSTEMS

AVAILABLE FEATURES & APPLICATIONS

- Minicomputer Interfaced Keyboard to Cassette
- Multiplexed A/D Entry
- Cassette To: 7 or 9 Track Tape, TTY, Punched Card, Paper Tape
- Write Only, Read Only, Read/Write, Read After Write
- Parity Detection
- Error Correction Codes
- Tape Sensing—BOT, EOT, and EOT Warning
- Inter-Record Gap—0.1" Inches Min.
- Automatic Self Test Features
- Synchronous or Asynchronous Operating Modes
- Data Rate: 3.75 KC Typical
- Data Capacity: 4 Million Bits
- Fast Forward/Fast Reverse Capability
- Address Capability
- Correction Capability
- Stack Loader/Reader
- Unequal Read/Write Speeds

PORTABLE CASSETTE DATA LOGGER

- Battery Operated
- Self-Contained A/D Converter

Dytro also manufactures other analog card/ticket printers, cassette tape checkers, hybrid & digital acquisition, recording, formatting and printing equipment.

DYTRO CORPORATION, 63 TEC STREET
HICKSVILLE, NEW YORK 11801 ▪ (516) 822-2130

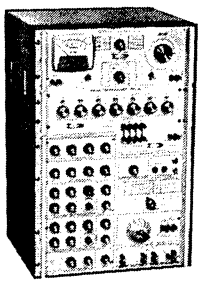
Dytro

DYTRO / originators of the ***PRINTING DIGITAL VOLTMETER***

DYTRONICS

PHASE ANGLE MEASUREMENT AND STANDARDS

Instrumentation for the measurement and generation of phase angle. This advanced measurement technique is recognized as the finst throughout the world. For complete information contact DYTRONICS COMPANY, INC., 4800 Evanswood Drive, Columbus, Ohio 43229.



MODEL 311/RT-1/717S
PRIMARY PHASE ANGLE STANDARD

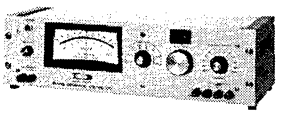
The first authentic Primary Phase Angle Standard for industry.

- 0.015° Accuracy
- Self-Calibrating
- Maximum 125 Volt Output
- Shift or Measure Phase Angle
- Frequency Range 30Hz to 10,000Hz
- 12 Microdegrees Resolution

Model 244 Phase Sensitive Voltmeter

SOLID STATE, SELF TESTING

Operates as Conventional AC Voltmeter
Measures In-Phase and Quadrature Voltages
Measures Phase Angle



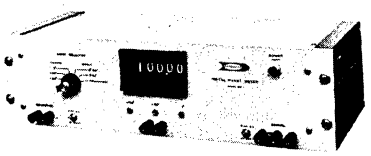
See our catalog for a complete list of models and specifications.

Model Number	Frequency Range	Accuracy	Measure Phase?	Shift Phase?	0° to 360° Coverage without Ambiguity?
222	20Hz-40kHz	±0.1°	Yes	No	Yes
224	20Hz-40kHz	±0.1°	Yes	No	Yes
301	10Hz-30kHz	±2°	Yes	Yes	Yes
311/RT-1/717S	30Hz-10kHz	±0.015°	Yes	Yes	Yes
312	4kHz-500kHz	±0.02°	Yes	Yes	Yes
341	400Hz	±0.1°	Yes	Yes	Yes
400K	400Hz	±0.05°	No	Yes	No
410	0.1Hz-130kHz	±0.15°	No	Yes	Yes
445	100Hz-50kHz	±5°	No	Yes	Yes

Model 224 "Hands-Off" Digital Phase Meter

Hands-Off Phase Angle Measurements using new "Linear Mode Concept"

0.1° Accuracy
0.01° Resolution

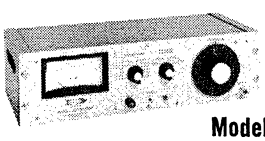


DYTRONICS

TUNABLE FILTERS

Dytronics offers tunable filters for every application. These products find application for Spectrum Analysis, Sound and Vibration studies, filtering of Digital Data, Medical Research, and Geophysical studies. Our many years of filter engineering assures you of the most complete selection of high performance tunable filters.

Model Number	Tuning Range	Description
700		Automatic tracking of frequency
717S	20Hz-20kHz	Narrow-band tunable filter and Frequency Selective Voltmeter
718	3kHz-400kHz	Narrow-band tunable filter
719	0.1Hz-1kHz	Ultra low-frequency Narrow-band tunable filter
720	1Hz-10kHz	Low-frequency Narrow-band tunable filter
721	1Hz-100kHz	Digital-data filter; stable D.C. response
722	1Hz-100kHz	Universal Filter; Low-pass, high-pass, band-pass, and band-reject
723	1Hz-100kHz	Universal Filter; Low-pass, high-pass, band-pass, and band-reject
724	1Hz-100kHz	Universal Filter; Low-pass, high-pass, band-pass, and band-reject
730	0.1Hz-10kHz	Notch Filter



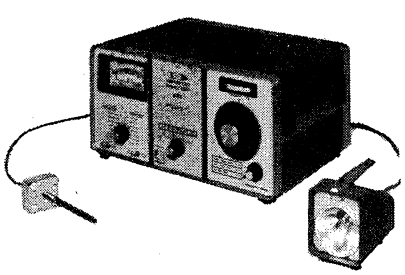
Model 717S

DYTRONICS

VIBRATION MEASUREMENT AND CONTROL

Vibration is a major problem for industry. Dynamically solve your vibration problems using Dytronics Instrumentation. Detect Analyze Correct Monitor-Vibration. Select from Dytronics "family" of vibration instruments, the one to match your needs and your budget. Contact: Dytronics Co., Inc., 4800 Evanswood Drive, Columbus, Ohio (614) 885-3303.

Model 4000 Vibration Analyzer



Performs every function required for the detection, analysis, and correction of vibration. Measures acceleration or displacement. Utilizes Amplitude Meter, Frequency Meter, Vibration Filter and Stroboscopic Light.

	Description	Application	Frequency Range
4200	Vibration Examiner Amplitude and Frequency Meter. Tunable Filter AC or Battery Operation	Detecting and analyzing vibration	50 CPM to 500,000 CPM
4400	Vibration Surveyor Amplitude and Frequency Meter. AC Battery Operation	Survey machine conditions avoid costly breakdown	50 CPM to 500,000 CPM
4604	Four Channel Vibration Monitor and Machine Protector	Prevents costly breakdowns by continuously monitoring machine performance; can perform automatic shutdown when vibration becomes severe	50 CPM to 240,000 CPM
1101	Seismic type vibration pickup that generates a voltage proportional to acceleration	High output vibration pickup	1Hz to 1700Hz Resonant Frequency 4000Hz
1104	Proximity Pickup	Measures distance without touching	Static Displacement to 240,000 CPM

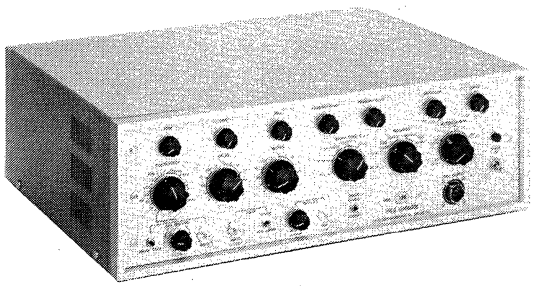
Model 4606 Vibration Monitor

Industrial vibration monitor for preventing machine breakdown. Continuously monitors machine condition. Offers warning and automatic shutdown if the vibration signature indicates impending machinery breakdown. Supplied with one to six channels of monitoring. Each channel can be provided to operate from either an accelerometer, a velocity or proximity pickup.

DYTRONICS COMPANY, INC. • 4800 EVANSWOOD DRIVE • COLUMBUS, OHIO 43229 • (614) 885-3303

HIGH PERFORMANCE PULSE GENERATORS

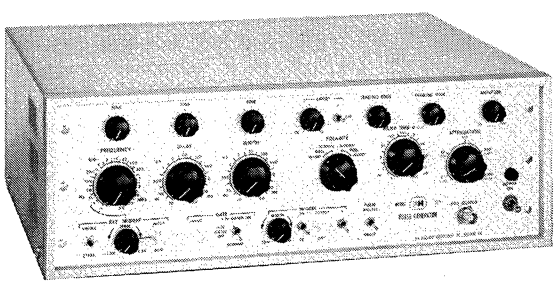
The pulse generator is a basic tool for requirements as diverse as solid-state research and development and production line testing. The E-H pulse generator line, which has made us a leader in pulse technology, provides models for specialized applications as well as general-purpose applications. For example, the Model 129 is used in high-speed digital logic testing, and is capable of driving the fastest digital circuits. Until the Model 129 was introduced, no practical commercial pulse generator offered repetition frequencies beyond 200 MHz. The Model 129 offers 500 MHz, 2 volt pulses with less than 500 ps risetime and has such valuable features as adjustable baseline offset, baseline/pulsetop inversion logic, and synchronous gating. The Model 135 could be characterized as the "universal" pulse generator because of its great versatility, full waveshape control, and capability for handling any pulse requirements today and for some time to come. The Model 135 is the only 50 MHz pulse generator available with complete waveshape control, selectable gate on/gate off



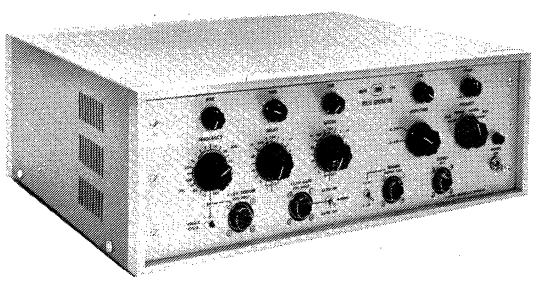
137

E-H RESEARCH LABORATORIES, INC.

Dept. A 515 11th Street Oakland, Calfornia 94604 (415) 834 - 3030 Ext. 319



135



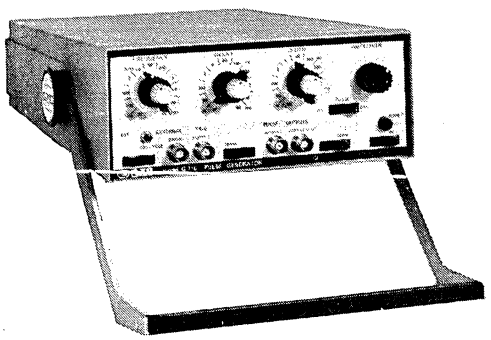
129

	MODEL	FREQUENCY	AMPLITUDE
FAST RT	125A	10 Hz to 1 MHz	−10 V (fixed)
HIGH POWER	131	10 Hz to 100 kHz	50 V
	132A	5 Hz to 3.5 MHz	±50 V max.
	133A	1 kHz to 5 MHz	±200 mV to ±50 V
	123A	1 kHz to 20 MHz	±200 mV to ±50 V
GENERAL PURPOSE	127	10 Hz to 50 MHz	±20 V
	135	10 Hz to 50 MHz	±30 mV to ±10 V
	G710	20 Hz to 50 MHz	5 V
	139B	10 Hz to 50 MHz	±30 mV to ±10 V
HIGH FREQUENCY	137	10 Hz to 100 MHz	±125 mV to ±5 V
	122	1 kHz to 200 MHz	±150 mV to ±5 V
	129	10 kHz to 500 MHz	±200 mV to ±2 V

PRICES AND TECHNICAL DATA

operation, and unattenuated baseline offset to ±5 V. It also features rise and fall times from 3 ns to greater than 8 ms. For those applications requiring high performance on a limited budget, the Model G 710 is just the thing. This unit offers 50 MHz pulse repetition frequencies, less than 5 ns rise and fall times, and normal and complement outputs with 5 V amplitude into 50 ohms. In addition to these features, the Model G 710 offers low pulse distortion, and a switch-selected internal 50-ohm termination to eliminate mismatch and reflection problems. To simplify maintenance, the Model G 710 was designed with no internal adjustments, and does not require periodic recalibration.

G710



The other models in the pulse generator line fill testing applications in the semiconductor industry, in memory research and development, in flight line or depot maintenance of avionics modules, and in time domain reflectometry.

This listing of the E-H pulse generator line is necessarily brief, and includes only major specifications. For complete information on any of these products, contact your local E-H sales representative or E-H Department A in Oakland (ext. 319).

Leader in Pulse Technology

EH

RISETIME/ FALLTIME	WIDTH	DELAY	DUTY FACTOR	EXTERNAL DRIVE	EXTERNAL GATE	TRIGGER OUTPUT	PRICE
<300 ps/ <500 ps	<1 ns to 100 μs	30 ns to 100 μs	10% max.	+1.5 V into 200 ohms	−2 V into 300 ohms	+1.5 V into 50 ohms	$2910
<10 ns/ <12 ns	100 ns to 500 μs	−1 μs to +1 ms	10%	2 V rms into 1000 ohms	+2 V into 1000 ohms	+10 V open circuit	$ 575
<12 to 100 ns <14 ns	<100 ns to 10 ms	<100 ns to 10 ms	25%	−4 V into 2000 ohms	−5 V	−4 V into 2000 ohms	$ 715
10 ns to 10 μs 20 ns to 10 μs	50 ns to 300 μs	75 ns to 100 μs	50%	+1.5 V min; +15 V max.	−2 V min; −15 V max.	+1.5 V into 50 ohms	$2395
<7 ns	20 ns to 300 μs	50 ns to 100 μs	50%	+1.5 V into 200 ohms	−2 V into 300 ohms	+1.5 V into 50 ohms	$1975
<2.5 ns/ <4.5 ns	10 ns to 10 ms	10 ns to 10 ms	60%	+1.75 V into 50 ohms	+1.75 V into 50 ohms	+2 V into 50 ohms	$2615
3 ns to >8 ms	10 ns to 50 ms	10 ns to 50 ms	50%	−1.5 V to +1.5 V; 15 V max.	±2 V, 15 V max.	+1.5 V or +0.15 V either polarity	$1595
<5 ns	<10 ns to 50 ms	<10 ns to 50 ms	50%	+1.5 V	no	+2.5 V into 50 ohms	$ 395
6 ns to 3 ms	10 ns to 10 ms	10 ns to 10 ms	50%	+1.5 V min, +15 V max.	−2 V min, −15 V max.	+1.5 V into 50 ohms	$1275
<2 ns to >160 μs	5 ns to 1 ms	5 ns to 1 ms	50%	−1.2 V to +1.2 V ±15 V max.	+1.5 V into 50 ohms	+2 V into 50 ohms	$1950
<1.0 ns	2 ns to 100 μs	2 ns to 100 μs	40%	+1.5 V into 50 ohms	synchronous gate, −1 V	+250 mV into 50 ohms	$2875
<500 ps	approx 1 ns 50 μs	approx 1 ns 50 μs	50%	+1.5 V into 50 ohms	+1.5 V (on) or −1.5 V (off)	+1.5 V into 50 ohms	$3925

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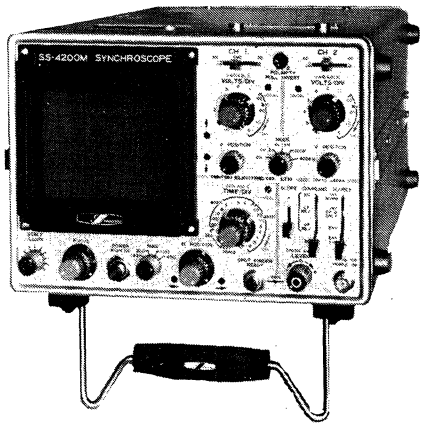
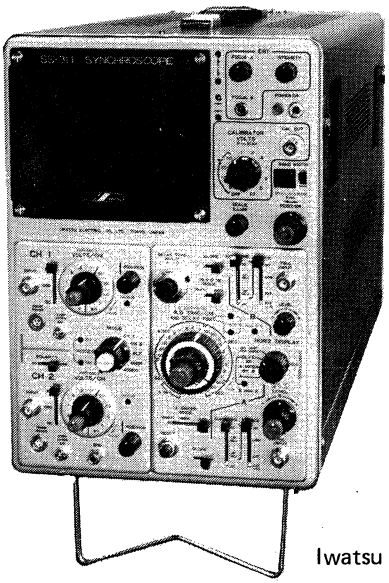
HIGH PERFORMANCE OSCILLOSCOPES



Iwatsu 4200M



Iwatsu 311

The oscilloscope line marketed by E-H is perhaps the broadest in the industry, ranging from low-cost models such as the SS-5020 to high-performance models such as the SS-311, the SAS-5009B and the AMC Model 1100. E-H can provide a model for nearly every oscilloscope application, whether research and development, industrial, radio and television service, or educational.

The AMC Model 1100 Digital Readout Oscilloscope introduces the convenience and accuracy of digital

E-H RESEARCH LABORATORIES, INC.

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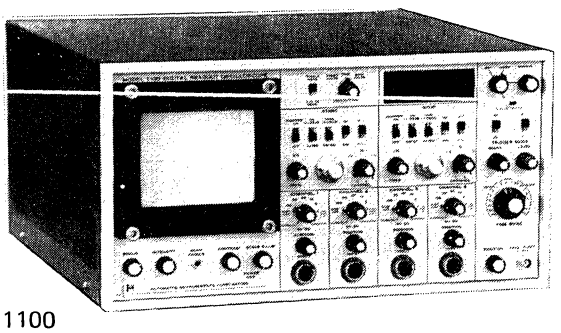
MODEL	SENSITIVITY	BANDWIDTH	RISETIME	SIGNAL DELAY	INPUT IMPEDANCE
SS-5020	20 mV/cm to 50 V/cm	DC-2 MHz, –3 dB	180 ns	—	1 MΩ// max. 40 pF
SS-5050	10 mV/cm to 25 V/cm	DC-5 MHz, –3 dB	70 ns	—	1 MΩ// max. 40 pF
SS-5057V	20 mV/cm to 20V/cm	DC-7 MHz, –3 dB	50 ns	—	1 MΩ// max. 40 pF
SS-4200M	5 mV/div to 25 V/div	DC-15 MHz, –3 dB	24 ns	120 ns	1 MΩ// max. 25 pF
SS-4500	5 mV/div to 10 V/div	DC-50 MHz, –3 dB	7 ns	150 ns (approx)	1 MΩ// max. 18 pF
SS-112	5 mV/cm to 12.5 V/cm	DC-100 MHz, –3 dB	3.5 ns	90 ns	1 MΩ// max. 13 pF
SS-212	5 mV/cm to 12.5 V/cm 1 mV/cm (ch.1 + ch.2)	DC-200 MHz, –3 dB	1.75 ns	80 ns	1 MΩ// max. 14 pF
SS-200	5 mV/div to 12.5 V/div 1 mV/div (ch.1 + ch.2)	DC-200 MHz (–3 dB) 10 mV/div	10 mV/div -5 V/div, 1.75 ns 5 mV/div, 2.4 ns 1 mV/div, 12 ns	80 ns	1 MΩ// 14 pF
SS-311	5 mV/cm 12.5 V/cm 1 mV/cm (ch.1 + ch.2)	DC-300 MHz (–3 dB) 10 mV/cm	10 mV/cm-5 V/cm, 1.2 ns 5 mV/cm, 1.4 ns 1 mV/cm, 12 ns	80 ns	1 MΩ//14 pF 1 MΩ//5 pF (SFP-2)

measurements to the field of high-performance sampling oscilloscopes. The Model 1100 is the only sampling oscilloscope available today with all these features: 1 GHz bandwidth, four-channel, four-trace capability, and digital readout. With its simple, easy-to-read display the 1100 enables sophisticated pulse and rf waveform measurements to be made by relatively untrained, non-technical personnel. In addition, the four-trace capability allows digital logic designers to see *and* to make quantitative measurements on waveforms at both "0" and "1" flip-flop outputs, input and OR/NOR outputs of gates, etc.



AMC 1100

The Iwatsu Model SS-311 is currently the only realtime oscilloscope offering 300 MHz bandwidth together with all such desirable features of low-frequency oscilloscopes as delayed sweep and dual-trace presentation. The SS-311 also features 1 megohm input impedance for direct connections and 10 megohm input impedance with the passive divider probes supplied. High sensitivity (10 mV/cm), combined with a high writing rate CRT, makes it easy to photograph low-level single waveforms.

For applications requiring oscilloscopes that combine performance with portability, the Iwatsu Model SS-200 offers 200 MHz bandwidth, dual-trace operation, and delayed sweep in a package weighing only 28 lb. This versatile oscilloscope is just the thing for field service of computers, radio communications equipment, avionics equipment, or test systems.

For detailed information on any of the oscilloscopes listed here, contact your local E-H representative or E-H Department A in Oakland (ext. 319).

Leader in Pulse Technology

INPUT IMPEDANCE with probe	TRIGGER RANGE	SWEEP RANGE (with magnifier)	DELAYED SWEEP	DELAY TIME RANGE	SWEEP MAG	CALIBRATOR	DISPLAY AREA	PRICE F.O.B. OAKLAND
10 MΩ// max. 20 pF	30 Hz Min. 3 MHz	0.2 μs/cm to 1.25 s/cm	—	—	x5		8 x 10 cm	$250
10 MΩ// max. 20 pF	DC to 5 MHz	0.1 μs/cm to 1.25 s/cm	—	—	x5	40 mV, 0.4 V	8 x 10 cm	$550
10 MΩ// max. 20 pF	DC to 7 MHz	1 μs/cm to 0.5 s/cm	TV Sync Separator And Special Sweep Ranges			0.1 V, 1 V	8 x 10 cm	$330
10 MΩ// max. 18 pF	DC to 15 MHz	10 ns/div to 1.25 s/div	—	—	x10, x20, x50	20 mV, 0.2 V, 2 V	8 x 10 div (1 div=8 mm)	$1360
10 MΩ// max. 10 pF	DC to 50 MHz	10 ns/div to 0.5 s/div	0.1 μs/div to 0.5 s/div	1 μs to 5 s	x10	20 mV, 0.2 V, 2 V	6 x 10 div (1 div=8 mm)	$1875
10 MΩ// max. 10 pF	DC to 150 MHz	2 ns/cm to 12.5 s/cm	5 ns/cm to 2.5 s/cm	1 μs to 50 s	x10	5 mV to 10 V 5 mA	6 x 10 cm	$2340
10 MΩ// max. 10 pF	DC to 200 MHz	1 ns/cm to 12.5 s/cm	1 ns/cm to 1.25 s/cm	1 μs to 50 s	x10	5 mV to 10 V, 5 mA	6 x 10 cm	$3120
10 MΩ// 10 pF	DC to 200 MHz	1 ns/div to 1.25 s/div	1 ns/div to 0.5 s/div	1 μs to 12.5 s	x10	0.02 V/0.2 V/ 2 V	6 x 10 div (1 div=8 mm)	$3590
10 MΩ// 10 pF 1 MΩ//2.5 pF SFP-2 with 20x)	DC to 500 MHz	1 ns/cm to 12.5 s/cm	1 ns/cm to 5 s/cm	1 μs to 50 s	x 10	5 mV to 10 V (11 steps) 5 mA	6 x 10 cm	$4995

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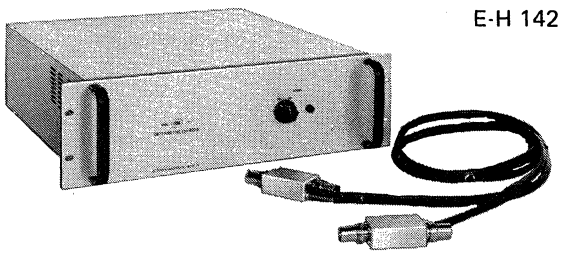
PROGRAMMABLE SYSTEM COMPONENTS

ANALYSIS MODULES

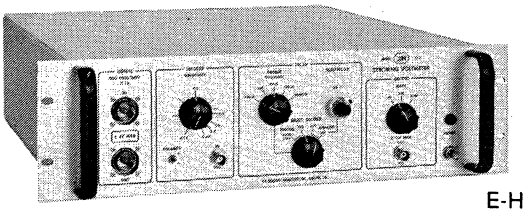
The measurement, or analysis portion of an automated test system is vital in determining system performance. The analysis units must measure response waveforms accurately and consistently, and in addition, must be completely programmable and capable of operating at high testing rates.

The E-H programmable units presented here meet all of the above requirements and offer additional features for a wide range of system applications.

E-H 142



The **E-H Model 142 Switching Time Converter** is an economical solution to the problem of measuring nanosecond time intervals in automated systems applications. Using the single-shot technique, the Model 142 provides an analog output which is easily converted to digital form. Full-scale time ranges of 1 ns, 10 ns, 100 ns, and 1 μs, provide adequate range for any test system application.



E-H 153

Voltage-sensing remote discriminator units are used to generate start/stop pulses that define the time interval to be measured. Each discriminator is separately programmed by a dc voltage equivalent to the required start and stop thresholds. When the signal at the discriminator input reaches a level equal to the programmed dc level, the discriminator generates a control pulse which is sent to the main converter unit. The selected start/stop pulse pair is used to control a converter circuit which generates a pulse whose amplitude is proportional to the measured time interval.

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STIMULUS MODULES

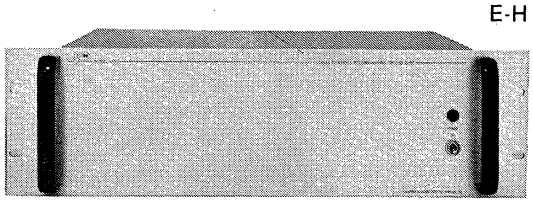
In a fully-automated test system, the programmable drivers are an important part of the stimulus/response measurement portion of the system. Unless the drivers are capable of complete waveshape control, and provide output pulses with linear transitions, and low pulsetop distortion, assurance of predictable device response becomes difficult.

The E-H line of programmable drivers and timing units provides precisely what the system designer needs for every test system requirement.

The **E-H Model 1422 Programmable Timing Unit** provides a wide range of pulse parameters for system timing and stimulus applications. The Model 1422 was designed with ECL testing specifically in mind but with enough flexibility so that it can be used as a timing unit for pulse drivers, such as the E-H Model 1139, and for other system applications. The output pulses will vary in amplitude from less than 0.8 V to over 2 V, with an offset that will vary from zero to −2 V. The output pulse has a programmable polarity of positive normal or positive inverted.

An internal clock provides triggers to two independent channels of width and delay to give output pulse repetition frequencies from 1 kHz to 100 MHz. By programming one line per channel the internal clock can be inhibited from triggering either one or both of the delay and width channels.

E-H 1422

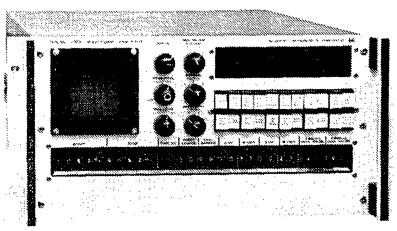


The **E-H Model 1030/1033 Six-Pak Pulse Driver** is a compact, three-unit plug-in combination containing six 1-ampere output channels, each with independent amplitude, polarity, and linear rise-fall time controls. Designed to operate at repetition frequencies up to 5 MHz from an external drive source, the Model 1030/1033 features separate automatic overload protection for the output of each operating channel.

The instrument is modular in design, with the Model 1030 Power Unit containing six separate regulated power supplies. The Model 1033 Dual Ramp Unit (three dual units

The **E-H Model 153 Strobing Voltmeter** brings new simplicity to the realm of amplitude measurement in automated systems. On a single waveform, the Model 153 samples the voltage amplitude at a preprogrammed time (strobe time) with respect to the system clock, generates an analog output proportional to the signal amplitude at strobe time, and holds the measurement long enough for conversion to digital form or for analog comparison.

Using a balanced diode-bridge gate, the Model 153 isolates its 50-ohm feed-through signal line from the measurement circuitry. This gate is opened by a strobe signal for several nanoseconds at the end of a controlled delay period. The voltage on the signal line at the end of the strobe time is processed through a fast FET memory amplifier. A second strobe then applies the output of the first memory amplifier to a second memory amplifier, which amplifies and stretches the signal to a level suitable for processing by external equipment. An external trigger signal starts the measurement cycle; once the cycle has been initiated, the trigger-recognition circuit is blocked for approximately 1 millisecond. Output gain is available in three decade multiples of the input, x1, x10, and x100, with an output range from −10 to +10 volts.



AMC 1000

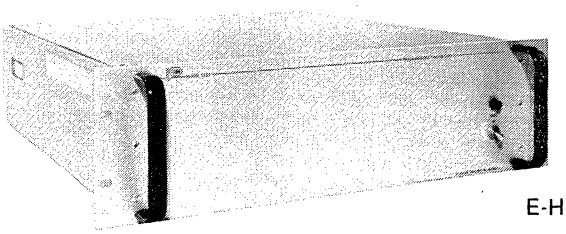
The **AMC Model 1000 Waveform Analyzer** offers high-speed, programmable measurement capability for automated test systems or laboratory bench use. This unique instrument is the heart of programmable waveform measurement systems and converts dc as well as sub-nanosecond ac signals to digital data. This data may then be processed by the rest of the system for classification, data logging, or go/no-go decisions.

The Model 1000 combines the functions of sampling oscilloscope, digital counter, and digital voltmeter to provide time and voltage measurements of sampled waveforms. At programmed points on the waveform, reference levels are established to provide a basis for comparison with successive measurements. Start and stop points for time measurements are referred to these reference levels, either in percentage of the levels or in actual voltages with respect to them. A normal measurement cycle consists of two successive sets of samples made on a repetition waveform. In the first set of samples, reference levels are established by memory circuits. In the second set, comparator circuits start and stop the counter when the signal coincides with preset start and stop levels. If a voltage measurement is required, the internal digital voltmeter measures the voltage difference between the reference levels on the sampled waveform.

Leader in Pulse Technology

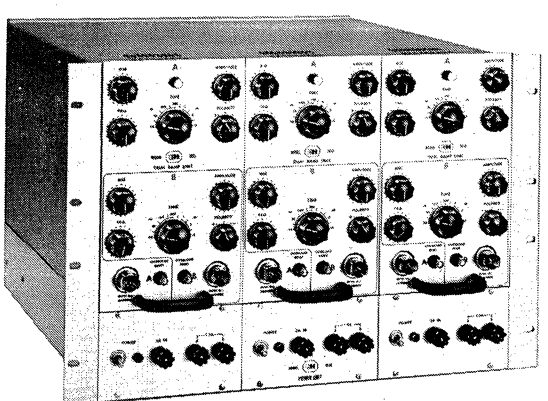
per instrument) contains the input, control, and output driver circuits.

The **E-H Model 1223 Programmable Timing Unit** offers extended stimulus generator capability to the systems designer, with 50 MHz repetition frequency capability and high-resolution pulse width programming. Six independent channels generate fast-rise pulses with widths programmable from 10 ns to 1 ms. Either 50-ohm or high-impedance logic



E-H 1223

level trigger signal sources may be used to drive the Model 1223. Channels may be series-connected to give programmable delay for systems timing applications.

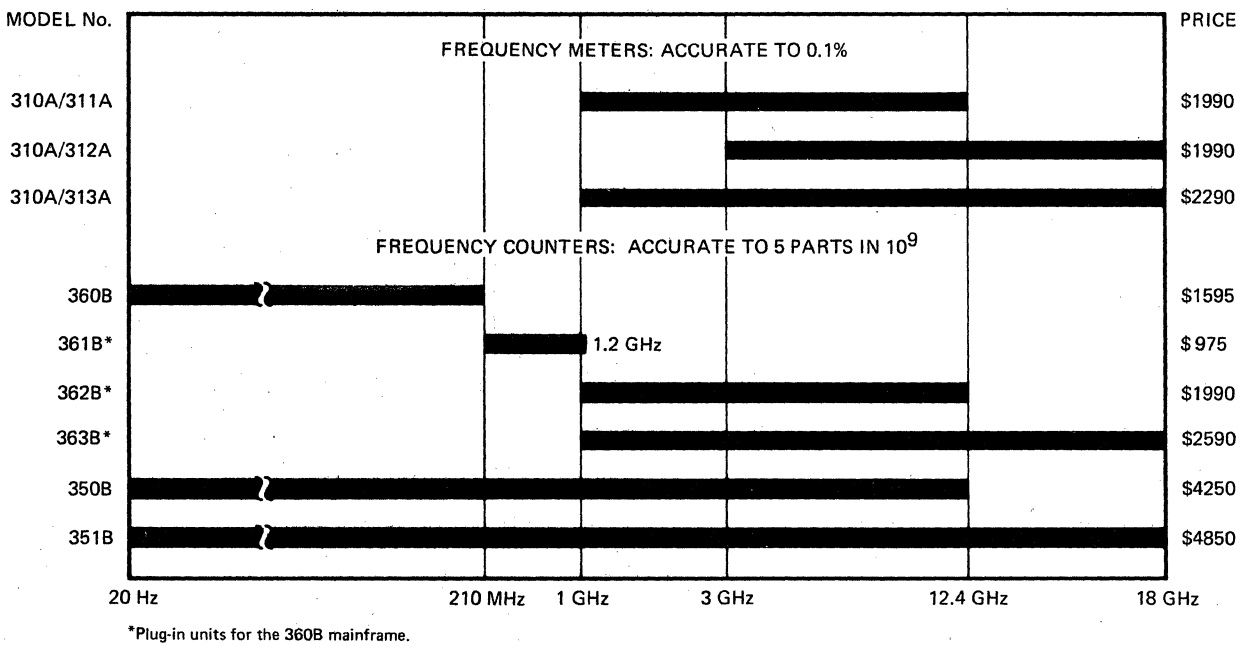


E-H 1030/1033

Two outputs are provided for each channel. A negative-going trigger output is coincident with the output pulse leading and trailing edges and may be used to drive external equipment or one of the other channels for delay generation. The main pulse output is a +2.5 V pulse with risetimes less than 4 ns and falltime less than 5 ns. Both trigger and main pulse are 50-ohm, coaxial outputs.

For detailed specifications on these units, or on the complete line of E-H and AMC modules, or for information on complete testing systems, contact your local E-H representative or E-H Department A in Oakland (ext. 319).

EIP Frequency Measurement Selection Guide 20Hz to 18GHz



*Plug-in units for the 360B mainframe.

These are the instruments that measure frequency automatically. You just connect the input signal; if the signal is within the frequency and amplitude range, the counter will measure it. No tuning. No sensitivity adjustments. No gate time to set.

You'll still get your reading even if your signal has substantial FM or noise. There are no restrictions on the input signal, except frequency and amplitude range.

And because they are designed specifically for frequency measurement, EIP instruments are extremely easy to read. The counters have an eleven digit display that is conveniently sectioned in GHz, MHz, kHz, and Hz. You read the frequency directly to 1 Hz resolution. The frequency meters have a five digit display with 1 MHz resolution.

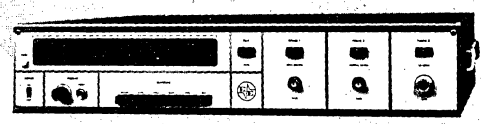
Your local EIP field representative will be glad to give you more information. Or contact us directly at 2353 De La Cruz Boulevard, Santa Clara, California 95052, (408) 244-7975/6.

EIP INC.

EIP, the 0 that counts automatically.

Frequency, Time Interval, Voltage and Time Code Instrumentation . . .

Microwave

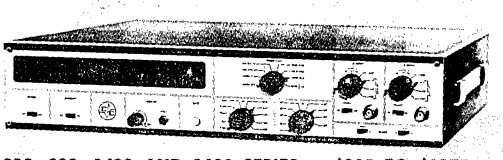


900 SERIES, 3 — 18 GHz — $2250 TO $5450

- COMPLETELY AUTOMATIC MEASUREMENTS
- OVER 7 YEARS MICROWAVE EXPERIENCE
- PIONEERED SAMPLING AND YIG MEASUREMENT TECHNIQUES

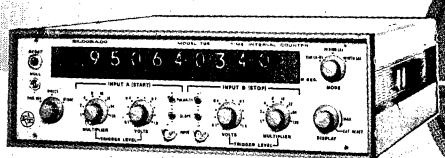
Lab and Communications

- 500, 200, 32, 15 MHz AND 100 kHz FREQUENCY COUNTERS
- 0.1, 1 μs, AND 1 ms TIME INTERVAL METERS
- FCC APPROVED



200, 300, 1400 AND 1600 SERIES — $325 TO $1875

Nanosecond

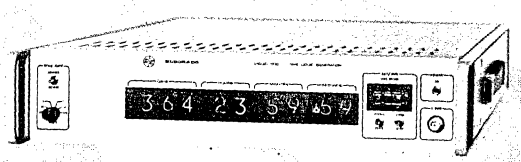


600 AND 700 SERIES — $1750 TO $5500

- TIMES WITH 1 ns, 10 ns RESOLUTION
- 1 ns TIME DELAY GENERATOR
- RADAR RANGING

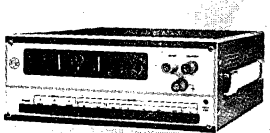
Timing

- COMPLETE LINE OF GENERATORS, READERS CLOCKS AND TAPE SEARCH INSTRUMENTS
- COMPETITIVELY PRICED



1700 SERIES — $675 TO $2030

Voltage



1800 SERIES — $275 TO $645

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- LOWEST PRICED 0.1% DMM

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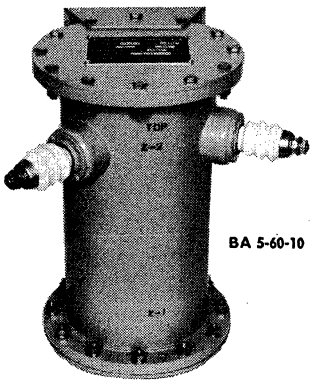
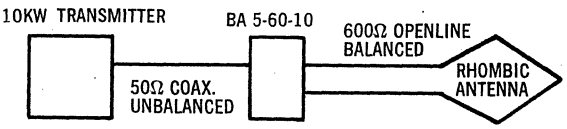
- Ambient temperature range (typical) −40°C to +50°C
- Frequencies to 34 MHz





TYPICAL BALUN APPLICATION

SPECIFICATIONS — HIGH POWER MODELS

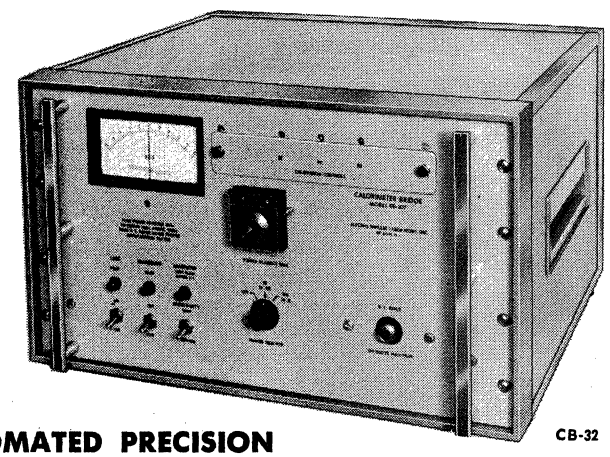
Model	Input Output Z	Peak Power	Average Power
BA 5-60-10	50/600	40KW	10KW
BA 5-7.5-10	50/75	40KW	10KW
BA 5-60-25	50/600	100KW	25KW
BA 5-7.5-25	50/75	100KW	25KW
BA 5-20-100	50/200	Inquire	100KW

AUTOMATIC DIRECT READING CALORIMETERS

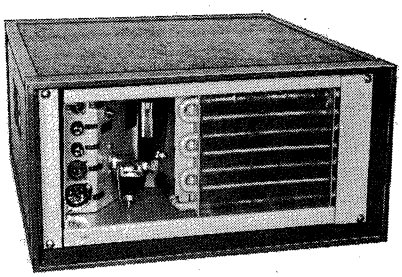
1% ACCURACY

TRACEABLE TO NATIONAL BUREAU OF STANDARDS!

One percent accuracy is independent of frequency and waveshape, but does not include load error. A VSWR vs. frequency chart can be furnished with your choice of any standard waveguide or coaxial load. (No extra cost on 1% models.)



CB-32



ADR-100, REAR VIEW

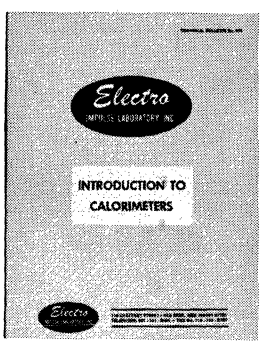
AUTOMATED PRECISION

Instead of time consuming manipulation of Controls, Flow Adjustments, Reading of Thermometers, Flow Meters, Graphs and other error producing devices.

Model	Max. Power	Load*
CB-32	100 watts**	
CB-36	500,1000 watts	CHOOSE ANY
ADR-100	100 watts	STANDARD
ADR-1000	1000 watts	LOAD
ADR-5000	5000 watts	DC-40GHz
ADR-10000	10000 watts	

*Price includes choice of Standard Load and Connector.
**Manual 1% version.

WRITE FOR FREE APPLICATION BULLETIN #685: "INTRODUCTION TO CALORIMETERS"



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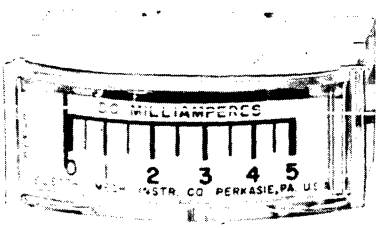
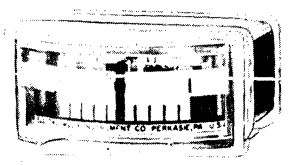
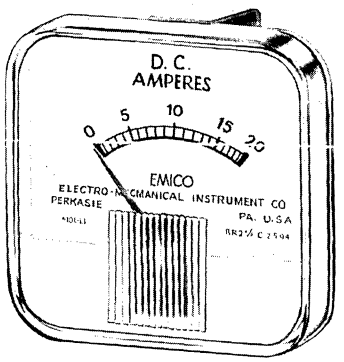
- VOLTAGE TESTERS
- AMMETERS
- MILLIAMMETERS
- DB METERS
- CIRCUIT INDICATORS
- INDUCTION METERS



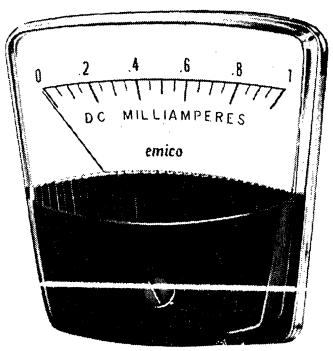
EDGE READING METER
Model 13
1 13/16" x 3/4"



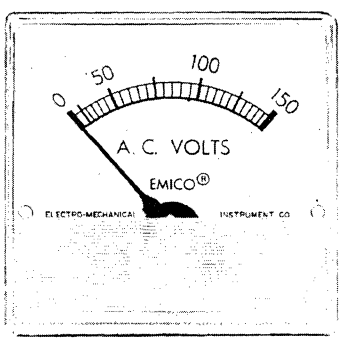
EDGE READING METER
Model 12 1¼" x 5/16"



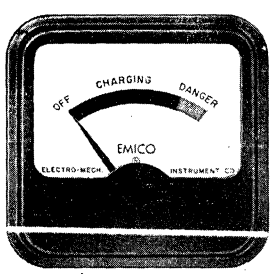
PLASTIC BEZEL METER
Model 42 2 5/16" square



STARLINE METER
Model 32
approx. 3" square

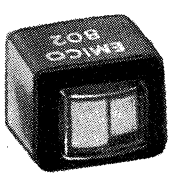


PLASTIC BEZEL METER
Model 52 approx. 2 3/8" square

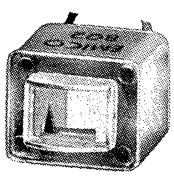


METAL BEZEL METER
Model 72 2¼" square

MICRO-MINIATURE CIRCUIT INDICATORS



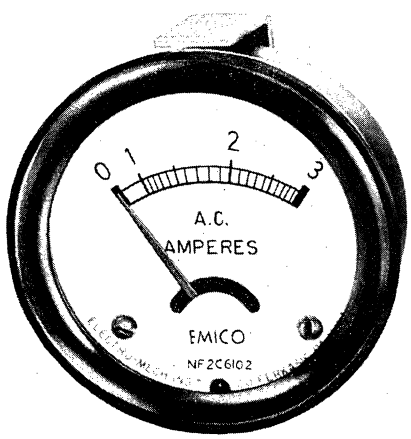
For monitoring on-off conditions, malfunctions, or battery charge conditions, select either Model 802P (pointer-type) or 802F (flag-type) indicator. Rugged, dependable, extremely low-cost. Available with either wire leads or plug-in jacks for easy installation. For technical details, request Bulletin R12-A.



Model 802F approx. ½" square

Model 802P approx. ½" square

EMICO designs and engineers meters to your exact requirements, including any custom dial face, with special scale, trademark, name or colors. Send details or drawings for prompt quotation.



METAL BEZEL METER
Model 73
2¼" diameter

Phone: (215) 257-6561 TWX: 510-661-5170

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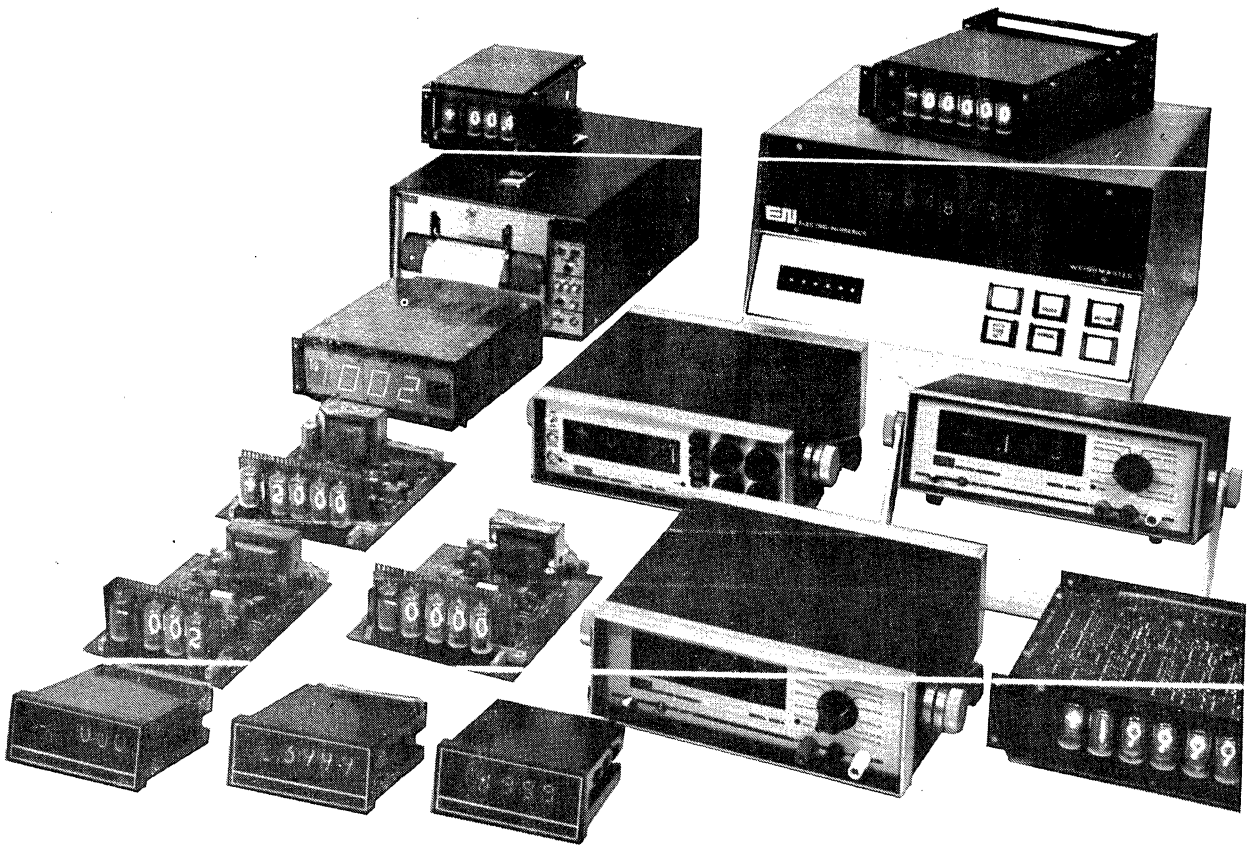


Last year we were shipping a dozen different kinds of digital panel meters, plus printers, DVM's and digital transducer meters — in production quantities. Our option list was the best in the industry: Peak retention, BCD, Limits, preamps, wide range offset, battery operation, remote readout, AC, and more. We electronically cycled every unit for 96 hours at 65°C and then warranty them for two full years. Our customer reported an average field failure rate of less than 4% over the preceding 24 months — We're better now!

ELECTRO-NUMERICS CORPORATION 2961 Corvin Drive, Santa Clara, California 95051 408-738-1840

e|s|i® precision test and calibration instruments

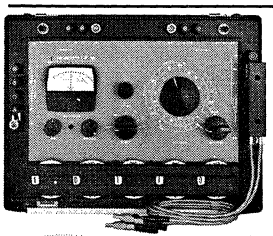
ESI produces a comprehensive line of instruments, standards and system components for the precise measurement of resistance, voltage, capacitance, inductance and ac/dc ratio. The full spectrum of critical application is covered: standards and laboratory calibration, design work, production and field test.

All calibrations on ESI instruments are traceable to the National Bureau of Standards through ESI transportable reference standards. These standards are test reported by NBS and maintained by ESI. They form the base from which our professional grade instruments derive their warranted accuracy.

For more complete information than given here, please request our comprehensive metrology catalog.

Multi-Purpose Instruments

MODEL	DESCRIPTION	RANGE	NOMINAL ACCURACY	PRICE
300A	Measuring E, I, R and ratio (battery)	0-511 V, 0-5.11 A, 0-511 MΩ	0.01%	**$1075.**
300	(same)	(same)	0.02%	**995**
250DE	Measures R, C, L battery operated (line operation and rack mount opt.)	0-12 MΩ 0-1200 μF 0-1200 H	0.1% 0.2% 0.2%	**550.**
293	Universal bridge for R, G, C, L AC/DC gen.-det. (Bridge alone—$600)	0-1.2 MΩ 0-1200 mmho 0-1200 μF 0-1200 H	0.05% 0.05% 0.1% 0.1%	**1300.**

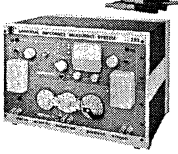


300A PVB® Potentiometric Voltmeter Bridge

The Model 300A Potentiometric Voltmeter Bridge provides a complete five-dial dc measurement facility in one convenient battery-operated instrument with 0.01% accuracy, 2 μV sensitivity.

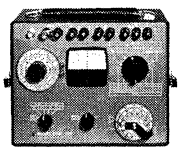
The PVB® combines the functions of a five-range potentiometric voltmeter, three-range precision voltage source, eight-range ammeter, ten-range guarded Kelvin double bridge, four-terminal 0.01% resistance comparison bridge, ratiometer and high-sensitivity electronic null detector.

A modulator-type null detector with an integral high-gain solid-state amplifier provides better than 2 microvolts dc sensitivity with an input impedance of approximately one megohm. Exceptional rejection of ac pickup by the detector, coupled with complete guarding and shielding, makes possible accurate measurements in noisy electrical environments under conditions of high humidity. Long battery life provides complete flexibility of measurement by isolating the instrument from annoying ground loops and power line transients.



293 Universal Impedance Measuring System

Measures resistance and conductance (0.05% accuracy), inductance and capacitance (0.1%) in five figures of direct, in-line readout, plus D or Q. Detector sensitivity of 5 microvolts; variable output generator. Self-contained, ac/dc generator-detector. Front panel terminals.

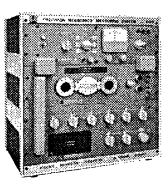


250 DE Portable Impedance Bridge

Measures R, at 0.1%, C and L at 0.2%. Includes solid-state ac/dc detector and generator; operates on four 1.5V D batteries. Terminals provided for external bias, range extension. Measures dissipation factor and storage factor for capacitors and inductors. 12,005 divisions of dial resolution.

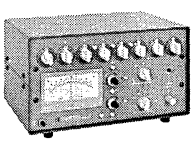
Resistance Measurement

MODEL	DESCRIPTION	FULL SCALE RANGES	NOMINAL ACCURACY	PRICE
242B	Kelvin bridge, gen.-det. and decade standard	0.1 mΩ to 120 MΩ (1 μΩ resolution)	50 ppm	**$4000.**
242D	(same)	(same)	10 ppm	**5600.**
262	Resistance comparator	1 mΩ to 100 MΩ	0.01%	**490.**
263	Resistance deviation bridge	1Ω to 111 MΩ	0.02%	**1175.**
232A	Wheatstone bridge, gen.-det.	1.2Ω to 12 GΩ	0.01%	**1575.**



242D Resistance Measuring System

Most versatile system at 10 ppm direct readout accuracy. (5 ppm can be specified as an option.) Four-terminal comparisons to 1 ppm, with 0.1 ppm resolution. Matched generator-detector with complete guarding and shielding provides easy operation over wide range (10 microhms—120 megohms). Data logging available, as is less accurate, less expensive Model 242B.

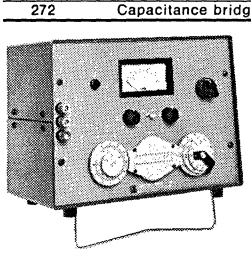


263 Resistance Deviation Bridge

Ideal production bench instrument for determining cutoff point when winding wire resistors; also to measure adjustment of metal film resistors and networks, or in rapid testing or sorting of discrete resistors, using the two analog limits. Responds within few milliseconds at 0.02% accuracy from 1 ohm to 100 megohms. Eight decades resolution; 4-terminal guarding and high ac rejection. Individual resistors within network can be measured. Less expensive Model 262 available without built-in standard.

Voltage and Capacitance Measurement

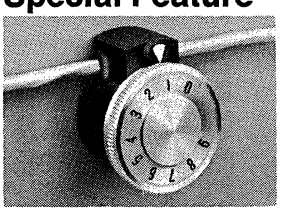
MODEL	DESCRIPTION	FULL SCALE RANGES	NOMINAL ACCURACY	PRICE
1045A1	Potentiometric DC voltmeter, two internal detectors	11 V-1111 V (1 μV steps)	5 ppm	**4850.**
701	Capacitance measuring system, gen.-det.	12 pF-1200 nF (0.0001 pF resolution)	0.01%	**2500.**
273	Capacitance bridge, 4-terminal, gen-det.	120 pF-12,000 μF (0.01 pF resolution)	0.1%	**950.**
272	Capacitance bridge, improved dissipation resolution	120 pF-120 μF (0.01 pF resolution; 0.0001 dissipation resolution)	0.1%	**950.**



272 Capacitance Bridge

Offers lower D and C ranges (0 to 0.0105 at 1 kHz and 0 to 120 pF) plus greater D resolution (0.0001 at 1 kHz) than its sister, the Model 273. In addition, it has better D accuracy (0.0005) while maintaining the same C accuracy of 0.1%. Highest of the instrument's seven C ranges is 0 to 120 microfarads. All types of capacitors, including electrolytic or tantulum varieties, may be checked.

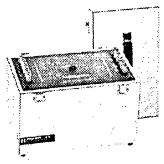
Special Feature



New DATA-DIAL easily adapts calibration instruments for automatic data logging. Simple knob replaces all decade switches on front panel of your calibration equipment. Each DATA-DIAL contains circuitry and wiring for digital output. Take off old knob, put on DATA-DIAL without removing panel, dust cover or exposing switch decks. Costs only $35.00 per dial.

e|s|i, Electro Scientific Industries, 13902 N.W. Science Park Drive, Portland, Oregon 97229

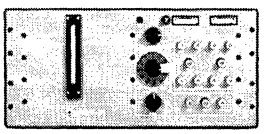
esi® Standards



SR 104 Transportable Resistance Standard

Calibration to 1 ppm accuracy is available on this 10-kilohm standard. Unique features include stability of 0.5 ppm/yr after two years and a temperature coefficient of less than 0.1 ppm/°C. It also is available at 1000-ohm and 100-ohm values and, as the Model 105, in the classic enclosure that permits oil bath immersion.

SV 150 Standard Voltage Cell



First voltage standard easily transported. Four cells sealed in controlled environment with integral batteries for maintaining power during shipment. Sealed batteries rarely need servicing and cannot spill.

MODEL	DESCRIPTION	VALUE	NOMINAL ACCURACY	PRICE
†SR 104	10k transportable resistance standard	10 kΩ	5 ppm (1 ppm/yr stability)	$ 600.
SR 1	Standard resistor	.01 Ω	500 ppm	55.
		0.1 Ω	300 ppm	45.
		1, 10, 100 Ω; 1, 10, 100 kΩ	50 ppm	40.
		1 MΩ	100 ppm	70.
		10 MΩ	100 ppm	150.
SR 1010	Resistance transfer standard (12 steps)	1, 100 Ω	50 ppm	350.
		1, 10, 100 kΩ (per step)	50 ppm	350.
SR 1010/LTC	Low temperature coefficient model	10 Ω/step	50 ppm	475.
SR 1010/MTA	Resistance transfer standard, trimmable	10 kΩ/step	1 ppm	850.
SR 1050	High resistance transfer standard (11 steps)	100 kΩ/step	50 ppm	600.
		1 MΩ/step	50 ppm	700.
		10 MΩ/step	50 ppm	975.
†SC 1000	Standard Capacitor	1 nF	20 ppm	325.
SV 150	Standard cell bank	4 standard cells	———	1650.

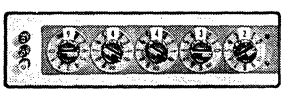
†Certified report of calibration supplied

Working Standards

Many of the decade and divider standards offered in the ESI catalog can be special ordered in a programable version. Most accuracies and ranges can be obtained with either binary of BCD coding. Contact repeatability and reliability are outstanding, due to the use of latching mercury-wetted relays throughout.

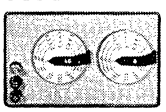
RV 726 DEKAVIDER Decade Voltage Divider

Self-calibration, 7-decade Kelvin-Varley circuit provides 0.1 linearity, 0.1 ppm resolution and outstanding performance at low settings. Temp. coefficient of ± 1 ppm/°C. RV 722 is a 7-decade, 1 ppm non-trimmable unit.



DB 52 DEKABOX In-line Decade

Resistors used for precision dc and audio frequency. Low temperature, power coefficients; minimal leakage. Six-dial DB 62 also available.



DB 877 DEKABOX® Decade Resistor

Compact design employs two coaxial dials (ESI patent) for 8 full decades to 12 megohms at 0.02% accuracy long term.

MODEL	DESCRIPTION	VALUE	LINEARITY	PRICE
†RV 622A	Resistive divider (Kelvin-Varley), 6 decades	10 kΩ	5 ppm	$ 500.
		100 kΩ	5 ppm	570.
†RV 722	Standard divider (Kelvin-Varley), 7 decades	100 kΩ	1 ppm	995.
†RV 724	Standard divider—7 decades, over ranging	11 kΩ	1 ppm	1400.
RV 726	Adjustable divider (Kelvin-Varley), 7 decades	100 kΩ/110 kΩ	0.1 ppm	1495.
†DT 72A	Ratio transformer—7 decade standard	1.1111110	0.5 ppm	670.

MODEL	DESCRIPTION	PER STEP	TOTAL RESISTANCE	NOMINAL ACCURACY	PRICE
*DB 655	6-Decade resistor—tilting bench model	0.1, 1 Ω	120 kΩ, 1.2 MΩ*	0.02%	$ 235.
		10 Ω	12 MΩ*	0.02%	275.
DB 877	8-Decade resistor—tilting bench model	0.1 Ω	12 MΩ	0.02%	310.
DB 52	Decade resistor—5 decades in-line	0.01, 0.1 Ω	1.1111, 11.111 kΩ	0.02%	165.
		1 Ω	111.11 kΩ	0.02%	175.
		10 Ω	1.1111 MΩ	0.02%	195.
		100 Ω	11.111 MΩ	0.02%	270.
DB 62	Decade resistor—6 decades in-line	0.01 Ω	11.1111 kΩ	0.02%	185.
		0.1 Ω	111.111 kΩ	0.02%	195.
		1.0 Ω	1.11111 MΩ	0.02%	215.
		10 Ω	11.1111 MΩ	0.02%	300.
*RS 624	6-Decade resistance standard, 2-terminal, rack panel	1.0 Ω	1.2 MΩ	0.01%	815.
RS 925A	9-Decade resistance standard, 4-terminal	100 μΩ	1.2 MΩ	0.005%	1450.
RS 925C	9-Decade standard, trimmable, highest accuracy	100 μΩ	1.2 MΩ	0.0005%	2500.
DC 57	4-Decade capacitor—plus air variable		1.11 μF	1.0%	250.

*Special order †Certified report of calibration supplied

Ratio Measurement / Generators-Detectors

MODEL	DESCRIPTION	RANGE	NOMINAL ACCURACY	PRICE
†*731A	DC ratio and voltage calibration (less power supply)	7-dial K-V divider (0.1 ppm/step)	1-10 ppm	$2795.
791	AC ratio measuring system, gen.-det.	7-dial transformer (0.1 ppm/step)	0.5-5 ppm	2850.
†*1071	AC ratio measuring system, gen.-det.	7-dial transformer (0.1 ppm/step)	0.5-5 ppm	2015.
951	Temp. meas., R_T/R_0	0-1111 Ω	10 ppm	6150.

*Special order †Certified report of calibration supplied

MODEL	DESCRIPTION	GEN. OUTPUT	DETECTOR SENS.	INPUT R.	PRICE
801	DC generator-detector 3 μV-1000 V end scale	0-600 V	0.1 μV	100 k-100 MΩ	$1300.
803A	DC generator-detector	0-200 V	5 μV	500 kΩ	500.
830	DC generator, guarded and isolated	0-200 V	———	———	575.
861A	AC generator-detector, variable freq.	0-200 V, 20 Hz-20 kHz	0.25 μV	1 MΩ	850.
865	AC/DC generator-detector	0-6 V	5 μV	10 MΩ	575.
900R	Nanovolt galvanometer, 10 nV-3 mV end scale	———	2 nV	1000 Ω	2350.

For Individual Decades and Components, see ESI page in Precision Resistor Section #4750.

esi Electro Scientific Industries, 13902 N.W. Science Park Drive, Portland, Oregon 97229

AC & DC voltage and current calibrators

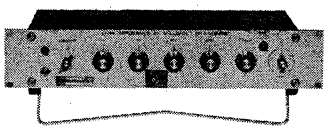
General purpose and special purpose

standards, sources and references

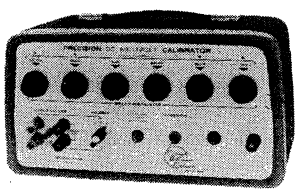
DC Voltage Standards

Applications for Production Line QC, Field Service, Calibration Laboratories. Ideal as a Reference/Source/Supply for design and development labs. Simulator for thermocouples and transducers.

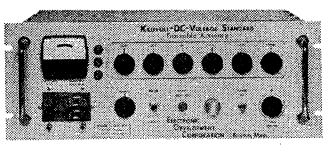
MODELS	E10D	VS14/B	VS11/B	VS111/B	VS1000NR/B
Bulletin	(#26.1)	(#23)	(#26)	(#26)	(#26)
DC Volts	±11 V	±1 V	±11 V	±111 V	±1111 V
Resolution	10 ppm	1 ppm*	1 ppm*	1 ppm*	1 ppm
I_{out}	75 mA	50 mA z=100 μΩ	50 mA	50 mA	10 mA
Accuracy	±0.01%	±0.005%	±0.005%	±0.005%	±0.007%
Price	$450	$720	$720	$920	$1250



Model E10D

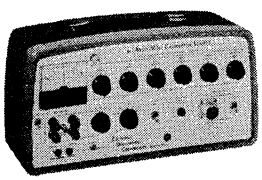


Model VS14/B

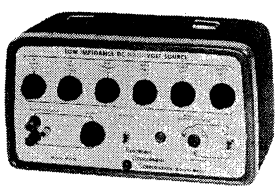


Model VS1000NR/B

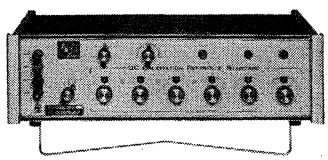
RANGING MODELS	E100E	MV100/B	MV105/B	MV106/B	MV115/B	330
Bulletin	(#26.2)	(#25)	(#25)	(#25)	(#23)	(#19)
DC Volts (Ranges)	±11 V ±111 mV	±11 V ±111 mV	±11 V ±111 mV	±11 V ±111 mV ±11 mV	±11 V ±1 V	±300 V ±30 V ±3 V
Resolution	10 ppm	1 ppm*	1 ppm*	1 ppm 10 nV	1 ppm*	10 ppm
I_{out}	75 mA	50 mA	50 mA	50 mA	50 mA	100 mA
Accuracy	±0.01%	±0.005%	±0.005%	±0.005%	±0.005%	±0.002%
Price	$525	$770	$850	$975	$820	$990



Model MV105G/B



Model MV106/B

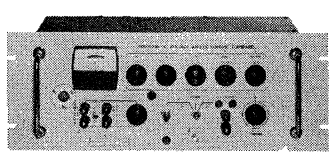


Model 330

DC Current Standards

Short circuit and open circuit protected. 30 second warm-up. Automatic zero.

MODEL	CR 10/A	CR 100/A	CR 102/A	CR 103/A
Bulletin	(#31)	(#31)	(#32)	(#32)
OUTPUT				
I mode	±11.1110 mA	±111.110 mA	±111.110 mA	±11 110 mA
E mode	±11.1110 Vdc	—	±11.1110 Vdc	±11.1110 V ±111.110 mV
COMPLIANCE				
I mode	50 V	100 V	100 V	100 V
E mode	50 mA	N/A	50 mA	50 mA
Resolution ±Vernier	10 ppm	10 ppm	10 ppm	10 ppm
Accuracy	±0.01%	±0.01%	±.0075%	±.0075%
Price	$900	$1000	$1200	$1350



Model CR 103NR
Bench & rack mountable
with null detector

OPTIONS — *Bulletin 27*

Available on MV, VS and CR models.

Null Detector for potentiometric measurements.
Add: suffix "N" Price $25.00

Electronic Galvanometer for potentiometric and differential measurements.
Add: suffix "G" Price $225.00

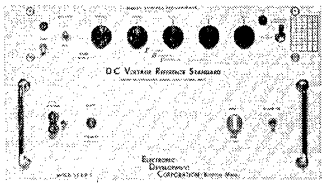
Rack Mountable and bench use. Add: suffix "R" Price $15.00

**Resolution* Series A 10 ppm plus ±Vernier ..... no charge
Series B 1 ppm no Vernier ..... no charge

Digitally Programmable DC Voltage Standards

True digital programming from BCD or ASCII code, serial or parallel entry. Sign and each digit independently selected and isolated from chassis and output. Logic levels as low as 1.5 V (for TTL or DTL Logic) and as high as 28 V.

MODEL	VS 14P4	VS 11P4	VS 111P4
Bulletin 34 & 34.1			
E_{out}	1.0000 V	10.000 V	100.00 V
Accuracy	±0.01%	±0.01%	±0.01%
I_{out}	50 mA	50 mA	50 mA
Z_{out}	100 μΩ	0.03Ω	0.1Ω
Resolution	100 μV	1 mV	10 mV
Price	$1120	$1120	$1320



Model VS 11P5
with Remote Control
Model RCM-2

Programming: Computer programmable. Punched paper tape, incremental mag. tape, punched card, DVM or electronic calculator outputs.

Memory Feature: Preserves the register contents and maintains voltage output without maintaining digital input. Programmer may then be used for other functions.

Options: There are 12 different programmable models.

Additional Resolution: Option "P5", (5 decades, 10 ppm) .... Price $100.00

Bipolar programming: Option H .... Price $100.00

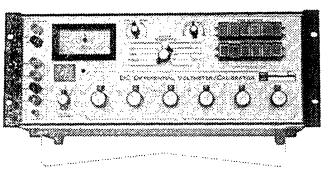
Remote sensing: Option J .... Price $50.00

Differential Voltmeter, Galvanometer and Calibrator ΔVM TVM and standard

The **Model 2901** is a high accuracy potentiometric null-balance galvanometer. Also, a high impedance differential voltmeter, and, in addition, a high accuracy Voltage reference/source/calibrator.

MODEL 2901 — *Bulletin 21*

INPUT SPECIFICATIONS		OUTPUT SPECIFICATIONS	
ΔVM and Galvo Mode		**Accuracy**	±0.002%
E_{in}	1 μV to ±1100 Vdc in 4 ranges	**Output 4 ranges**	100 NV to ±100 Vdc
Resolution	1 ppm	**Resolution**	1 ppm
Sensitivity	1 μV	**Stability**	0.0005%/8 hrs.
Z_{in}	∞ at null; 10 MΩ off null	**Current**	100 mA
		Z_{out}	.03Ω
		Weight	10 lbs
		Price	$1350

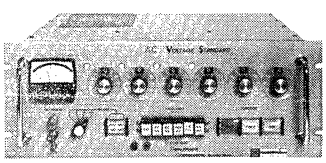


Model 2901

AC Voltage Standards

Completely Solid State. Highly stable. 60 Second warm-up. Low output impedance.

MODEL	AC 1000	AC 200	3434
Bulletin	(#35)	(#37)	(#36)
E_{out}	1 μV to 1000 V in 4 ranges**	1 μV to 200 V in 4 ranges**	1 μV to 1000 V in 4 ranges
E Accuracy	0.05%	0.05%	0.05%
Burden	50 VA	25 VA	50 VA
Freq. Range	45 Hz to 5 kHz	30 Hz to 20 kHz	40 Hz to 5 kHz



Model 3434

5 internal frequencies 50 Hz, 60 Hz, 400 Hz, 1 kHz plus optional frequency *and* unlimited number of frequencies attained by use of external oscillator via front panel terminals.

Distortion	0.5%	0.5%	0.5%
Weight	50 lbs	45 lbs	55 lbs
Price	$2750	$2550	$3200

OPTIONS

MODEL AC-B-1000 — *Bulletin 35.1* AC Voltage Attenuator (factory installed) Resolution 1 μV to 1000 V $275

MODEL IC-15 — *Bulletin 35.2* Meter Increment Calibrator (factory installed) $1290

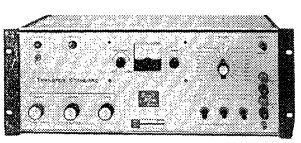
MODEL PAS 36 — *Bulletin 35.3* Phase Shifter (factory installed) $500

AC to DC Thermal Transfer Standard

The Model 2401 is a revolutionary new transfer for High accuracy, low level (below ½ V) transfer with very high input impedance. The thermal element is guaranteed against accidental damage.

MODEL 2401 — *Bulletin 40*

19 Ranges	1 mV to 1000 Vac rms	**Reversal error**	0.005%
Frequency	5 Hz to 50 kHz	**Input Impedance** 1 mV to 5 V	100 kΩ/V or 10 μA
Accuracy	1 mV to 200 mV = 0.05% 500 mV to 1000 V = 0.01%	10 V to 1 kV	1 kΩ/V or 1 mA
		Price	$1550
Sensitivity	Electronic Galvo — 10 ppm (max)		
T.C. Accuracy	0.0075%	Bench use and Rack mountable	

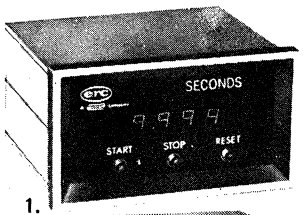


Model 2401

Electronic Development Corp.

11 Hamlin St. Boston, Mass 02127 (617) 268-9696

All EDC instruments are traceable to the U.S. National Bureau of Standards. Certification supplied with each instrument / All instruments are available under GSA Contract / Export prices slightly higher / Line (Mains) power: 115 Vac, 60 or 400 Hz; or 220 Vac, 50 Hz / Instruments available for no-charge evaluation. Contact your local sales representative or the main plant.



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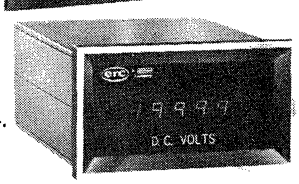
2.

3.



4.

New!

DIGITAL COMPONENTS for Industrial Control Systems

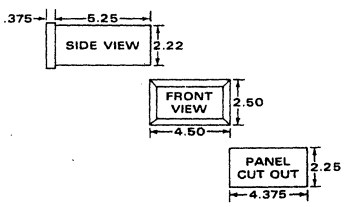
A new concept in functional building blocks designed to fill the system requirements for MEASURE-COMPARE-CONTROL applications.

MEASURE time, quantity, frequency, electrical parameters.

COMPARE with desired values or limits.

CONTROL the parameter being monitored using relays included in the comparator units.

1. **Digital Stop Watch /** 3-6 digits, microsecond to minutes resolution. Priced from $214
2. **Digital Comparators /** 3-7 digits, single and dual set points. Remote programing option. Priced from $126
3. **Digital Counters /** 3-6 digits, unidirectional and bi-directional. Presettable option. Priced from $216
4. **Digital Panel Meters /** 4½ digit 0.01%, Price $400
5. **Digital Clocks /** 12Hr, 24Hr, 100Hr; 60 Hz or Xtal Time Base. Price $353 (60Hz time base)



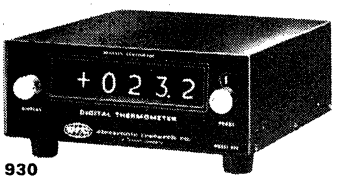
5.

DIGITAL THERMOMETERS

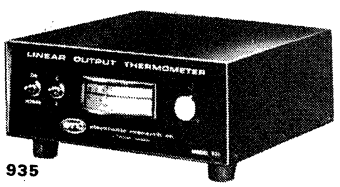
ERC Model 930 Digital Thermometer measures temperature with a certified accuracy of 0.5°C from test point to read out using a 2 terminal DC measurement circuit. No cold reference junctions, no copper wire transitions, no bridge circuits, no microvolt amplifiers with drift and aging problems. $595.00 including one standard probe.

ERC Model 935 is an economical unit similar to the 930 except the A/D converter and digital display are not included. It is designed to interface with all standard DVM's. $325.00 including one standard probe.

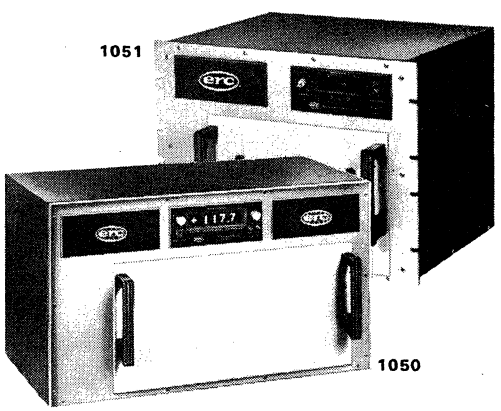
Both units have front panel channel selector for ten separate input probes and operate from −60°C to +160°C or −76°F to +320°F.



930



935



TEMPERATURE TEST SYSTEMS

The Series 1050 main-frame Chamber and Series 920 Controllers are basic equipment for the newest concept in Temperature Test Systems. The Chambers are designed with two or three cavities for ERC plug-in system equipment . . . Digital Thermometer, Programmer, Scanner, Counter or Printer. When equipped with the Series 920 Digital Controller, the Chamber accuracy is 0.5°C over the operating temperature range. The forced Laminar Air Flow of 200 Ft./minute insures minimum temperature gradients.

Model 1050—with 920 Controller $1250.00/with 921 Controller $945.00.

Model 1051—with 920 Controller $1150.00/with 921 Controller $845.00

erc **electronic research co.** — a extron company

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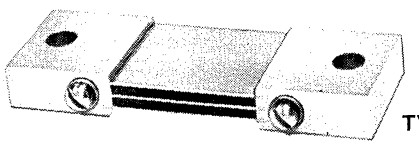
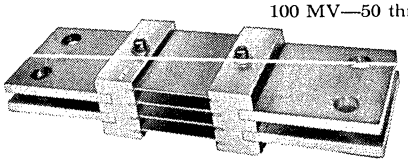
World's Largest Selection of D.C. AMMETER SHUNTS

ACCURACY ¼%



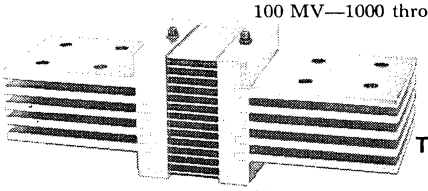
TYPE A

50 MV—15 through 600 amperes
100 MV—50 through 600 amperes



TYPE C

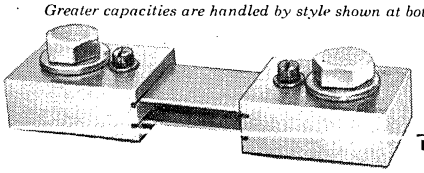
50 MV—1000 through 2000 amperes
100 MV—1000 through 2000 amperes



TYPE F

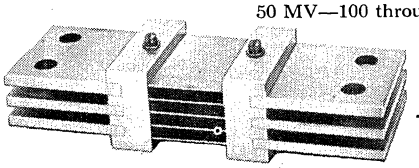
50 MV—2500 through 30000 amperes
100 MV—2500 through 10000 amperes

Style shown here has rated capacities of 10,000 amps and under. Greater capacities are handled by style shown at bottom of page.



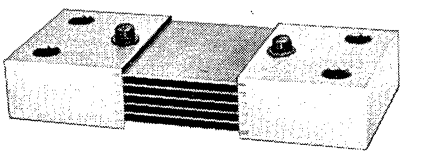
TYPE TRW-50

50 MV—100 through 600 amperes



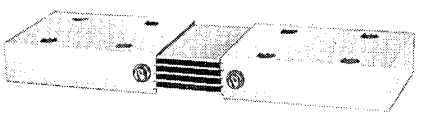
TYPE WT

50 MV—1000 through 10000 amperes
100 MV— 600 through 6000 amperes



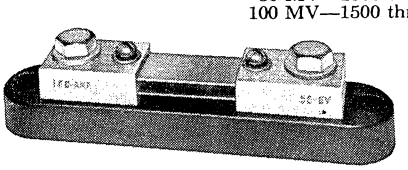
TYPE B

50 MV—300 through 1200 amperes
100 MV—300 through 1200 amperes



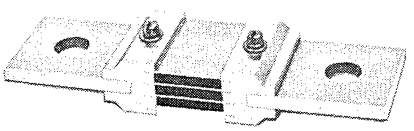
TYPE E

50 MV—1500 through 2000 amperes
100 MV—1500 through 2000 amperes



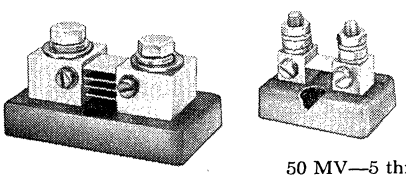
TYPE HA

50 MV—1 through 500 amperes
100 MV—1 through 500 amperes



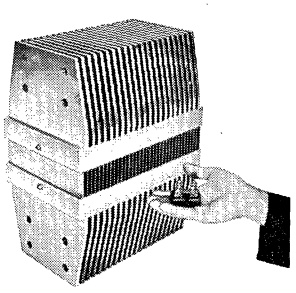
TYPE W

50 MV—500 through 1000 amperes
100 MV—120 through 500 amperes



LIGHTWEIGHT TYPES

50 MV—5 through 1200 amperes



Large capacity Type F shown with Lightweight Type

We offer the widest selection of standard model shunts available anywhere. Both switchboard and portable types. In addition, we produce custom made shunts to your specifications. Our standard models, illustrated on this page, have current ratings up to 30,000 amperes. Many of these can be shipped immediately. Custom made shunts, of course, take a little time to produce. But whether you order a standard or special model, we promise fast service, fine craftsmanship and a personal interest in your complete satisfaction.

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Fla. 32806: Orlando
Electro-Tech, Inc.
307 27th St.
Phone: 305/423-5589

Ga. 30054: Atlanta
Electro-Tech, Inc.
3020 Commerce Way
Phone: 404/767-8761

Ill. 60644: Chicago
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Phone: 301/796-5600

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Phone: 212/726-4551

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Electro-Tech, Inc.
5141 Belhaven Blvd.
Phone: 704/392-7451

Ohio 44135: Cleveland
Weschler Electric Corp.
4250 West 130th St.
Phone: 216/251-4609

Pa. 19115: Philadelphia
Sunshine Scientific Inst., Inc.
1810 Grant Ave.
Phone: 215/ORchard 3-5600

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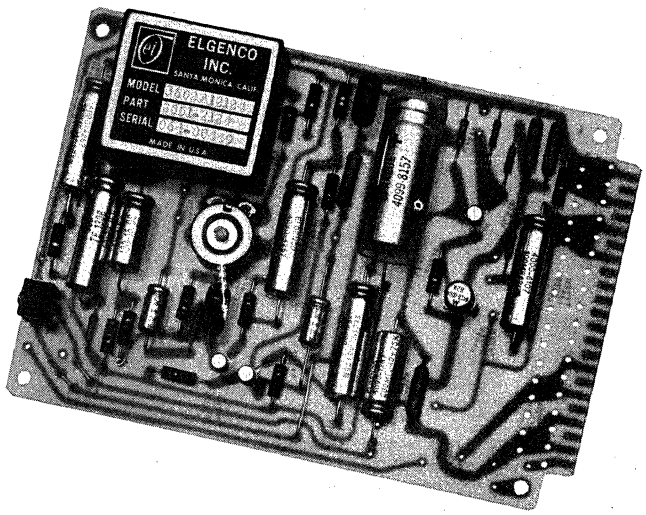
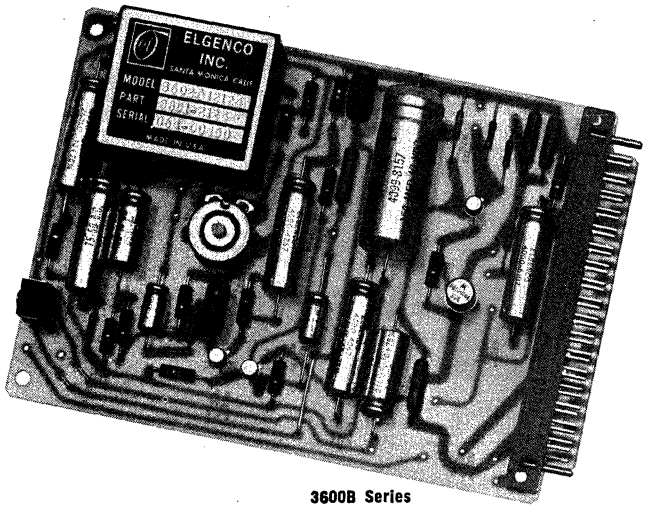
SERIES 3600 FIXED RANGE • NOISE GENERATOR CARDS



3600A Series



3600B Series

SPECIFICATIONS

FREQUENCY RANGE: The frequency band may be any combination of the listed low and high frequencies.

Lower Frequency: 10, 20, 50, or 200 Hz, 5 kHz.

Upper Frequency: 20, 50, 100, 200, or 500 kHz; 1, 2, 3, or 5 mHz.

SPECTRAL UNIFORMITY: Spectral uniformities are available as:

Upper Frequency	Spectral Uniformity
20 kHz to 500 kHz	±0.5, ±1.0, ±2.0 or ±3.0db
1 mHz to 3 mHz	±1.0, ±2.0, or ±3.0db
5 mHz	±2.0 or ±3.0db

As a rule of thumb, the roll off above the specified upper frequency gives a 3db point about twice the specified upper frequency. Roll off above 3db point approaches 12db per octave. Spectral uniformities in the midband are typically flat to better than ±0.5db.

OUTPUT IMPEDANCE:

20 kHz to 500 kHz units .....600 ohms
1 to 5 mHz units .....200 ohms

POWER REQUIREMENTS:

	3600A Series or 3600B Series	Low Current Option 3600A or 3600B	3600C Series
Power supply voltage required	−30 VDC ±1%	−30 VDC ±1%	−24 VDC ±1%
Approximate current..	50 ma	30 ma	37 ma
Output level	0 to 3.0 VRMS	0 to 1.5 VRMS	0 to 2.2 VRMS

Note: The 3600B series units are the same as the 3600A series except the 3600B series have a test point and Elco 00-7023-035-000-001 connector mounted on the PCB.

The 3600A and 3600C units mate with a Cinch 250-22-30-170, Elco 00-6007-022-940-022 connector or equivalent.

SPECIFICATIONS COMMON TO ALL UNITS:

Amplitude Probability Distribution: Gaussian.

Peak to RMS Capability: Minimum dynamic ranges 3.5 to 1 at specified maximum level. Increases with lower output levels.

Maximum Load: 900 ohms minus output impedance.

Operating Temperature Range: 0 to 50°C.

Size: 4½ x 6½ x ⅞ inches.

Weight: 7 oz.

PRICING:

Base Price: 3600A, 3600C and 3600A or C with reduced current option (specify on order).

Base price plus $10.00: 3600B or 3600B with reduced current option (specify on order).

OPTIONS:

Other than specified frequency; add $10.00 each per frequency per board.

Steel shield plate, ¼-inch off conductor side of PCB; add $4.90 each.

Other than specified output impedance; add $5.00 each.

To operate on other power supply voltages, voltage difference must be 30-volts for 3600A or 3600B and 24-volts for 3600C. Specify on order; "Decoupled option for operation on _____ power supply," and add to price as:

Quantity Per Order	Add Each	Quantity Per Order	Add Each
1	$15.00	25-49	$2.50
2	10.00	50-99	2.00
3	7.50	100-249	1.95
4	6.00	250-499	1.90
5-9	5.00	500 up	1.85

DISCOUNT: Quantity discounts apply as:

Quantity	Discount	Quantity	Discount
1-4	List	50-99	8%
5-9	2%	100-199	10%
10-24	4%	200-499	12%
25-49	6%		

MODEL 3609A POWER SUPPLY CARD

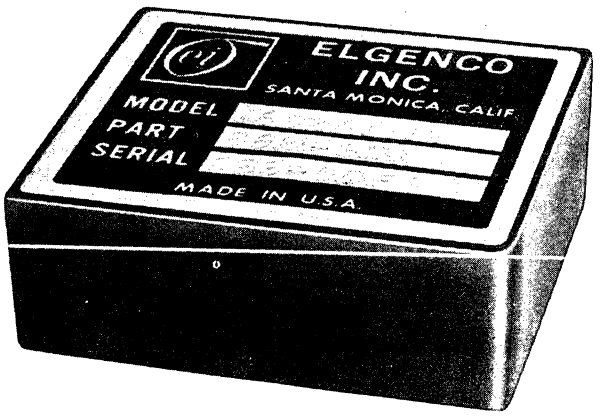
Size: 4½" x 6½" x 2 1/16".

Input: 115/230 volts ± 10/20 volts, 50 to 1000 Hz.

Supplies power for up to 2 noise generator cards or up to 4 noise generator cards with reduced current option. Price: **$67.00**

MATING CONNECTOR: Mating Elco Connector; Elgenco, Inc. part numbers 7521-1122, for 3600A, 3600C and 3609A is available at $4.90 each.

SERIES 1600 • ENCAPSULATED NOISE SOURCE MODULES



SPECIFICATIONS IN RECOMMENDED CIRCUIT:

The 1600 series provide a low level wide band output. A portion of this wide band is specified to a certain flatness; uniformity. The 3 or 5 millivolt output is for the whole band extending to 5 mHz.

SPECTRAL DENSITY UNIFORMITY: Available with uniformity to ±½db, ±1db, ±2db, or ±3db and many frequency ranges within 10 Hz to 5 mHz. See price list for complete list of standards.

SPECTRAL DENSITY: Approximately 2 $\mu v/\sqrt{}$ Hz .

RMS OUTPUT LEVEL: 1602A series 3 mv; 1603A, 1606A, and 1607A series 5 mv.

OUTPUT IMPEDANCE: Approx 20 ohms.

AMPLITUDE PROBABILITY DISTRIBUTION: Gaussian.

OPERATING TEMPERATURE RANGE: 0 to 50°C.

POWER REQUIREMENTS: −30 volts dc ±1% at approximately 3.5 ma. **Note:** external passive components are required to properly install unit.

MOUNTING: .032" Printed Circuit Leads.

Size: 11/16" H x 1 51/64" W x 1 37/64" D.

WEIGHT: Approx 1.5 oz.

SERIES 3600/1600 PRICES

Frequency Band	Flatness	SERIES 3600 CARDS Model No.	SERIES 3600 CARDS Price	SERIES 1600 MODULES Model No.	SERIES 1600 MODULES Price	Frequency Band	Flatness	SERIES 3600 CARDS Model No.	SERIES 3600 CARDS Price	SERIES 1600 MODULES Model No.	SERIES 1600 MODULES Price
200 Hz to 20 kHz	±½db	3606A-52224	$269.00	1606A-52224	$220.00	200 Hz to 500 kHz	±1db	3603A-12255	$219.00	1603A-12255	$170.00
50 Hz to 20 kHz	±½db	-55124	$279.00	-55124	$230.00	50 Hz to 500 kHz	±1db	-15155	$229.00	-15155	$180.00
20 Hz to 20 kHz	±½db	-52124	$299.00	-52124	$250.00	20 Hz to 500 kHz	±1db	-12155	$249.00	-12155	$200.00
10 Hz to 20 kHz	±½db	-51124	$334.00	-51124	$270.00	10 Hz to 500 kHz	±1db	-11155	$284.00	-11155	$225.00
200 Hz to 50 kHz	±½db	3606A-52254	$289.00	1606A-52254	$240.00	200 Hz to 50 kHz	±2db	3602A-22254	$144.00	1602A-22254	$ 95.00
50 Hz to 50 kHz	±½db	55154	$299.00	-55154	$250.00	50 Hz to 50 kHz	±2db	-25154	$154.00	-25154	$105.00
20 Hz to 50 kHz	±½db	-52154	$319.00	-52154	$270.00	20 Hz to 50 kHz	±2db	-22154	$174.00	-22154	$125.00
10 Hz to 50 kHz	±½db	-51154	$354.00	-51154	$295.00	10 Hz to 50 kHz	±2db	-21154	$209.00	-21154	$150.00
200 Hz to 100 kHz	±½db	3606A-52215	$309.00	1606A-52215	$260.00	200 Hz to 100 kHz	±2db	3602A-22215	$149.00	1602A-22215	$100.00
50 Hz to 100 kHz	±½db	-55115	$319.00	-55115	$270.00	50 Hz to 100 kHz	±2db	-25115	$159.00	-25115	$110.00
20 Hz to 100 kHz	±½db	-52115	$339.00	-52115	$290.00	20 Hz to 100 kHz	±2db	-22115	$179.00	-22115	$130.00
10 Hz to 100 kHz	±½db	-51115	$374.00	-51115	$315.00	10 Hz to 100 kHz	±2db	-21115	$214.00	21115	$155.00
200 Hz to 200 kHz	±½db	3606A-52225	$324.00	1606A-52225	$275.00	200 Hz to 200 kHz	±2db	3602A-22225	$169.00	1602A-22225	$120.00
50 Hz to 200 kHz	±½db	-55125	$334.00	-55125	$285.00	50 Hz to 200 kHz	±2db	-25125	$179.00	-25125	$130.00
20 Hz to 200 kHz	±½db	-52125	$354.00	-52125	$305.00	20 Hz to 200 kHz	±2db	-22125	$199.00	-22125	$150.00
10 Hz to 200 kHz	±½db	-51125	$389.00	-51125	$330.00	10 Hz to 200 kHz	±2db	-21125	$234.00	-21125	$175.00
200 Hz to 500 kHz	±½db	3606A-52255	$344.00	1606A-52255	$295.00	200 Hz to 500 kHz	±2db	3602A-22255	$184.00	1602A-22255	$135.00
50 Hz to 500 kHz	±½db	-55155	$354.00	-55155	$305.00	50 Hz to 500 kHz	±2db	-25155	$194.00	-25155	$145.00
20 Hz to 500 kHz	±½db	-52155	$374.00	-52155	$325.00	20 Hz to 500 kHz	±2db	-22155	$214.00	-22155	$165.00
10 Hz to 500 kHz	±½db	-51155	$409.00	-51155	$350.00	10 Hz to 500 kHz	±2db	-21155	$249.00	-21155	$190.00
200 Hz to 20 kHz	±1db	3602A-12224	$144.00	1602A-12224	$ 95.00	200 Hz to 500 kHz	±3db	3602A-32255	$144.00	1602A-32255	$ 95.00
50 Hz to 20 kHz	±1db	-15124	$154.00	-15124	$105.00	50 Hz to 500 kHz	±3db	-35155	$154.00	-35155	$105.00
20 Hz to 20 kHz	±1db	-12124	$174.00	-12124	$125.00	20 Hz to 500 kHz	±3db	-32155	$174.00	-32155	$125.00
10 Hz to 20 kHz	±1db	-11124	$209.00	-11124	$150.00	10 Hz to 500 kHz	±3db	-31155	$209.00	-31155	$150.00
200 Hz to 50 kHz	±1db	3602A-12215	$164.00	1602A-12254	$115.00	5 kHz to 1 mHz	±1db	3607A-15316	$345.00	1607A-15316	$286.00
50 Hz to 50 kHz	±1db	-15154	$174.00	-15154	$125.00	5 kHz to 2 mHz	±1db	-15326	$435.00	-15326	$376.00
20 Hz to 50 kHz	±1db	-12154	$194.00	-12154	$145.00	5 kHz to 3 mHz	±1db	-15336	$535.00	-15336	$476.00
10 Hz to 50 kHz	±1db	-11154	$229.00	-11154	$170.00						
200 Hz to 100 kHz	±1db	3603A-12215	$184.00	1603A-12215	$135.00	5 kHz to 1 mHz	±2db	3607A-25316	$255.00	1607A-25316	$196.00
50 Hz to 100 kHz	±1db	-15115	$194.00	-15115	$145.00	5 kHz to 2 mHz	±2db	-25326	$330.00	-25326	$271.00
20 Hz to 100 kHz	±1db	-12115	$214.00	-12115	$165.00	5 kHz to 3 mHz	±2db	-25336	$410.00	-25336	$351.00
10 Hz to 100 kHz	±1db	-11115	$249.00	-11115	$190.00	5 kHz to 5 mHz	±2db	-25356	$570.00	-25356	$511.00
200 Hz to 200 kHz	±1db	3603A-12225	$199.00	1603A-12225	$150.00	5 kHz to 1 mHz	±3db	3607A-35316	$195.00	1607A-35316	$136.00
50 Hz to 200 kHz	±1db	-15125	$209.00	-15125	$160.00	5 kHz to 2 mHz	±3db	-35326	$255.00	-35326	$196.00
20 Hz to 200 kHz	±1db	-12125	$229.00	-12125	$180.00	5 kHz to 3 mHz	±3db	-35336	$325.00	-35336	$266.00
10 Hz to 200 kHz	±1db	-11125	$264.00	-11125	$205.00	5 kHz to 5 mHz	±3db	-35356	$460.00	-35356	$401.00

NOTE: A SERIES TO OPERATE ON −30VDC
C SERIES TO OPERATE ON −24VDC, PRICE SAME AS (A) SERIES

TO EXTEND 3607A LOW FREQUENCY ADD AS FOLLOWS:

200 Hz add $30.00 20 Hz add $60.00
50 Hz add $40.00 10 Hz add $95.00

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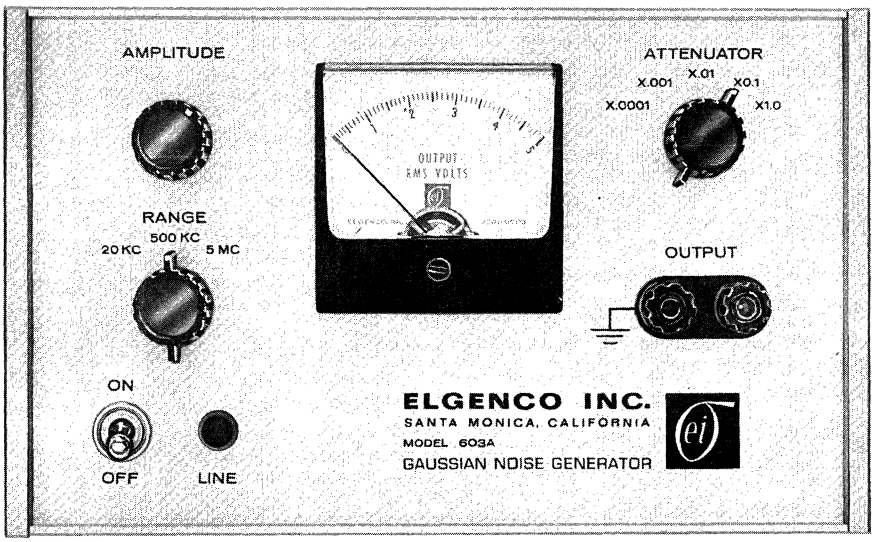
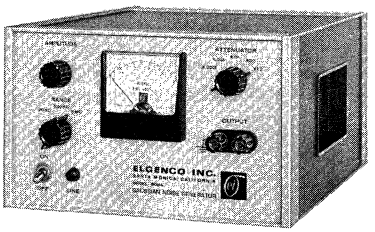
MODELS 602A-200/602A-1390/603A • ALL SOLID STATE NOISE GENERATORS 5 Hz TO 5 MHz





SPECIFICATIONS:

These specs are unique to the Series 602A-200, 602A-1390, 603A introduced on this page.

FREQUENCY RANGES: 5 Hz to 20 kHz, 5 Hz to 500 kHz, 5 Hz to 5 mHz.

OUTPUT SPECTRUM:

Accuracy	602A-1390	602A-200	603A
20 Hz to 20 kHz	±1 db	±1 db	—
20 Hz to 500 kHz	±3 db	±2.5 db	—
500 kHz to 5 mHz	±8 db	±5 db	—
10 Hz to 500 kHz	—	—	±1 db
500 mHz to 5 mHz	—	—	±3 db

RMS OUTPUT LEVEL: (Minimum value of maximum open circuit output).

20 kHz range	3 volts	3 volts	3 volts
500 kHz range	2 volts	2.5 volts	3 volts
5 mHz range	1 volt	2.0 volts	3 volts

OUTPUT IMPEDANCE:

	900 ohms ±10%	200 ohms ±10%	200 ohms ±10%

MAXIMUM LOAD: (on direct output)

	no limit	700 ohms	700 ohms

OUTPUT STEP ATTENUATOR: Five positions: X1.0, X0.1, X.01, X.001, and X.0001; calibrated to work into open circuit. Accuracy:

to 100 kHz	±3%	±3%	—
to 500 kHz	—	—	±3%
to 5 mHz	±10%	±10%	±5%
Output Impedance	200 ohms	200 ohms	200 ohms
	—	±1%	±1%

SPECTRAL DENSITY: Approximate spectral density (mv $\sqrt{}$ Hz) for 1 volt RMS output.

20 kHz band	5.0	5.0	5.0
500 kHz band	1.2	1.2	1.2
5 mHz band	0.6	0.4	0.4

AMPLITUDE PROBABILITY DISTRIBUTION: Gaussian.

Price	$385.00	$445.00	$595.00

SPECIFICATIONS • ALSO COMMON TO SERIES 624A

These specs are common to the Series 602A-200, 602A-1390, 603A introduced on this page and the Series 624A on facing page.

DYNAMIC RANGE: 3.5 to 1 peak to RMS at 3 volts RMS open circuit; 5 to 1 at 2.1 volts RMS. Dynamic range is inversly proportional to output level as set by front panel amplitude control.

OUTPUT METER: Rectifier type meter circuit reads proportional to average value, calibrated to read RMS value of Gaussian Noise; 0-5 volts RMS scale.

OPERATING TEMPERATURE RANGE: 0 to 50°C.

POWER SUPPLY: Built-in highly regulated dc supply.

POWER REQUIREMENTS: 115/230 volts ±10/20 volts, 50 to 1,000 Hertz ac; approximately 5 watts. A rechargeable battery option is available. Battery is recharged by operating unit on ac line.

DIMENSIONS: 5¼″ high x 8⅝″ wide x 11″ deep.

RACK MOUNT: A rack mounting adapter kit is available for rack mounting two units side by side. Also available is a rack mounting adapter kit for rack mounting one unit. One or two units use 5¼″ x 19″ of rack panel space with adapter kit. Full rack width cabinet option for one unit is available. Size of unit with this option is 5¼″ high x 17″ wide x 11″ deep and comes with rack mounting hardware.

SHIPPING WEIGHT: Approximately 12 lbs.

OPTIONS AVAILABLE: Full rack width cabinet with mounting hardware option; rechargeable battery option; BNC output terminal on rear panel option.

ACCESSORIES AVAILABLE: Dual adapter kit and rack mounting hardware; single unit adapter kit with rack mounting hardware and front and rear dummy panels; rechargeable battery adapter kit.

OPTIONS & ACCESSORIES FOR MODELS 602A/603A/610A & SERIES 624A

Adapter kit, single unit rack mounting (includes blank panel to make dual unit) ..... $ 56.00

Rechargeable battery kit $175.00

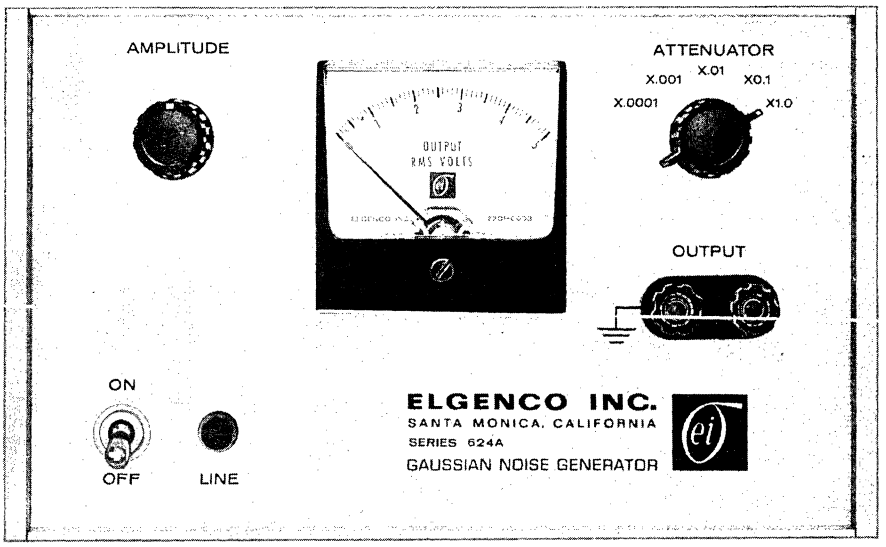
Pink filters ..... $ 49.00

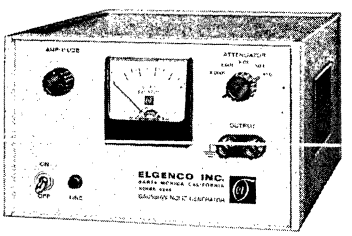
Rechargeable battery option .....add $165.00

Full rack width cabinet and rack mounting hardware option ....add $ 35.00

Adapter kit, dual unit and rack mounting hardware ..... $ 7.00

SERIES 624A FIXED RANGE • ALL SOLID STATE NOISE GENERATORS





SPECIFICATIONS • ALSO SEE FACING PAGE

FREQUENCY RANGES: See price list for a partial list of frequency ranges available.

RMS OUTPUT LEVEL: (Minimum value of maximum open circuit output) 3 volts.

OUTPUT IMPEDANCE: 200 ohms ±10%.

MAXIMUM LOAD: (on direct output) 700 ohms.

OUTPUT STEP ATTENUATOR: Five positions: X1.0, X0.1, X.01, X.001, and X.0001; calibrated to work into open circuit.

Accuracy: ±3%
Output Impedance: 200 ohms

SPECTRAL DENSITY: Approximate spectral density (mv$\sqrt{}$ Hz) for 1 volt RMS output.

Accuracy	Volts	Accuracy	Volts
20 kHz band	5.0	200 kHz band	1.6
50 kHz band	3.1	500 kHz band	1.0
100 kHz band	2.2		

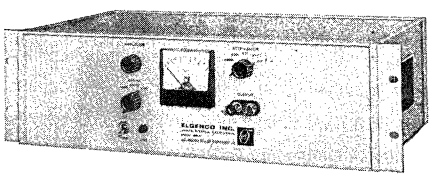
AMPLITUDE PROBABILITY DISTRIBUTION: Gaussian.

SPECIFICATIONS FOR SERIES 624A

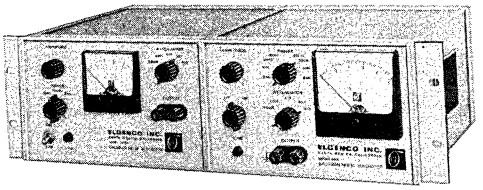
624A-11124	10 Hz to 20 kHz, ±1db	$390.00
-12124	20 Hz to 20 kHz, ±1db	$345.00
-15124	50 Hz to 20 kHz, ±1db	$335.00
-12224	200 Hz to 20 kHz, ±1db	$325.00
624A-11154	10 Hz to 50 kHz, ±1db	$410.00
-12154	20 Hz to 50 kHz, ±1db	$375.00
-15154	50 Hz to 50 kHz, ±1db	$355.00
-12254	200 Hz to 50 kHz, ±1db	$345.00
624A-11115	10 Hz to 100 kHz, ±1db	$430.00
-12115	20 Hz to 100 kHz, ±1db	$395.00
-15115	50 Hz to 100 kHz, ±1db	$375.00
-12215	200 Hz to 100 kHz, ±1db	$365.00
624A-11125	10 Hz to 200 kHz, ±1db	$480.00
-12125	20 Hz to 200 kHz, ±1db	$445.00
-15125	50 Hz to 200 kHz, ±1db	$425.00
-12225	200 Hz to 200 kHz, ±1db	$415.00

SPECIFICATIONS FOR SERIES 624A (Cont'd)

624A-11155	10 Hz to 500 kHz, ±1db	$500.00
-12155	20 Hz to 500 kHz, ±1db	$465.00
-15155	50 Hz to 500 kHz, ±1db	$445.00
-12255	200 Hz to 500 kHz, ±1db	$435.00
624A-21154	10 Hz to 50 kHz, ±2db	$390.00
-22154	20 Hz to 50 kHz, ±2db	$355.00
-25154	50 Hz to 50 kHz, ±2db	$335.00
-22254	200 Hz to 50 kHz, ±2db	$325.00
624A-21115	10 Hz to 100 kHz, ±2db	$395.00
-22115	20 Hz to 100 kHz, ±2db	$360.00
-25115	50 Hz to 100 kHz, ±2db	$340.00
-22215	200 Hz to 100 kHz, ±2db	$330.00
624A-21125	10 Hz to 200 kHz, ±2db	$410.00
-22125	20 Hz to 200 kHz, ±2db	$380.00
-25125	50 Hz to 200 kHz, ±2db	$360.00
-22225	200 Hz to 200 kHz, ±2db	$350.00
624A-21155	10 Hz to 500 kHz, ±2db	$430.00
-22155	20 Hz to 500 kHz, ±2db	$395.00
-25155	50 Hz to 500 kHz, ±2db	$375.00
-22255	200 Hz to 500 kHz, ±2db	$365.00
624A-31155	10 Hz to 500 kHz, ±3db	$390.00
-32155	20 Hz to 500 kHz, ±3db	$355.00
-35155	50 Hz to 500 kHz, ±3db	$335.00
-32255	200 Hz to 500 kHz, ±3db	$325.00
624A-51124	10 Hz to 20 kHz, ±½db	$515.00
-52124	20 Hz to 20 kHz, ±½db	$480.00
-55124	50 Hz to 20 kHz, ±½db	$460.00
-52224	200 Hz to 20 kHz, ±½db	$450.00
624A-51154	10 Hz to 50 kHz, ±½db	$530.00
-52154	20 Hz to 50 kHz, ±½db	$480.00
-55154	50 Hz to 50 kHz, ±½db	$460.00
-52254	200 Hz to 50 kHz, ±½db	$450.00
624A-51115	10 Hz to 100 kHz, ±½db	$555.00
-52115	20 Hz to 100 kHz, ±½db	$520.00
-55115	50 Hz to 100 kHz, ±½db	$500.00
-52215	200 Hz to 100 kHz, ±½db	$490.00
624A-51125	10 Hz to 200 kHz, ±½db	$605.00
-52125	20 Hz to 200 kHz, ±½db	$570.00
-55125	50 Hz to 200 kHz, ±½db	$550.00
-52225	200 Hz to 200 kHz, ±½db	$540.00
624A-51155	10 Hz to 500 kHz, ±½db	$625.00
-52155	20 Hz to 500 kHz, ±½db	$590.00
-55155	50 Hz to 500 kHz, ±½db	$570.00
-52255	200 Hz to 500 kHz, ±½db	$560.00



Model 602A with full rack width mounting option



Models 602A and 610A combined by dual unit adapter kit.

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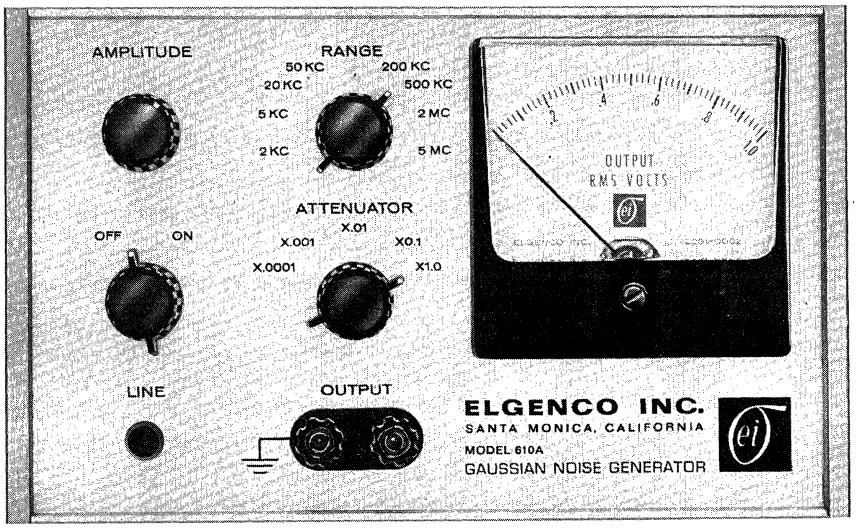
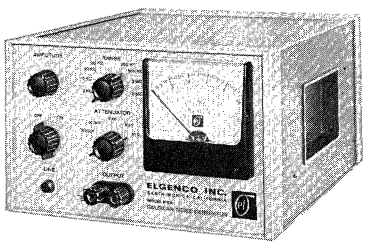
MODEL 610A • ALL SOLID STATE NOISE GENERATOR • 5Hz TO 5MHz





SPECIFICATIONS

FREQUENCY RANGES: Eight ranges selectably by front panel switch; 5 Hz to 2 kHz, 5 Hz to 5 kHz, 5 Hz to 20 kHz, 5 Hz to 50 kHz, 5 Hz to 200 kHz, 5 Hz to 500 kHz, 5 Hz to 2 mHz, and 5 Hz to 5 mHz.

OUTPUT SPECTRUM: Uniform to ±0.5 db from 10 Hz to 500 kHz and ±2.0 db from 500 kHz to 5 mHz.

OUTPUT LEVEL: 0 to 1 volt RMS, adjustable by front panel amplitude control. A dynamic range of 5 to 1 peak to RMS value is provided.

OUTPUT STEP ATTENUATOR: Five positions; X1.0, X0.1, X.01, X.001, X.0001. Accuracy ±0.1 db to 500 kHz; ±0.25 db to 5 mHz.

SPECTRAL DENSITY: Approximate spectral density for 1 volt RMS output.

Band	volts/√ Hz	Band	volts/√ Hz
2 kHz	1.75×10^{-2}	200 kHz	1.75×10^{-3}
5 kHz	1.1×10^{-2}	500 kHz	1.1×10^{-3}
20 kHz	5.5×10^{-3}	2 mHz	5.5×10^{-4}
50 kHz	3.5×10^{-3}	5 mHz	3×10^{-4}

AMPLITUDE PROBABILITY DISTRIBUTION: Symmetrical Gaussian Distribution all ranges.

OUTPUT METER: Meter reads 0 to 1 volt RMS. Accuracy ±2% of full scale to 2 mHz; ±5% to 5 mHz.

MAXIMUM LOAD: 500 ohms on direct output.

OUTPUT IMPEDANCE: Approximately 50 ohms direct output. Step attenuated output 50 ohms ±1%.

POWER SUPPLY: Built-in highly regulated dc supply.

POWER REQUIREMENTS: 115/230 volts ±10/20 volts, 50 to 1,000 Hertz ac; approximately 7 watts. A rechargeable power option is available. Battery is recharged by operating unit on ac line.

DIMENSIONS: 5¼" high x 8⅝" wide x 11" deep.

RACK MOUNT: A rack mounting adapter kit is available for rack mounting two units side by side. Also available is a rack mounting adapter kit for rack mounting one unit. One or two units use 5¼" x 19" of rack panel space with adapter kit. Full rack width cabinet option for one unit is available. Size of unit with this option is 5¼" high x 17" wide x 11" deep and comes with rack mounting hardware.

SHIPPING WEIGHT: Approximately 14 lbs.

PRICE: $1,275.00.

MODELS 632A/631A • ALL SOLID STATE NOISE GENERATORS

Model 632A Dual Output DC to 400 Hz and 5 Hz to 40 kHz.....**$2,595**

LOW FREQUENCY OUTPUT

AMPLITUDE PROBABILITY DISTRIBUTION: Gaussian ±1.0%.
OUTPUT SPECTRUM: Uniform ±0.1 db from DC to 350 Hz.

MAXIMUM OUTPUT: 1.0 volts rms. A dynamic range of 5 to 1 peak to rms value is provided.

MAXIMUM SPECTRAL DENSITY: Approx. 1.5×10^{-3} volts²/Hz.

OUTPUT MEAN: Less than 5 mv.

OUTPUT IMPEDANCE: Approximately 1,000 ohms.

HIGH FREQUENCY OUTPUT

AMPLITUDE PROBABILITY DISTRIBUTION: Gaussian ±2%.

OUTPUT SPECTRUM: Uniform ±0.5 db from 10 to 35,000 Hz.

MAXIMUM OUTPUT: 1.0 volts rms. A dynamic range of 5 to 1 peak to rms values is provided.

MAXIMUM SPECTRAL DENSITY: Approx. 2×10^{-5} volts²/Hz.

OUTPUT MEAN: Less than 1 mv.

OUTPUT IMPEDANCE: Approximately 100 ohms.

NOISE REGULATOR: rms output level continuously stabilized against a reference voltage.

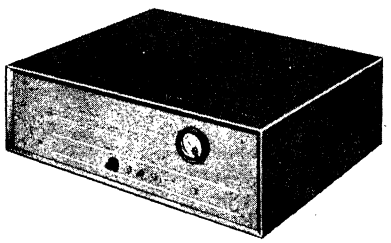
OVERLOAD INDICATOR: Panel overload indicator lights when input noise level to regulator is out of regulation range.

POWER: 115/230 volts ±10/20 volts, 50 to 1,000 Hertz ac.

DIMENSIONS: 5¼" high x 17" wide x 11" deep. 19" wide with rack mounting flanges mounted (supplied).

Model 631A 5 Hz to 40 kHz **$1,645**

MODELS 301A/321A/331A/311A/312A • VACUUM TUBE NOISE GENERATORS



Model 301A DC to 40 Hz **$2,195**

AMPLITUDE PROBABILITY DISTRIBUTION: Gaussian ±1%.

OUTPUT SPECTRUM: Uniform ±0.1 db from 0 to 35 Hz.

MAX. OUTPUT: 12 volts rms into a 1 megohm input resistance. Dynamic range of 5 to 1 peak-to-rms is provided.

D.C. UNBALANCE: Less than 50 mv.

NOISE REGULATOR: rms output level continuously stabilized against a reference voltage.

POWER: 115/230 volts ±10/20 volts, 50 to 1,000 Hertz, ac.

MOUNTING: Standard relay rack panel 7″ high x 19″ wide. Can be supplied in deluxe cabinet as shown for $75.00 extra.

Model 321A DC to 120 Hz **$2,295**

OUTPUT SPECTRUM: Uniform ±0.1db from 0 to 105 Hz.

MAX. SPECTRAL DENSITY: Approx. 1.0 volts²/Hz.

OTHER SPECIFICATIONS SAME AS MODEL 301A

Model 331A 5 Hz to 20 kHz **$1,395**

OUTPUT SPECTRUM: Uniform to plus or minus 0.5 db from 10 to 20,000 Hz.

OUTPUT LEVEL: 0 to 5 volts rms, adjustable by self contained attenuator. A dynamic range of 7 to 1 peak to rms value is provided.

SPECTRAL DENSITY: Approx. 1 mv/$\sqrt{}$Hz for 5 volt rms output.

AMPLITUDE PROBABILITY DISTRIBUTION: Gaussian ±1%.

NOISE REGULATOR: rms output level continuously stabilized against a zener reference voltage.

OVERLOAD INDICATOR: Panel overload indicator lights when input noise level to regulator is out of regulation range.

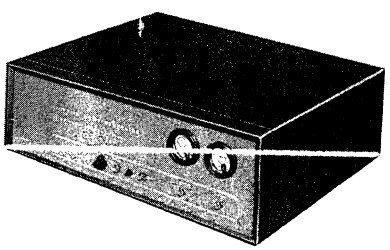
OUTPUT METER: 0 to 5 volts rms.

MAX. LOAD: 10,000 ohms.

POWER REQUIREMENTS: 115/230 volts ±10/20 volts, 50 to 1,000 Hertz ac.

MOUNTING: Standard relay rack panel 7″ high x 19″ wide and is 15″ deep. Can be supplied in deluxe cabinet as shown for $75.00 extra.

Model 331A-23 5 Hz to 2 kHz **$1,495**
Model 331A-53 5 Hz to 5 kHz **$1,495**
Model 331A-54 5 Hz to 50 kHz **$1,495**
Model 331A-25 5 Hz to 200 kHz **$1,595**
Model 331A-55 5 Hz to 500 kHz **$1,745**



Model 311A Dual Output DC to 40 Hz and 5 Hz to 20 kHz **$2,595**

LOW FREQUENCY OUTPUT

AMPLITUDE PROBABILITY DISTRIBUTION: Gaussian ±1%.

OUTPUT SPECTRUM: Uniform ±0.1 db from 0 to 35 Hz.

MAX. OUTPUT: 12 volts rms into a 1 megohm input resistance. Dynamic range of 5 to 1 peak-to-rms is provided.

MAX. SPECTRAL DENSITY: Approx. 2.5 volts²/Hz.

D.C. UNBALANCE: Less than 50 mv.

HIGH FREQUENCY OUTPUT

AMPLITUDE PROBABILITY DISTRIBUTION: Gaussian ±2%.

OUTPUT SPECTRUM: Uniform ±0.5 db from 10 to 20,000 Hz.

MAX. OUTPUT: 15 volts rms.

MAX. SPECTRAL DENSITY: 7.5 x 10^{-3} volts²/Hz.

NOISE REGULATOR: rms output level continuously stabilized against a reference voltage.

OVERLOAD INDICATOR: Panel overload indicator lights when input noise level to regulator is out of regulation range.

POWER: 115 v. ±10 v, 50/60 Hertz ac.

MOUNTING: Standard relay rack panel 7″ high x 19″ wide. Deluxe cabinet as shown not available.

Model 312A Dual Output DC to 120 Hz and 5 Hz to 20 kHz **$2,695**

CALL or WRITE for individual Data Sheets on VACUUM TUBE NOISE GENERATORS.

NEW Available August 1971

10 KHz TO 30 MHz
ALL SOLID STATE
NOISE GENERATOR

PRELIMINARY SPECIFICATIONS

OUTPUT SPECTRUM: Uniform within ±1.0 db from 10 kHz to 30 mHz.

AMPLITUDE PROBABILITY DISTRIBUTION: Gaussian.

MAX. OUTPUT LEVEL: 3 VRMS open circuit, 1.5 VRMS into 50 ohms.

OUTPUT IMPEDANCE: 50 ohms.

AMPLITUDE CONTROL: Continuously variable.

STEP ATTENUATOR: 0 to 80 db in 10 db steps.

PRELIMINARY PRICE: $795.00.

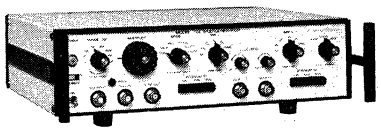
NEW Available May 1971

VERY HIGH FREQUENCY
NOISE SOURCE MODULES

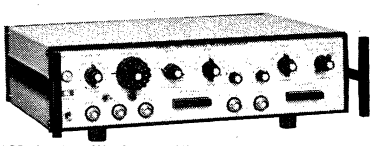
2 mHz to 30 mHz, ±3 db .....$ 99.00
2 mHz to 30 mHz, ±2 db $129.00
2 mHz to 30 mHz, ±1.5 db $179.00
2 mHz to 30 mHz, ±1.0 db $249.00
2 mHz to 30 mHz, ±0.5 db $349.00
2 mHz to 45 mHz, ±3 db $129.00
2 mHz to 45 mHz, ±2 db $179.00
2 mHz to 45 mHz, ±1.5 db $249.00
2 mHz to 45 mHz, ±1.0 db $349.00
2 mHz to 45 mHz, ±0.5 db $479.00
2 mHz to 50 mHz, ±3 db $179.00
2 mHz to 50 mHz, ±2 db $249.00
2 mHz to 50 mHz, ±1.5 db $349.00
2 mHz to 50 mHz, ±1.0 db $479.00
2 mHz to 50 mHz, ±0.5 db $639.00
2 mHz to 100 mHz, ±3 db $249.00
2 mHz to 100 mHz, ±2 db $349.00
2 mHz to 100 mHz, ±1.5 db $479.00
2 mHz to 100 mHz, ±1.0 db $639.00

For 1 mHz lower end: add $25 for ±1 db, ±1.5 db, ±2 db, and ±3 db units; add $50 for ±0.5 db units.

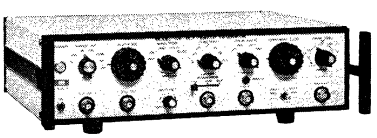
EXACT WAVEFORM GENERATORS



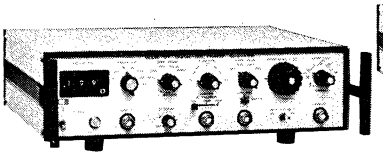
MODEL 124 MULTIGENERATOR $595
Waveforms including normal sine, square and triangle, plus and minus sine, square and pulse, haversines, burst, single shot, sweep symmetrically up and down. Dual output amplifiers, dual generators, 1000:1 VCF, frequency range 0.1 Hz to 5 MHz, 80 db attenuation.



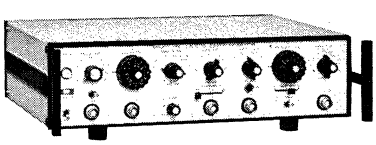
MODEL 125 LIN-LOG MULTIGENERATOR $795
Both linear and logarithmic sweep modes are provided in addition to normal sine, square and triangle, plus and minus sine, square and pulse, haversine, burst and single shot. Dual output amplifiers, dual generators, 1000:1 VCF, 0.1 Hz to 5 MHz frequency, 80 db attenuation. Sweep 20 Hz to 20 kHz in one range.



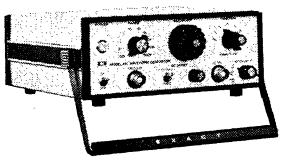
MODEL 126 VCF/SWEEP GENERATOR.....$495
Two-in-one instrument with main generator used for sine, square, triangle, pulse and sync, plus a ramp generator for sweeping or triggering main generator. 0.1 Hz-to-3 MHz bandwidth, 1000:1 sweep range, variable start/stop, search mode, Kelvin-Varley controls.



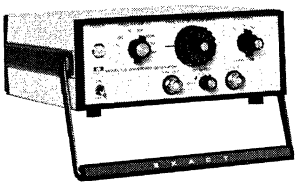
MODEL 127 DIGITAL-DIAL/SWEEP GENERATOR $645
Same features as Model 126 with a 1 per cent three-digit dial frequency control for the sine, square and triangle generator.



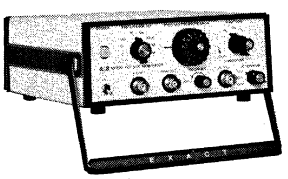
MODEL 128 VCF LIN-LOG SWEEP GENERATOR $695
Same features as Model 126 except both linear and logarithmic sweep capability is provided. A V:f (voltage proportional to frequency) output gives a voltage directly related to frequency for marker applications for X axis drive in plots. A ramp-hold mode also is provided; and 20 Hz to 20 kHz can be swept in one range.



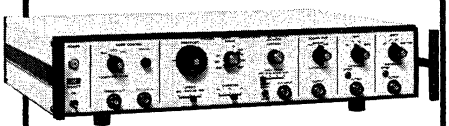
MODEL 100 MINIATURE WAVEFORM GENERATOR $495
Sine, square, triangle, ramp, pulse and sync pulse waveforms. Frequency range 0.001 Hz to 5 MHz. Variable ±5 V D.C. offset. 70 db attenuation in 20 db steps with 30 db variable. 30 V P-P (15 V into 50 ohms) output voltage. Kelvin-Varley control.



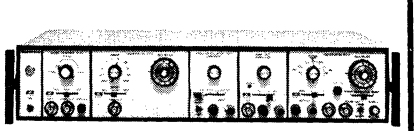
MODEL 120 LOW-COST WAVEFORM GENERATOR $295
Sine, square, triangle and sync pulse waveforms. 0.1 Hz to 3 MHz frequency range. Kelvin-Varley frequency control. 1000:1 manual search mode for manually sweeping over 3 decades. ±10 V variable D.C. offset. Floating output provision. 20 V P-P (10 V into 50 ohms) output voltage.



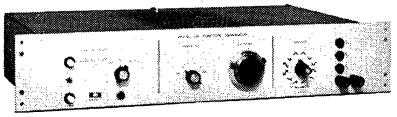
MODEL 123 VCF WAVEFORM GENERATOR....$345
Sine, square, triangle and sync pulse waveforms. 0.1 Hz to 3 MHz frequency range. 20 V P-P open circuit (10 V into 50 ohms) output voltage. 60 db attenuation in 20 db steps with 20 db variable. Voltage controlled frequency (VCF) with 1000:1 range. 1000:1 manual sweep. ±10 V variable D.C. offset.



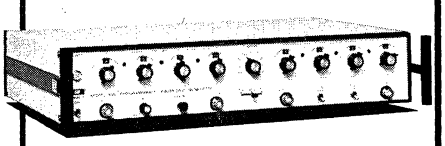
MODEL 500B SERIES GENERATORS—$495 to $645
Basic Model 500B produces sine, square (bipolar, pos or neg), triangle, ramp and pulse waveforms. 0.0001 Hz to 1 MHz frequency range. Variable ±4 V D.C. offset. Floating output. Model 500B is $495. Model 503B has VCF, costs $545. Model 504B has external gating and triggering, costs $565. Model 505B has VCF, gating and triggering, costs $645.



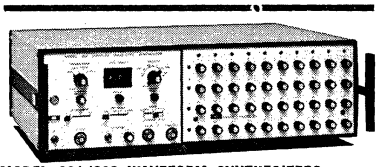
SERIES 5000 MODULAR SYSTEM
System begins with basic cabinet with power supply and has seven module spaces. Modules available include several generators and amplifiers, a modulator and a mode control unit. The Exact system concept permits wide-ranging custom systems for countless applications.



SERIES 330 MECHANICAL TESTING GENERATORS from $1,495
The 330 series produces positive and negative square, positive and negative triangle, sine, inverted sine, haversine, inverted haversine, positive and negative ramp and plus and minus hold ramp. Frequency range 0.001 Hz to 1 kHz, with 0.0001 Hz option. Model 330 is basic instrument. Model 331 adds external programming, Model 332 has quadrature outputs, Model 333 has both programming and quadrature.



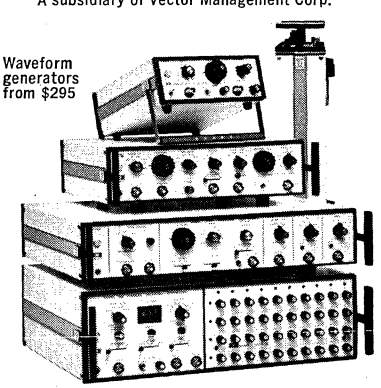
MODEL 605/606 PROGRAMMABLE GENERATOR from $1,250
Remote or local programming of frequency, waveform, amplitude, trigger, gate D.C. offset and phase. Sine, square, triangle, ramp and pulse waveforms. Inputs compatible with DTL, TTL, or contact closure. Frequency 0.001 Hz to 1.1 MHz. Model 605 with remote and local programming $1,450. Model 606 with remote programming only $1,250.



MODEL 201/202 WAVEFORM SYNTHESIZERS
Electrically generates complex waveforms in a bit-by-bit manner, each bit independently controlled in amplitude, width and slope. Applications include signals for shock table drives, medical simulation, telemetry, waveform analysis, distortion studies and compensation for distortion and non-linearity. Model 202 has same capabilities as Model 201 with the addition of a cycle length counter. From $1,995 with programmer.

EXACT®
electronics, inc.
Box 160, Hillsboro, Oregon 97123
Telephone (503) 648-6661, TWX 910-460-8811
A subsidiary of Vector Management Corp.

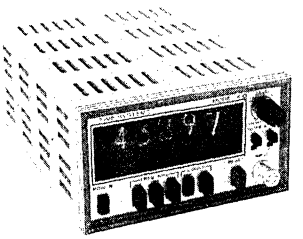
Waveform generators from $295



FARATRON

FARATRON CORPORATION
290 LODI STREET
HACKENSACK, N.J. 07601
(201) 488-1440
710-990-5022

COMPACT LOW COST COUNTERS (Less than $80.00 per digit)

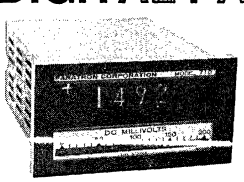


SPECIAL FEATURES

- BUFFERED BCD OUTPUTS
- SENSITIVITY: 100 μV
- FULLY PROGRAMMABLE
- INPUT SIGNAL CONDITIONING CONTROLS
- COUNT TOTALIZER
- RATIO
- DISPLAY STORAGE
- THREE TIME BASES WITH NO "DEAD TIME"
- DIMENSIONS: 2.75″ X 4.9″ X 7″

Model	Description
410-1	2 HZ TO 200 KHZ, 4½ DIGIT, 60 HZ POWER LINE TIME BASE
410-2	2 HZ TO 2 MHZ, 5½ DIGITS, 60 HZ POWER LINE TIME BASE
410-3	2 HZ TO 200 KHZ, 4½ DIGIT, CRYSTAL OSCILLATOR
410-4	2 HZ TO 2 MHZ, 5½ DIGIT, CRYSTAL OSCILLATOR

DIGITAL PANEL METERS (3 1/2 digits)



SPECIAL FEATURES (single range meters)

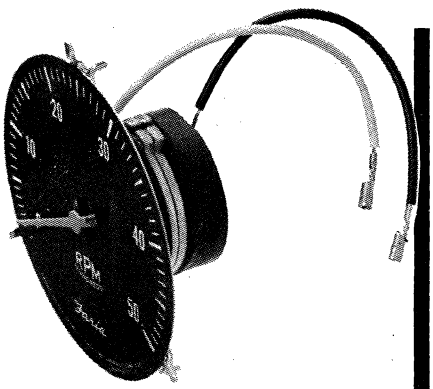
- ISOLATED/BUFFERED BCD OUTPUTS
- RESOLUTION AS LOW AS 100 μv
- INPUT OFFSET CURRENT $<$ 100 PICO AMPS
- AUTOPOLARITY
- 100% OVERRANGING DIGIT
- DIMENSIONS: 3″ X 5.6″ X 7″
- NOTES:
  - (A) MODEL 710 COMES AS A SINGLE RANGE UNIT INCLUDING LITE NEEDLE "ANALOG" READOUT.
  - (B) MODELS 710 AND 711 ARE AVAILABLE IN 5 RANGES FROM 199.9 MV TO 1.1 KV
  - (C) UNIT IS AVAILABLE IN A LOWER COST VERSION WITHOUT BCD AS THE MODEL 700 (IN THE SAME RANGES AS THE MODEL 710)
  - (D) ALL PANEL METERS AVAILABLE AS AMMETERS WITH RANGES FROM 1.999 μa to 199.9 MA

SPECIAL FEATURES (multirange meters)

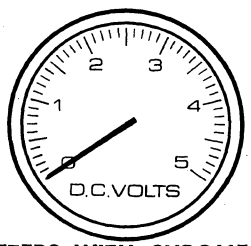
- ISOLATED/BUFFERED BCD OUTPUTS
- RESOLUTION AS LOW AS 100 μv
- INPUT OFFSET CURRENT $<$ 100 PICO AMPS
- AUTOPOLARITY
- 100% OVERRANGING DIGIT
- DIMENSIONS: 3″ X 5.6″ X 7″
- NOTES:
  - (A) MODEL 713 IS AVAILABLE IN RANGES FROM 1.999 V TO 1.1 KV
  - (B) UNIT IS AVAILABLE IN A LOWER COST VERSION WITHOUT BCD AS MODEL 703 (IN THE SAME RANGES AS MODEL 713)
  - (C) MODEL 704 MULTIRANGE DC AMMETER IS AVAILABLE WITH RANGES FROM 1.999 μa TO 199.9 MA

FARIA 250° METERS

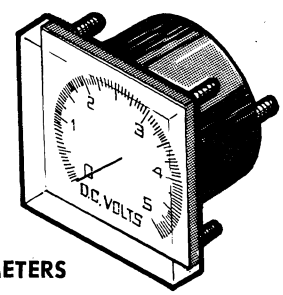
COST THE SAME AS ORDINARY 100° METERS!!!



METER MOVEMENTS
MODEL 1101



ROUND
PANEL METERS WITH CHROME BEZELS, AUTOMOTIVE STYLING
2" MODEL 1102
3" MODEL 1103
4" MODEL 1104
HERMETICALLY SEALED TO 5 PSI WITH INTERNAL LIGHTING



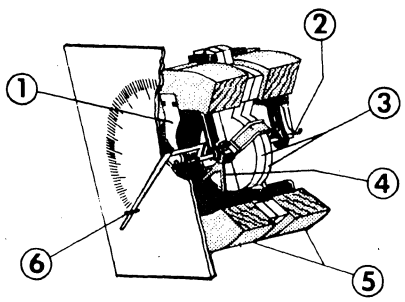
SQUARE
PANEL METERS
2½" MODEL 1105
3½" MODEL 1106
— ASA DIMENSIONS —

GET 2-1/2 TIMES GREATER READABILITY—AT THE SAME PRICE!!!

TYPICAL RANGES AVAILABLE

Range	Resistance	Part No.
50 ua	5,770	xxxx-1-101
100 ua	3,280	xxxx-1-102
200 ua	1,370	xxxx-1-103
500 ua	596	xxxx-1-105
1 MA	233	xxxx-1-200
5 MA	28	xxxx-1-201
10 MA	14	xxxx-1-202
50 MA	3.7	xxxx-1-203
1 A(DC)	50 MV	xxxx-1-400
5 A(DC)	50 MV	xxxx-1-402
10 A(DC)	50 MV	xxxx-1-403
25 A(DC)	50 MV	xxxx-1-404
50 A(DC)	50 MV	xxxx-1-405
5 DCV	1,000 ohms/volt	xxxx-1-300
10 DCV	1,000 ohms/volt	xxxx-1-301
25 DCV	1,000 ohms/volt	xxxx-1-303
50 DCV	1,000 ohms/volt	xxxx-1-304
100 DCV	1,000 ohms/volt	xxxx-1-305
150 DCV	1,000 ohms/volt	xxxx-1-306
500 DCV	1,000 ohms/volt	xxxx-1-307
150 ACV(Rect)	1,000 ohms/volt	xxxx-2-501
300 ACV(Rect)	1,000 ohms/volt	xxxx-2-502
500 ACV(Rect)	1,000 ohms/volt	xxxx-2-503

SPECIAL RANGES NOT SHOWN AND CUSTOM DIALS ARE AVAILABLE. CONSULT FACTORY. TO ORDER RANGES SHOWN ABOVE SPECIFY 4 DIGIT MODEL NUMBER AND PART NUMBER.



1. Tension member assures constant band tension while absorbing shock and vibration to prevent band breakage.

2. Strong taut-band eliminates friction and will withstand heavy shock and vibration without damage.

3. Pole piece design assures uniform flux density from 0 to 250° deflection for better tracking.

4. Unique balance weight design assures proper balance even after heavy shock and vibration. No weight wires to shift as on other meters.

5. Large berrium ferrite magnet provides 40% more flux density than other "core magnet" designs for better torque.

6. Movement is suppressed slightly against stop peg to eliminate zero adjust. Pointer is always at zero in any position.

Field proven in the most rugged automotive and snowmobile OEM applications, this high performance 250° meter movement is featured in all the case styles shown at left. Wrtie or call for data sheets and prices today!

Faria Meter Corporation

19 FARIA LANE, UNCASVILLE, CONNECTICUT 06382
(203) 848-9271

FREQUENCY PRODUCTS

INSTRUMENTS

High Stability Frequency Standards

Digital Phase Comparators

High Performance Distribution Amplifiers

High Stability Portable Clocks

High Precision Low Frequency Variable Oscillators

OSCILLATORS

High Stability Crystal Oscillators
Oven Proportionally Controlled

Sub-Miniature Crystal Oscillators
No Ovens Utilized

High Stability Crystal Oscillators
Low Power Oven

High Precision Crystal Oscillators
Frequency Voltage Controlled

Temperature Compensated Oscillators

High Stability Proportional Ovens

Linear Discriminators

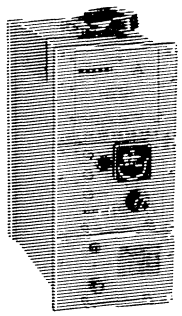
SEND FOR COMPLETE CATALOG C

FREQUENCY ELECTRONICS, INC.

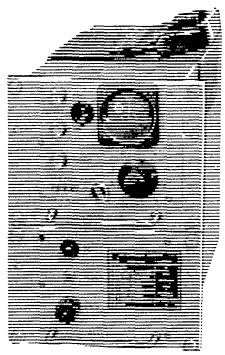
Where Time/Frequency is a unique dimension

3 Delaware Drive,
New Hyde Park, N. Y. 11040
(516) 328-0100

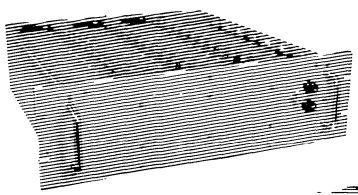
INSTRUMENTATION



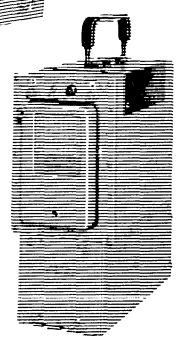
PORTABLE DIGITAL CLOCKS



HIGH STABILITY FREQUENCY STANDARDS

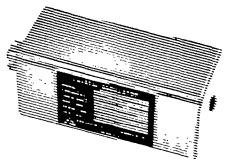


DISTRIBUTION AMPLIFIERS

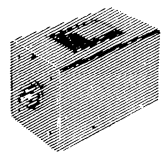


DIGITAL PHASE COMPARATORS

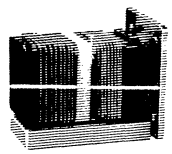
COMPONENTS



CRYSTAL OSCILLATORS

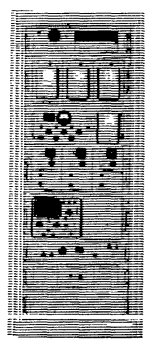


LINEAR DISCRIMINATORS



PROPORTIONAL OVENS

SYSTEMS



FREQUENCY-TIME STANDARD

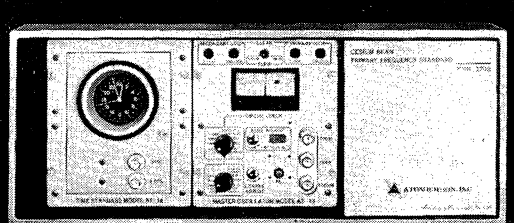
and now... Precision Frequency Standards *by* Atomichron® MODEL 3702

CESIUM BEAM PRIMARY TIME AND FREQUENCY STANDARD

Atomic and UTC Time Scales

Model 3702 Atomichron is a compact, solid-state, self-contained, cesium-beam primary time and frequency standard, designed for scientific, industrial and military applications. The 3702 provides output frequencies accurate to ± 1 parts in 10^{11} for the life of the cesium beam resonator, with a 1,000 second stability of ± 3 parts in 10^{12} rms.

Standard output frequencies are 5 MHz, 1.0 MHz and 100 kHz. A time standard option provides a synchronizable and adjustable 1 pps output and a 24 hour clock. The Model 3702 features time scale selection and settability to 3×10^{-13} without C-field adjustment.



MODEL 3702
with Option I

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digital multimeters and voltmeters

A New Approach to the Digital Voltmeter

Fluke digital multimeters and voltmeters are the first instruments to use the recirculating remainder analog to digital technique. This circuit discipline results in a number of benefits which, in total, yield the most reliable, flexible and lowest cost family of digital voltmeters and multimeters ever built. Among them are low parts count for reliability, fast speed for easy systems use, high common mode and normal mode rejection for excellent isolation and total quality of measurement, low power consumption for reliability and portability, and isolated data output with an easy to convert BCD code with DTL and TTL logic levels. Timeouts, flags and serial acquisition make the recirculating remainder technique the most systems compatible. Most options can be added in the field at any time.

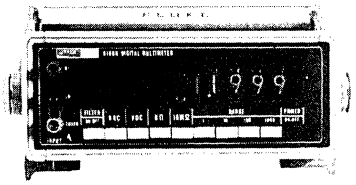
Basic specifications

Model	8100A	8110A	8120A	8200A	8300A	8400
DC Volts Range	110,100, 1000	1,10,100, 1000	0.1, 1, 10, 100, 1000	1,10,100, 1000	10,100,1000	0.1,1,10,100, 1000
90 day Accuracy%	0.02	0.01	0.02	0.01	0.01	0.004
AC Volts Range	1,10,100, 1000	1,10,100, 1000	0.1, 1, 10, 100, 1000	1,10,100, 1000	1,10,100, 1000	1,10,100, 1000
90 day Accuracy%	0.2*	0.2*	0.2*	0.1*	0.1*	0.05*
Ohms Range	1K,10K,100K, 10M	1K,10K,100K, 1000K, 10M	1K,10K,100K, 1000K,10M	100,1K,10K, 100K,1000K, 10M	1K,10K,100K, 1000K,10M	10,100,1000, 10,000,100K, 1000K,10,000K
90 day Accuracy%	0.1	0.02**	0.1	.02**	0.01**	0.01**
Price	$695	$850	$795****	$995	$1395	$2450
Options						
Rechargeable Battery	$100	$100	$100			
Printer Output	$225	$225		$200		
AC Converter				$250	$ 495	$ 750
MV Converter				$200	$ 395	
Ohms Converter				$200		$ 250
Parallel Rear Input				$ 40	$ 40	$ 40
Data Output				$400	$ 500	$ 500
Remote Control				$200	$ 200	$ 200
DC External Ref. Ratio				$150	$ 200	$ 200
AC External Ref. Ratio					$ 700	$ 700

*AC accuracies reduced below 50Hz and above 20KHz.
**.05% on 10M range.
***0.1/year on 10M
****Includes AC and DC current ranges of 100 μamps to 1 amp.

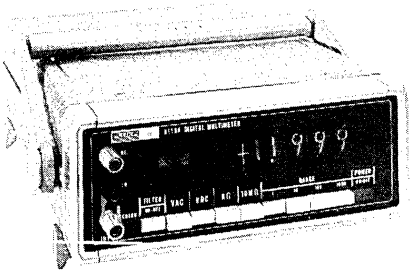
Digital Multimeters, Models 8100A, 8110A, and 8120A

The Model 8100A 0.02% Digital Multimeter measures AC and DC volts in four ranges to 1200 volts. Ohms are measured in five ranges to 12 megohms. Optional rechargeable battery pack provides true portability. Polarity indication is automatic. An active two pole digital filter provides more accurate measurements of noisy DC. Four full digits plus "1" for 20% overranging are offered. All functions are push button selectable.



For increased accuracy at a modest increase in price, Fluke offers the Model 8110A. Measurement capability and other features are the same as the Model 8100A with these exceptions. The model 8110A is guaranteed to remain within specification without recalibration over a broad temperature range for six months. Six month accuracy for DC is ±(0.01% of reading + 0.02% of range). AC and resistance accuracies are ±0.2% and ±0.02%.

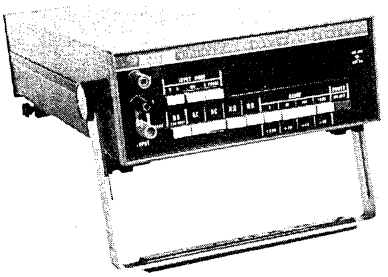
The Fluke 8110A won't fail when you overload it. Take off the overload and the instrument returns to normal. Weighing only 10 pounds, the 8110A gives you true portability for up to eight hours continuous operation with the optional rechargeable battery.



Newest digital multimeter in the Fluke line, the Model 8120A, is especially well suited for both the field and lab applications. In addition to measuring AC, DC, and resistance in the same ranges as the Model 8100A, the Model 8120A has 100 mV AC & DC ranges and measures AC and DC current.

DC current can be measured in five ranges, 0.1 ma, 1 ma, 10 ma, 100 ma, and 1000 ma with 20% overranging to an accuracy of ±(0.15% of reading + 0.15% range)/year. AC current can be measured over the same ranges and overranging to a midband accuracy of ±(0.3% reading + 0.2% range)/year. In both cases 100% overload can be handled on each range.

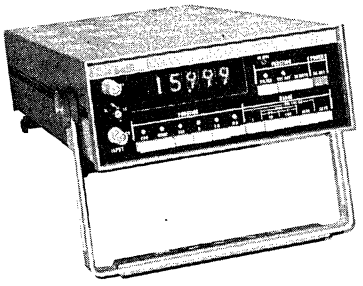
The AC/DC high voltage probe permits measurements up to 5000 volts with a ratio accuracy of 2%/year. A dual range clip-on current sensor can be used to measure currents from 0 to 10 amperes or 0 to 100 amperes DC or AC to an accuracy of ±0.5%/year.



Digital Voltmeters, Models 8200A, 8300A, 8400A, 8125A and 8425A

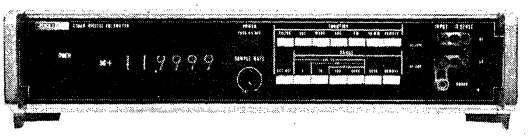
The Fluke 8200A is a fast new systems DVM with a sampling rate of 400 samples per second and 60% overranging. Standard features include autoranging (millivolts through volts and ohms through megohms), 1 millisecond sample and hold, half-rack width of 3½" high modular construction with vertical plug-in boards, switchable filter in volts and millivolts, DC capability from 100 microvolts to 1100 volts, full guarding for 140 dB common mode rejection DC to 60 Hz, 2 millisecond response time, and overload proof design.

Options include two ranges of millivolts for 1 microvolt resolution, six ranges for measurements from 10 milliohms to 16 megohms, four ranges of AC, true four wire ratio, isolated digital or printer output, and isolated remote control with memory for direct computer interface.



Fluke's Model 8300A is a 0.005% digital voltmeter with built-in systems capability. The basic unit measures 0 to 1100 volts DC in three ranges. Readout is five digits plus "1" for 20% overranging. Other features include 25 ms sampling speed, full guarding with 140 dB common mode rejection, NMRR to 60 dB (50 Hz up), automatic ranging and polarity, an active 3 pole switchable filter with a 60 Hz notch, full systems capability with timing signals, ready indicators and flags, DTL-TTL compatibility, data output and programming.

Options include AC voltage measurement in four ranges, the millivolt and ohms option is on one board, external reference for bipolar ratio measurement, fully isolated remote programming and data outputs, and AC ratio.



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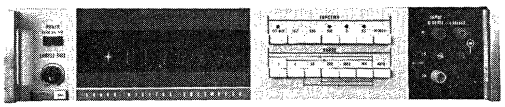
A systems DVM with "state of the art" accuracy, the new Fluke 8400A features five ranges of DC from 0.1V FS to 1,000V with 0.004% accuracy for 90 days and 0.01% for one year guaranteed. Readout is five full digits plus "1" for 20% overrange. Resolution is 1 uv. Reading speed is 33 per second with a 3 ms aperture sample and hold. A switchable filter on all ranges provides better than 65 dB noise rejection.

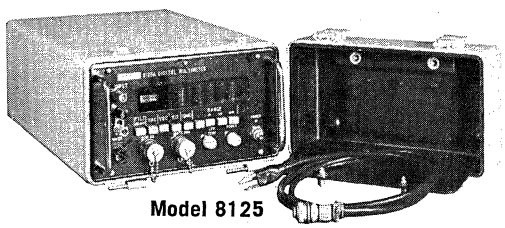
Options include seven ranges of 4 terminal resistance from 10 ohms to 10,000K ohms, four ranges of AC from 1 to 1,000 volts with 0.05% accuracy to 10KHz, AC/AC ratio and 4-wire DC/DC ratio, isolated data output, and memory for remote control instructions for computer communication.



Mil-Spec DVMs

The Model 8125A is the only 4½ digit military digital voltmeter on the market. Housed in a MIL-T-21200 combination case, it is both light and portable, featuring battery operation above O°C. It is qualified to Class II, flightline use of MIL-T-21200H. It meets all of the electrical specifications of the Fluke 8110A described above, with provision for battery and data output functions.

The Model 8425A Digital Voltmeter is a militarized version of the Fluke 8400A. It meets all of the electrical specifications and has provision for all of the Fluke 8400A options. It meets the same Milspecs as the Model 8125 and is housed in a similar case.



Model 8125

DVM/Multimeter Accessories

A number of matched accessories are available to make your Fluke meter more useful.

The Model A90 Current Shunt allows AC/DC current measurements up to 10 amperes. Price is $255.

High voltage probes extend measurement capabilities. Priced at $275, the Model 80F-5 extends measurement to 5000 volts. Model 80F-15 works to 15,000 volts DC. Price is $325. For frequency response from 10 kHz to 700 MHz, Fluke offers the Model 80RF Probe at $75.

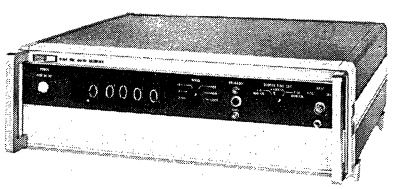
A dust cover is available for $10 and fiberglass carrying case for $100. The rack mounting kit is priced at $25.

true RMS voltmeters

RMS Digital Voltmeters - Model 9500A

The 9500A precisely measures the true RMS value of any signal up to 1100 volts. Decimal and calibration are automatic. Both display time and range may be varied by means of front panel control.

Voltage Range: 1mv to 1100V RMS
Accuracy: ±(0.05% of input + 0.015% of range) from 50 Hz to 10 kHz. Reduced accuracy specifications from 20 Hz to 700 kHz.
Frequency: 20Hz to 700 kHz
Input Resistance: 1 megohm shunted by 17 pf
Input Power: 115/230 VAC, 50-440 Hz
Price: $2485., Data output option, $195.

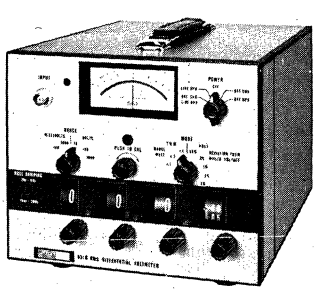


RMS Differential Voltmeter - Model 931B

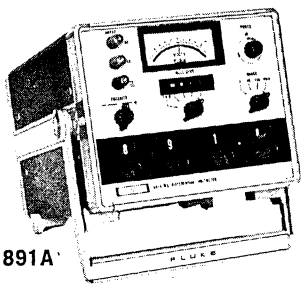
The Model 931B combines the advantages of a true RMS voltmeter for accurate measurement without waveform error and the null balance accuracy of a differential voltmeter.

Voltage Range:
Differential Mode: 0.01 to 1100V RMS in 5 ranges
Direct Mode: 0.003 to 1100V RMS in 11 ranges
Crest Factor: (Differential Mode) 10, 1500 volts peak
Input Power: 115/230V AC, 50-440 Hz
Input Impedance: 1 megohm shunted by less than 8 pf

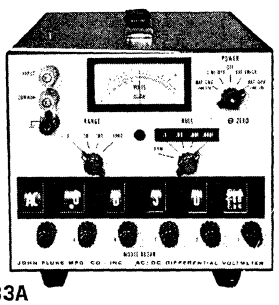
Accuracy:
Differential Mode: ±(0.05% of reading + 0.005% of range) from 30 Hz to 50 kHz. Reduced accuracy specifications from 1 Hz to 1 MHz.
Direct Mode: ±3% of end scale
Price: $995.



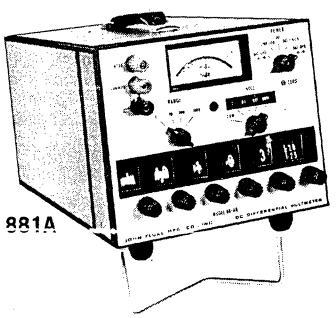
differential voltmeters



Model 891A



Model 883A



Model 881A

Fluke solid state AC/DC and DC differential voltmeters offer the widest range for performance and accuracy in the market. Most units operate from either internal rechargeable batteries or 115/230V, 50-440Hz line power. Battery power is essential for measurement where maximum accuracy demands complete line isolation. Input ranges are 1, 10, 100 and 1000V each with 10% overranging. Fluke differential voltmeters are electrically and mechanically designed to perform under the extremes of temperature, shock, vibration and humidity. The internal reference voltage is developed from matched zener diodes that are selected to establish excellent stability, tracking and temperature coefficient parameters. Fluke manufacturers all of the precision wire-wound resistors used in these instruments. The all solid-state differential voltmeters are lightweight for portability. They are provided with a tilt-back bail, or functional detented handle for operator convenience. Recorder output is available on all Fluke differential voltmeters. All Fluke differential voltmeters accept 115 or 230 VAC.

Model	Input Range	% of Input Accuracy DC	AC	Frequency Range	Max. Full Scale Sensitivity	Max Meter Resolution	Price
881AB[2]	0-1100V	±0.005			100 μv	1 μv	881AB - $995.
885AB[2]	0-1100V	±0.0025			100 μv	1 μv	885AB - $1160.
891A[3] &AR	0-1100V	±0.01			1 μv	10 μv	891A & AR - $745. 891A - 01 - $845.
895A[3]	0-1100V	±0.0025			100 μo	1 μv	895A - $1250.
896A[3]	0-15 kv	±0.005 ±0.1 from 1 kv to 15 kv			100 μv	1 μv	896A - $1995.
883AB[2]	0-1100V	±0.005	±0.1	20Hz-5kHz	100 μv	1 μv	883AB - $1395.
887A	0-1100V	±0.0025	±0.05	30Hz-5kHz	100 μv	1 μv	887A - $1495. 887AB - $1595.
893A	0-1100V	±0.01	±0.05	50Hz-10kHz	1 mv	10 μv	893A - $1045. 893A - 01 - $1145.

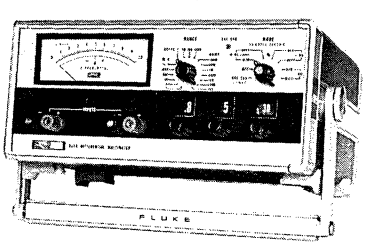
Solid state models available in either line-powered or combination rechargeable batteryline powered versions.

1. Reduced accuracy over wider frequency range. Model 893AR available in rack configuration at no extra cost.
2. AB models are combination line or battery-powered.
3. Infinite input resistance to 1100 volts.

differential multimeter - model 853A

The solid-state Model 853A is an extremely accurate low cost multimeter utilizing differential techniques to measure AC/DC voltages and current and resistance. The instrument may be operated from line and/or rechargeable or replaceable batteries.

Accuracy: +(0.2% + 0.02% FS) for DC voltage and current. +(0.5% + 0.05% FS) for AC voltage and current
Voltage Range: 0-1100 VAC/DC in 4 ranges
Frequency Range: 20 Hz to 30 kHz
Current Range: 0-10 amps AC/DC in 6 ranges
Resistance Range: 0-100 megohms in 7 ranges
Accuracy: ±(0.2% + 0.01% FS)
Overload Protection: 1200V RMS or DC on any range, 12 amps on 10 amp range. 2 amps on all other ranges.
Prices: $545 (AC operation and replaceable battery) $595. (AC operation and rechargeable battery)



Transit Cases

Where operation and storage in severe relative humidity conditions (up to and including 100%) are required, most Differentials are available with splash-proof panel and MIL-T-945A combination case.

Rack Mounting Kits

Kits are available for side-by-side, center or left/right side rack mounting of most half rack width Fluke voltmeters. Kits are also available for mounting full rack width voltmeters and calibrators.

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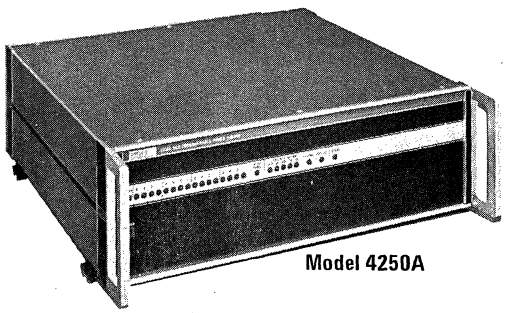
programmable power sources



Model 4250A

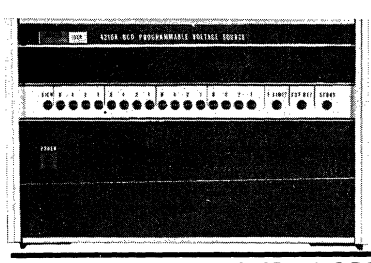
Representing an entirely new approach to automatic test and process control equipment, new Fluke programmable power sources are designed so that one instrument does the work of a whole rack of equipment. One compact unit can serve as a husky power supply, fast digital-to-analog converter, programmable attenuator, or power amplifier for external DC or AC sources. Systems compatability has been considered throughout the design.

Two families of instruments are presently available: Models 4210A and 4216A Programmable Systems Voltage Sources and Models 4250A and 4265A Programmable Power Sources.

Both families offer BCD or binary programming with internal memory, 0.01% accuracy, DC or AC external reference capability (programmable in or out), 50 millivolt peak programming noise, isolated control logic to separate digital noise from the output, and complete digital display of the command word.

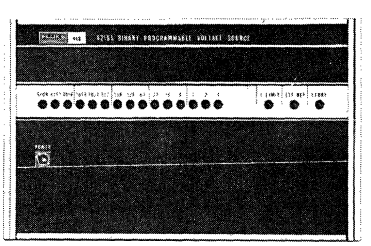
Basic Specification Model 4210A 4216A 4250A 4265A

Output voltage	10v	16v	10v, 65v	16v, 65v
Output current	100mA		1 Amp	
Settling Time	30μsec		100μsec	
Ripple & Noise	1mV pk-to-pk, 300 μv rms		1mV pk-to-pk, 300 μv rms on low range 10mV pk-to-pk, 3mV rms on 65V range	4mV pk-to-pk 1.2mV rms on 65V range
Programming Noise	50mV peak		50mV peak on low range 100mV peak on 65V range	
Stability	±(10 ppm of setting +20 μv) per 24 hours ±(30 ppm of setting +60 μv) per 90 days		Low Volt range: ±(10 ppm of setting + 40μv) per 24 hours ±(30 ppm of setting + 100μv) per 90 days 4250A, 65 Volt range: ±(30 ppm of setting + 500μv) per 90 days 4265A, 65 Volt range: ±(30ppm of setting + 300μv) per 90 days	
Prices	$995		$1295	
Options				
Isolated control logic	$300		$ 300	
Front panel display	$150		$ 200	
External reference	$200		$ 200	
Direct coupled control logic		No Charge		
Blank front panel		No Charge		
Current limit	N/A		$ 200	
Accessories				
Manual control unit (A 4200)		$250		
Rack mounting kit		$ 15		



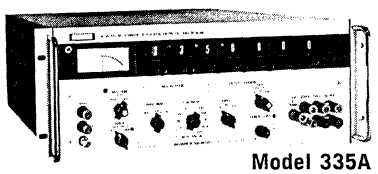
Model 4210A

Model 4216A

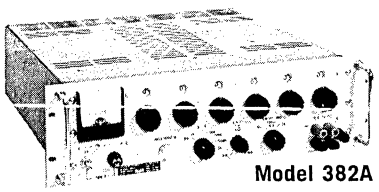


voltage & current calibrators

The Fluke line of voltage and current calibrators combine ruggedness and reliability with extreme accuracy and stability. Most units are provided with current and voltage limit functions. All solid-state models are equipped with zener diode reference elements, housed in proportionately controlled temperature ovens.



Model 335A



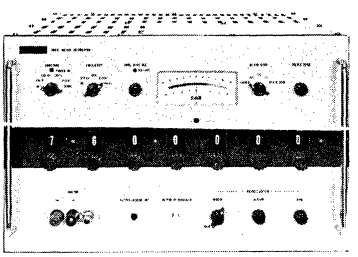
Model 382A

Model	Voltage	Current	Regulation Line	Regulation Load	Stability Hour	Stability Day	% per Mo.	Calibration Accuracy	Max. Ripple RMS	Price
313A	0-50	0-2A	0.0005	0.005	0.002	0.0025	0.005	0.01%	50 μv	$1395
332B	0-1111	0-50ma	0.0002	0.0002		0.002/year		0.002%	20-40 μv	2445
332D	0-1111	0-50ma	0.0002	0.0002		0.0014/year		0.001%	20-40 μv	2995
335A*	0-1111	0-50ma	0.0002	0.0002		0.002/year		0.002%	20-40 μv	2645
335D	0-1111	0-50ma	0.0002	0.0002		0.0014/year		0.001%	20-40 μv	3695
		(Models 335A and 335D are also a 20 ppm and 14 ppm differential voltmeters and nine range, high input impedence galvanometers)								
382A**	0-50	0-2A	0.0005	0.0005	0.0002	0.0025	0.005	0.01%	50 μv	1595
382A+	0-50	0-2A (4 ranges)	0.0005	0.0001	0.0025		0.005	0.02%	0.002% of range	

*Calibrator portion only **Voltage mode +Current mode

Meter Calibrator - Model 760A

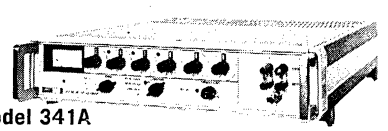
The Model 760A Meter Calibrator is a complete all solid-state calibration system for AC and DC voltmeters, ammeters, ohmeters, and multimeters. Interlocks and safety features are provided to protect both the operator and the instrument being calibrated.



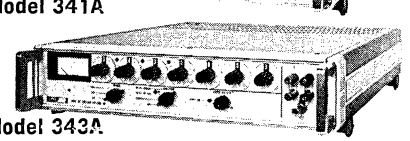
	DC VOLTAGE & CURRENT	AC VOLTAGE & CURRENT
Voltage Range:	0.001V to 1000V in 0.1 mv steps	0.001V to 1000V in 0.1 mv steps
Voltage Accuracy:	±(0.1% of setting + 25uv) Also ±0.33% at 1 mv, 3 mv, and 10 mv.	±(0.25% of setting + 25uv) Also ±0.33% at 1 mv, 3 mv, and 10 mv.
Current Range:	1 μa to 10A in 1 μa steps	1 μa to 10A in 1 μa steps
Current Accuracy:	±(0.25% of setting + 1 0.025 μa)	±(0.25% of setting + 0.025 μa)
Frequency:		60 Hz and 400Hz (60 Hz phase locked to power line)
Resistance:		
Range	0 to 10 megohms	
Accuracy	±(0.01% of setting + 0.4 ohm)	
Resolution:	1 ohm	
Price:	$2845.	

DVM Calibrator - Models 341A and 343A

Fluke Models 341A and 343A DVM Calibrators cover 0-1111 volts DC in three ranges of 10, 100, and 1000 volts, each with 11% overranging. For the Model 341A, calibration accuracy is ±(0.005% of setting + 0.0003% of range). Calibration accuracy for the Model 343A is ±(0.002% of setting + 0.002% of range. Each model has current limiting crowbar protection and a four-terminal floating output.



Model 341A



Model 343A

Model	Output Voltage	Current Output	Accuracy	Regulation Line-Load	Stability %per mo.	Ripple (rms)	Resolution PPM of Range	Price
341A	0 to 1111.110V	25 ma	+0.005%	0.0005%	+0.003%	100 μv	1ppm	$1195.
343A	0 to 1111.1110V	25 ma	+0.002%	0.0005%	+0.0015%	50 μv	0.1ppm	1795.

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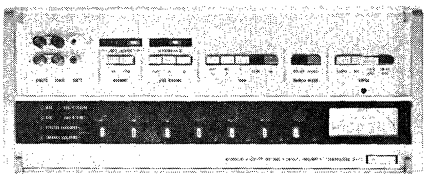
Programmable Voltage/Current Calibrator - Model 3330B

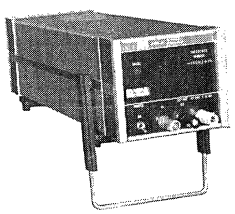
The Model 3330B is a fully programmable constant voltage/constant current calibrator. This calibrator provides output voltages from 0-1000V in 3 ranges and constant current outputs from 0-100 ma in three ranges, with 11% overranging on each range. Voltage accuracy is ±0.003%. Constant current accuracy is ±0.006%.



Mode	Voltage Range	Max. Current	Current Range	Compliance Voltage	Accuracy	Regulation Line-Load	Stability PPM of Output	Price
CONSTANT VOLTAGE	10, 100	100 ma			+0.003%	5 ppm of output	15 ppm per mo.	$3495
	1000V	50 ma						
CONSTANT CURRENT			1, 10	1000V	+0.006%	5 ppm of range	30 ppm per mo	
			100 ma	500V				

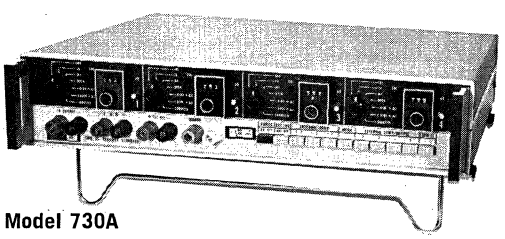
AC Reference Standard - Model 510A

The Fluke 510A is a precision AC voltage source which can be used as a calibration standard or as a fixed frequency source for test applications. An output voltage of 10 volts rms and a current of 10 ma rms to an accuracy of ±0.01% for 30 days and ±0.02% for 90 days are featured. Any fixed frequency output from 50 Hz to 100 kHz is available. Total harmonic distortion is less than 0.005%. The 510A can be calibrated with DC. An optional rechargeable battery pack provides up to 16 hours of operation without AC line power.
Price is $495. Rechargeable battery pack, $100.

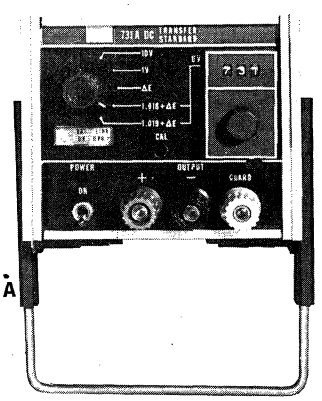


DC Transfer Standards

Fluke DC transfer standards, Models 730A and 731A offer the user standard cell accuracy in convenient portable instruments. Both models offer 2 ppm transfer accuracy, 10 ppm per month stability, fully guarded and battery operation. Both furnish the same output voltages per unit. The important difference is that the Model 730A consists of four independent reference supplies with output terminals to supply individual supply outputs, mean output of up to four references and series output of up to four references.



Model 730A

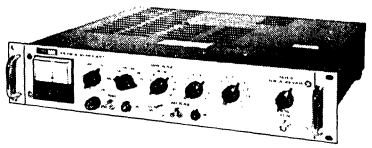


Model 731A

Model 730A		Model 731A
Output Voltage:	10.000V, 1.000V, 1.018 + △ E E, △ E, open output, shorted output.	Same
△ E Resolution and Accuracy:	1 μv	Same
Reference Stability:	10 ppm/month, mean of 4 outputs, within 1 ppm of straight line for 90 days	Same
Price:	**$1995.**	**$395.**

high voltage power supplies

Fluke high voltage power supplies have become the standard of the industry where quality and reliability are essential. They provide unexcelled performance through sound electrical and mechanical design. Voltages from 0-10,000 and from 10,000 to 30,000 are available with current capabilities from 0-50 ma. All instruments incorporate over-current protection circuits.



Model	Voltage	Current (ma)	Line	Load	Per hr.	Per day	Calibration Accuracy % of Output	Max. Ripple RMS	Resolution	Price
408B	0-600V	0-20	0.001	0.001	0.005	0.02	0.25	1 mv	5 mv	$ 700.
410B	0-10,000V	0-10	0.001	0.001	0.005	0.02	0.25	1 mv	5 mv	975.
412B	0-2100V	0-30	0.001	0.001	0.005	0.02	0.25	500 μv	5 mv	410.
415B	0-3111V	0-30	0.0005	0.0005	0.002	0.01	0.25	100 μv	5 mv	575.
430A	10KV-30.22KV	0-10	0.005	0.01	0.005	0.03	0.25	5 mv	100 mv	3940.

General Purpose Power Supply - Model 407D

Voltage: 0–555V

Stability: per hour – 0.01%
per day – 0.05%

Resolution: 2 mv

Regulation: Line – 0.005%
Load – 0.01%

Calibration accuracy: 0.5%

Max. Ripple RMS: 500 μv

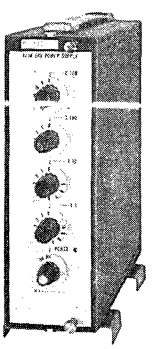
Price: Cabinet Model (407D) – $490.

Current: 0–300 ma

NIMS High Voltage Power Supply - Model 423A

Designed for Nuclear Instrument Module Systems (NIMS), the Model 423A is a versatile high voltage power source in a small package. Contained in either a portable bench case or a NIMS bin, the Model 423A features remote analog slewing of the output, or manual operation in steps of 10, 100 and 500 volts. A sweep vernier allows control of the output from zero to the calibrated dial settings.

Size: 3 inches by 9 inches by 10 inches
Voltage Calibration:
0 to 2500V in 5 steps of 500V
0 to 400V in 4 steps of 100V
0 to 90V in 9 steps of 10V
0 to 10V vernier
Price:
Basic Unit – $460.
Carrying Case – $35.
ΔE Option – $50.



BRIEF SPECIFICATIONS

Output Voltage	Output Current	Accuracy	Resolution	Slewing	Ripple & Noise	Overload Protection	Polarity
0 to +3000VDC	0-10 ma	0.25% or 1.25V whichever is greater	100 mv	0 to dial setting with vernier	5 mv p-p	Output limited to 15 ma	Reversible at rear panel

New True Digitally Programmable HVPS Model 4150A

The Model 4150A Programmable High Voltage Power Supply satisfies the need for a computer programmable unit with the same functional capabilities as manual units.

All functions are programmable with DTL-TTL logic levels except the on-off switch. Status indicators such as settling time and current limit flags are provided. Programming speed is less than 600 milliseconds from 0 to ±3400 volts. Current limit is programmable from 500 μa to 50 ma. The output can be short circuited with no damage to the instrument and automatic recovery will occur.

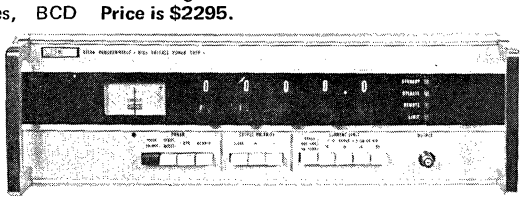
Output features include:

- Output voltage: 0 to ±3399.9 volts DC
- Output Current: 50 ma
- Output Accuracy: ±0.1% of setting or .1 volt
- Resolution: 0.1 volt
- Ripple & Noise: Less than 1 mV RMS; 10 mV p-p

Programmable features include:

- Program lines are isolated from the analog output
- Voltage Magnitude: 5 decades, BCD 8-4-2-1 coding
- Polarity: Positive, Negative or Output Open
- Optional Current Limit: 5 and 50 mA ranges, 10% steps to 110% of range
- Mode: Standby/Operate
- Current Trip: Enable/Disable and Reset
- Optional Output Flags: Settling Time – indicates programmed voltage is within 1 volt of final value
- Current limit – indicates that a current limiting condition exists.

Price is $2295.



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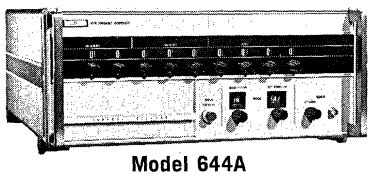
time and frequency

Frequency Synthesizers, Models 644A and 633A

These all solid-state Fluke frequency synthesizers cover the frequency range of 0 to 40 MHz with 2 instruments. The Model 644A provides DC to 40 MHz, and the 633A, DC to 11 MHz. Both instruments are of modular construction and have the same characteristics of 90 dB spectral purity, low phase noise and low noise floor. In addition, both have sweep and search functions available, and can be remotely programmed in 0.1 Hz increments. Internal frequency standards of 1 part in 10^8 or two parts in 10^9 per day are available.



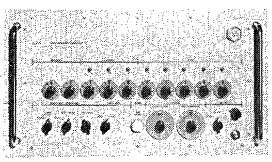
Model 644A

Model	Frequency Range	Price
644A	DC to 40 MHz	$9990 to $11,335
633A	DC to 11 MHz	$6790 to $8135

A 605 BCD to decimal decoder for remote programming, $1495

Frequency Synthesizers, Models 645A and 645M

The new Fluke Model 645A and militarized Model 645M Frequency Synthesizers cover the frequency range from DC to 50 MHz, in .01 Hz step increments. The spectral purity of this new instrument is at an all time high. All non-harmonically related spurious signals are at least 100 dB below the fundamental. The signal-to-phase-noise ratio is also greatly improved. The 645A contains all of the versatile features of the 600 Series family such as high speed remote programming and modular construction suitable for many varieties of special versions. In addition, the variety of standard options allows tailoring the 645A to most applications at a bare minimum cost to the customer. The 645A embodies all of the latest state-of-the-art improvements in synthesizer design and packaging to achieve a new standard of performance.



The new militarized Model 645M has been environmentally hardened to meet all environmental requirements of MIL E 16400F, Amendment 5, Class IV. Electrically, it's equivalent to the Model 645A.

Frequency Range	Frequency Increments	Spurious	Frequency Stability and Accuracy	Signal-To-Phase Noise Ratio	Price
DC to 50 MHz	up to .01Hz*	All non-harmonically related spurious signals are at least 100 db below the fundamental	1 part in 10^8 per day	Greater than 63 dB in a 30 Hz band centered on the carrier but excluding a 1 Hz band centered on the carrier	$11,500 to $14,100 (Model 645M quoted on request)

A 607 BCD decimal decorder for remote programming, $1495.
*Options

Frequency Comparator - Model 103A

The Model 103A now makes possible the comparison of test and reference frequencies from 100kHz to 1 MHz in 100 kHz steps and from 1 MHz to 5MHz in 1 MHz steps. Output may be read directly on external frequency counter, front panel meters and/or output recorder. Quadrature outputs are available for display on an oscilloscope of XY recorder.
Price is $1995.

VLF Receiver/Comparator - Model 207-1

The Model 207-1 is a coherent VLF tracking receiver for calibration of laboratory and communications center frequency standards. Frequency coverage is from 8.0 to 31.0 kHz in steps of 100 Hz with an additional channel at 60 kHz. The instrument is all solid-state and employs a multitude of integrated circuits. Multi-channel capability plus high sensitivity assures round-the-world reception of VLF signals for frequency standardization.
Price: $2995.

Frequency Distribution Amplifier - Model 203A

The Model 203A is a multi-channel distribution amplifier that features high stability, free from harmonics and spurious outputs and high inter-channel isolation. These amplifiers are being widely used for distribution of standard frequencies in laboratories, communication installations and industrial facilities.
Price $1395.

other instrumentation & accessories

Thermal Transfer Standard - Model 540B

For ±0.01% RMS AC transfer measurements without calibration curves or correction tables, Fluke offers the all solid-state Model 540B AC/DC Thermal Transfer Standard. Thermocouple burnout is virtually eliminated by a unique circuit. A search circuit provides visual indication of the percent of rated input. DC input to the unit is conveniently reversed via front panel switch. DC turnover is held to less than 0.01%.

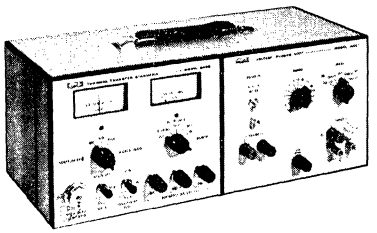
Voltage Range: 0.5 to 1000V in 14 ranges

Galvanometer Resolution: 0.0012% of input/scale div. at rated input

Accuracy: (% of input)

Range	Frequency	AC/DC Difference
All except 1000V	5Hz-50kHz	+0.01%
1000V	5Hz-20 kHz	+0.02%
1000V	20kHz-50 kHz	+0.04%
	50kHz-1 MHz	+0.1%

Price: $1045. (Rechargeable batteries included)



Current Transfer Accessories
Accessories for the Model 540B are Thermal Converters (A55), Current Shunts (A40), a Current Transfer Switch (A45), Coaxial Cable Kits (A55-110), and Storage Cases (C41 and C55).

Null Detector Microvoltmeter - Model 845AB

The Models 845AB and 845AR are designed for extremely high input resistance, sensitivity and isolation. Typical applications are standardization of voltage dividers and true comparison of standard cells and ratio measurements.

Input Ranges: 1 μv to 1000 VDC in 19 end-scale ranges
Accuracy: ±(2% end scale + 0.1 μv)
Input Resistance: 100 megohms on 300 mv range and above
10 megohms on 100 mv range and below
Input Power: 845AB rechargeable battery or 115/230 VAC ± 10%, 50-44 Hz 845AR 115/230 VAC ± 10%, 50-440 Hz
Price: $460.

Ratio Measurement Devices

Fluke Kelvin-Varley dividers, reference dividers and lead compensators for use in calibration consoles and ratio measuring systems meet all standards requirements.

Kelvin-Varley Dividers

Model	Input Resistance	Linearity	Resolution	Max. Input	Voltage Max. Pwr.	TC of Linearity	Price
720A	100k ohm +0.005% at 1.0 input	+0.1 ppm of input	0.1 ppm of input	1100V	11 watts	+0.1 ppm of input per/^{0}C	$1495

Reference Voltage Divider - Model 750A

Input Voltage Ranges	Output Voltage Ranges	Divider Current	TC of Output	Accuracy	Stability	Price
1.1, 5, 10, 50, 100, 500, 1000, 1100V, DC	0.1, 0.5, 1.1, 5, 10, 50, 100, 500, 1000, 1000V DC	1 ma	+1ppm/^{0}C over operating	+0.001%	+0.001% per year	$1195

Lead Compensator – Model 721A

4000:1 Max. Ratio Resistance • 0.1 milliohmn resolution • 1500 Max. Divider Voltage • 150 milliohmns maximum allowable lead resistance
Price: $295

Precision Voltage Dividers - Models 80E and 80F

The Models 80E & F are for use with all Fluke differential and digital voltmeters.

Model No.	Max. Input Voltage*	Input Resistance	Division Ratio	Division Ratio Accuracy	Price
80E-10	10kV	1-Megohms	10,000:1	+0.01	$395
80F-5	5kV	50-Megohms	1,000:1	+0.01	275
80F-15	15kV	100-Megohms	1,000:1	+0.01	325

*Intermediate voltages between 10kv and 30 kv available upon request.

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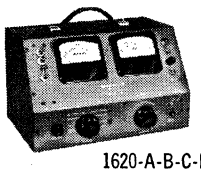
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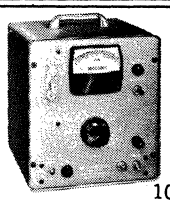
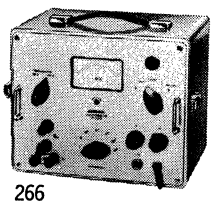

1020-C

667

2030-A-B-C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MEGOHMMETERS

Freed can supply a complete range of insulation resistance measuring equipment with fixed and variable d.c. test voltages from 5 to 5000 volts. Insulation and leakage measurements can be made on transformers, motors, cables, electronic assemblies and components, dielectric materials, electrical appliances and tools, capacitors and resistors.

Type	Resistance Range	Test Voltage	Accuracy	Power Requirements	Size and Weight	Price
1620	0.1 to 4,000,000 megohms 1 to 2,000,000 megohms @ 500 volts	Variable 50 to 1000 volts d.c.	±5% at full scale	105-125 volts 50-60 cycles	15" x 9" x 7½" 24 lbs. *	360.00
1620-A	0.01 to 4,000,000 megohms 0.1 to 200,000 megohms @ 50 volts 1 to 2,000,000 megohms @ 500 volts	Variable 5-100 volts d.c. 100-1000 volts d.c.	±5% at full scale	105-125 volts 50-60 cycles	15" x 9" x 7½" 24 lbs. *	375.00
1620-B	1 to 2,000,000 megohms 10 to 2,000,000 megohms @ 2500 volts	Variable 250-2500 volts d.c.	±5% at full scale	105-125 volts 50-60 cycles	15" x 9" x 7½" 24 lbs. *	395.00
1620-C	All features same as Type 1620 with additional circuitry for capacitor measurements	Variable 50 to 1000 volts d.c.	±5% at full scale	105-125 volts 50-60 cycles	15" x 9" x 7½" 24 lbs. *	385.00
1620-D	0.01 to 40,000,000 megohms 0.1 to 2,000,000 megohms @ 50 volts 1 to 20,000,000 megohms @ 500 volts	Variable 5-100 volts d.c. 100-1000 volts d.c.	±5% at full scale except highest range ±10%	105-125 volts 50-60 cycles	15" x 9" x 7½" 25 lbs. *	415.00
1020-C	0.1 to 2,000,000 megohms 0.1 to 200,000 megohms @ 50 or 100 volts d.c. 1 to 2,000,000 megohms @ 500 volts d.c.	Fixed 50, 100, 500 volts Regulated	±3% all ranges except highest range ±5%	105-125 volts 50-60 cycles	9½" x 10½" x 8" 18 lbs. *	280.00
1020-D	0.1 to 2,000,000 megohms 0.1 to 200,000 megohms @ 100 or 200 volts d.c. 1 to 2,000,000 megohms @ 500 volts d.c.	Fixed 100, 200, 500 volts Regulated	±3% all ranges except highest range ±5%	105-125 volts 50-60 cycles	9½" x 10½" x 8" 18 lbs. *	290.00
* 266	0.6 megohm to 500 teraohm @ 500 v. 0.6 megohm to 100 teraohm @ 100 v.	Fixed 100-500 v.d.c. Regulated	± 5% at full scale	105-125 Volts 50-60 Hz	11½" x 9" x 9" 18 lbs.	425.00
* 668	0 to 20,000 megohms @ 1000 v 0 to 50,000 megohms @ 2500 v 0 to 100,000 megohms @ 5000 v	Fixed 1000-2500 5000 v.d.c.	±2.5% of scale length	battery operated transistor supply built in charger	16" x 12½" x 6½" 23 lbs.	850.00
2030-A	10 to 2,000,000 megohms	Fixed 500 volts d.c.	±5% full scale	battery operated transistor supply	6" x 8" x 4" 8 lbs.	205.00
2030-B	1 to 20,000,000 megohms	Fixed 500 volts d.c.	±5% full scale	battery operated transistor supply	6" x 8" x 4" 8 lbs.	250.00
2030-C	1 to 2,000,000 megohms	Fixed 50 volts d.c.	±5% full scale	battery operated transistor supply	6" x 8" x 4" 8 lbs.	225.00
2030-D	1 to 2,000,000 megohms	Fixed 100 volts d.c.	±5% full scale	battery operated transistor supply	6" x 8" x 4" 8 lbs.	225.00
2030-E	1 to 2,000,000 megohms	Fixed 200 volts d.c.	±5% full scale	battery operated transistor supply	6" x 8" x 4" 8 lbs.	225.00
* 667	0 to 10,000 megohm	Fixed 100-250-500 1000 v.d.c.	± 2.5% of scale length	battery operated transistor supply	8½" x 4½" x 5" 4½ lbs.	175.00

Rack type available — 1620 series 19" x 10½" x 9½"
1020 series 19" x 7" x 9½"

* Norma Instruments, Freed exclusive U.S. agent.

MEGOHMMETER - NO. 1650 NEW

The Type 1650 Megohmmeter is a versatile ultra high resistance measuring instrument providing variable test voltages from 10 to 1000 v.d.c. Ground and guard terminals are provided for measurement of grounded and ungrounded two or three terminal components. Provision for pre-charging and discharging capacitors is incorporated in the instrument.

Specifications: Test Voltage: 10-1000 v.d.c. Resistance Range: 50 KΩ to 200 TΩ Operating Voltage: 105-125 volts, 50-60 Hz Size and Weight: 11" x 10" x 8"; approx. 12 lbs. – Price: $465.00.

MEGOHMMETER - NO. 2030-G NEW

The new Type 2030-G Megohmmeter is a portable re-chargeable battery operated high insulation resistance measuring instrument. Battery operation provides stable isolated resistance measurement capability not affected by leakage path through the power lines. Five commonly used test voltages are available from 50 to 500 volts.

Specifications: Test Voltages: 50, 100, 200, 250, 500 v.d.c., ±5% Resistance Range: 50 KΩ to 100 teraohms in eight ranges: 50 v., 50KΩ to 10 TΩ, 100 v., 100 KΩ to 20 TΩ, 200 v., 200 KΩ to 40 TΩ, 250 v., 250 KΩ to 50 TΩ, 500 v., 500 KΩ to 100 TΩ Resistance Accuracy: ±5% at full scale to 1 teraohm, ±10% above Operating Voltage: Re-chargeable batteries Size and Weight: 11" x 10" x 8", approx. 10 lbs. Price: $345.00.

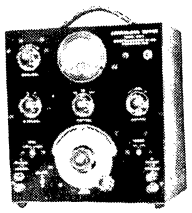
NON-DESTRUCTIVE MEGOHMMETER NEW

The Type 1625 Non-Destructive Megohmmeter provides three modes of insulation resistance testing: a manual voltage control meghommeter; an automatic linear ramp voltage; and an adjustable leakage current for non-destructive dielectric testing of components. The non-destructive feature will operate in the automatic ramp mode or by manual voltage control. Test voltage is removed from the unknown in milli-seconds when leakage current exceeds the preset value. A voltmeter indicates the test voltage at disconnect and will hold the reading until reset.

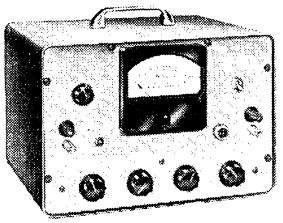
Specifications: Test Voltage: Manual or Ramp controlled, 50-1000 v.d.c. Resistance Range: 0.1 to 4,000,000 megohms, 1 to 2,000,000 megohms at 500v. Resistance Accuracy: ±5% at full scale Leakage Current: 15 microamps to 3 milliamps Operating Voltage: 105-125 volts, 50-60 Hz Size and Weight: 15" x 9" x 7½", 26 lbs. – Price: $495.00.

Prices quoted are subject to change without notice

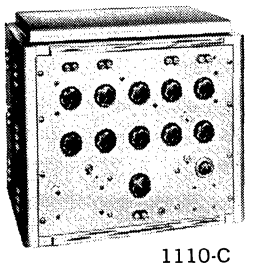
FREED TRANSFORMER CO., INC.



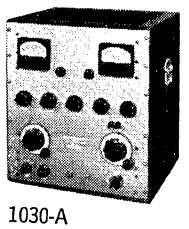
1010-A



1140-B



1110-C



1030-A

INCREMENTAL INDUCTANCE BRIDGES

Direct in-line readings of inductance and conductance of iron core component at audio frequencies with or without superimposed direct current. The bridge uses the Owens circuit with provisions for measuring the series or parallel inductance and conductance of the unknown inductor; five precision resistance and capacitance decades are provided to indicate these values. "Q" or storage factor can be measured as the product of the inductive reactance and the conductance.

Type	Inductance Range	Conductance Range	Frequency Range	D.C. Current	Accuracy	Dimensions and Weight	Price
1110-C	1111.1 h to 1 mh 5 decades 1.1 h to 1 μh 2 decades	0.015 μmho—100 mho "Q" = 600 max @ 100 cycles	20 cycles to 10KC	up to 2 amperes	±0.5% to 5 KC ±2% to 10 KC	21¾" x 17½" x 15¼" 50 lbs.	545.00
1115	111.1 h to 100 μh 5 decades 0.11 h to 0.1 μh 2 decades	0.15 μmho—1000 mho "Q" = 600 max @ 100 cycles	20 cycles to 10 KC	up to 15 amperes	±1% to 5 KC ±3% to 10 KC	21¾" x 28" x 15¼" 80 lbs.	825.00
1185	111.1 h to 100 μh 5 decades 0.11 h to 0.1 μh 2 decades	0.15 μmho—1000 mho "Q" = 600 max @ 100 cycles	20 cycles to 10 KC	up to 30 amperes	±1% to 5 KC ±3% to 10 KC	21¾" x 33¼" x 15¼" 100 lbs.	1250.00

IMPEDANCE & ADMITTANCE BRIDGE

An audio frequency bridge for measuring the complex impedances of inductors, transformers, filter networks and capacitors.

Type	Frequency Range	Impedance and Admittance	Accuracy	Maximum Applied Voltage	Dimensions and Weight	Price
1120	20 to 20,000 cycles	XL, XC and R up to 1000 ohms, BL, BC and G up to 1000 microhms	R: ±1% G: ±2% X: ±1% up to 5 KC B: ±1% up to 5 KC	125 Volts	10½" x 12" x 12" 25 lbs.	495.00

NULL DETECTOR

Sensitive null detectors for bridge measurements, with self contained selective filters to limit the amplifier characteristics at various bridge measuring frequencies.

Type	Sensitivity	Frequency Range	Filter	Power Requirements	Dimensions and Weight	Price
1140-B	10μ volts @ 1 KC for 15% meter deflection filter in	20 to 20,000 cycles	Fixed 60, 400, 1000 cycles Adjustable ±5% of center Other frequencies available	105-125 volts 50-60 cycles	Cabinet 12" x 8½" x 10"—10 lbs. Rack—19" x 6" x 10"	250.00

D.C. SUPPLY

A constant voltage transformer regulated current source designed for use with the Freed Incremental Inductance Bridges. Solid state bridge rectification, L-C filters and low internal impedance provides good current regulation with a minimum of circuit complexity.

Type	Current Ranges	Voltage Ranges	Regulation	Power Requirement	Dimensions and Weight	Price
1170-A	4 ranges, 0-5, 25, 100 and 1000 milliamperes	Maximum no load voltage 1000 Ma, 270V, 100 Ma, 270V, 25 Ma, 85 V, 5 Ma, 48 V	± 1% for line variation 105-125 V	105-125 volts 60 cycles	19" x 10½" x 13½" 66 lbs.	350.00

LOW FREQUENCY "Q" INDICATORS

Direct indication of "Q" at low frequencies, inductance, distributed capacity, impedance and dielectric loss can also be measured. Instrument may be used to study the magnetic properties of iron core material for stability as a function of applied voltage and losses as a function of the frequency.

Type	Test Frequency	Q Range	Accuracy	Test Voltage	Power Requirements	Dimensions and Weight	Price
1030-A	20 cycles to 200 K.C.	1-1000	±5% 20 cycles to 50 KC— to 200 KC at reduced accuracy	Voltage to series circuit, 0.01 to 10 volts voltage across coil variable to 100 volts	105-125 volts 50-60 cycles	21" x 23" x 15" 120 lbs.	1350.00

COMPARISON & LIMIT BRIDGE

A rapid and convenient method for laboratory or production testing of resistors, capacitors and inductors. Components may be sorted for tolerances up to ± 20% or selected in matched pairs.

Type	Inductance Range	Capacitance Range	Resistance Range	Test Frequency	Accuracy	Dimensions and Weight	Price
1010-A	10 μh-100 h	10 Pf-100 mf.	1 Ω-20 MΩ	50 or 60 cycles 1 KC-10 KC	± 0.1% on 5% range	10½" x 12" x 12" 17 lbs.	350.00

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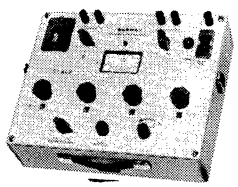
FREED TRANSFORMER CO., INC.



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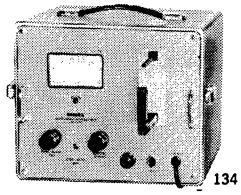

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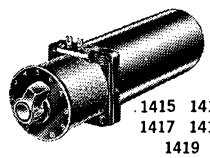

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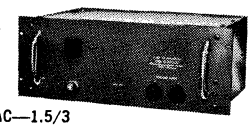
1417 1418
1419



RAC—1.5/3

DISTORTION METER

The type 1970 Distortion Meter is a wide range low input impedance instrument, designed with passive circuitry resulting in high stability, low residual distortion and hum levels.

Type	Frequency Range	Input Impedance	Input Voltage	Sensitivity	Dimensions and Weight	Price
1970	20 cycles to 1 megacycle	75-150 300-600	1 to 200 volts	Distortion level of 0.02% for 1 volt input	19″ x 10½″ x 12″ 30 lbs.	575.00

A.C. LINE REGULATOR

A distortion free 60/400 Hz electromechanical a.c. line regulator. Features a tubeless fast response phase reversible magnetic amplifier preceded by a transistor comparison amplifier with zener reference.

Type	Nominal Input Voltage-Frequency	Output Voltage	KVA Rating and Regulation Range	Regulation Accuracy	Response Speed Volts/sec.	Dimensions and Weight	Price
R.A.C. 1.5/3	115 Volts 60 or 400 Hz	Adjustable 110-120 volts	3 KVA for ± 10% regulation 1.5 KVA for ± 20% regulation	± 0.25% for ± 10% regulation range ± 0.5% for ± 20%	10@ ± 10% 20@ ± 20%	19″ x 7″ x 13″ 45 lbs.	450.00

In addition to the above R.A.C. 1.5/3 A.C. Line Regulator, other models are available from 500 VA to 5 KVA. Write for complete specifications and prices.

DECADE CAPACITORS

The Freed series of Decade Capacitors cover a wide range of values and can be supplied as individual decades from 0.0001 PF. per step to 1 mf. per step or in various combinations of assembled decade boxes. All capacitors are non-inductively wound and heat treated for stability.

Type	Total Capacity	Dielectric	Dissipation Factor	Accuracy	Dimensions and Weight		Price
1415	10 μf in steps of 1 μf	Mylar	<0.005	±1%	3″ x 3″ x 7″	2 lbs.	40.00
1416	1 μf in steps of 0.1 μf	Polystyrene	<0.0002	±1%	3″ x 3″ x 7″	2 lbs.	55.00
1417	0.1 μf in steps of 0.01 μf	Polystyrene	<0.0002	±1%	3″ x 3″ x 7″	2 lbs.	40.00
1418	0.01 μf in steps of 0.001 μf	Polystyrene	<0.0002	±1%	3″ x 3″ x 7″	2 lbs.	40.00
1419	0.001 μf in steps of 0.0001 μf	Polystyrene	<0.0002	±1%	3″ x 3″ x 7″	2 lbs.	45.00
1250	1.110 μf in steps of 0.001 μf	Polystyrene	<0.0002	±1%	13¾″ x 6″ x 4½″	8 lbs.	180.00
1351	11.111 μf in steps of 0.0001 μf plus 100 pf variable air capacitor	Mylar Polystyrene Air	<0.005	±1%	15″ x 10¾″ x 8″	25 lbs.	305.00
1352	1.111 μf in steps of 0.0001 μf	Polystyrene	<0.0002	±1%	19″ x 5¼″ x 10″	13 lbs.	220.00
1353	11.111 μf in steps of 0.0001 μf	Mylar Polystyrene	<0.005	±1%	19″ x 5¼″ x 10″	14 lbs.	275.00

Maximum operating voltage, 500 VDC or peak. Capacitors can be supplied to better than ±1%, write for complete information.
In addtion to listed equipment, Freed manufactures a complete series of decade inductors, AC and DC regulated power supplies, comparison and limit bridges. Write for complete catalog.

DECADE INDUCTORS

Each unit is an assembly of four toroids wound on a stabilized Molybdenum permaloy dust core. The coils have a nominal inductance of 1-2-3-4 and are connected in series and switched to vary the inductance from 0-10.

Type	Frequency Range, Cycles	Maximum*	Inductance per Step	Total Inductance	Accuracy	Dimensions and Weight		Price
1220	500-20,000	230 @ 4 KC	0.001 h	0.01 h	±2%	3″ x 3″ x 9″	4½ lbs.	$150.00
1230	500-20,000	280 @ 3 KC	0.01 h	0.1 h	±2%	3″ x 3″ x 9″	4½ lbs.	130.00
1240	500-20,000	260 @ 3 KC	0.1 h	1. h	±1%	3″ x 3″ x 9″	4½ lbs.	130.00
1270	500-20,000	190 @ 2 KC	1. h	10 h	±0.5%	3″ x 3″ x 9″	4½ lbs.	150.00
1341	100-2,000	100 @ 1 KC	10 h	100 h	±0.5%	3″ x 3″ x 9″	4½ lbs.	165.00
1280	500-20,000	280 @ 3 KC	0.001 h	1.11 h	See note	13¾″ x 6⅛″ x 5½″	16 lbs.	450.00
1290	500-20,000	280 @ 3 KC	0.001 h	11.11 h	See note	15″ x 7″ x 5½″	20 lbs.	525.00
1310	500-20,000	280 @ 3 KC	0.01 h	11.1 h	See note	13¾″ x 6⅛″ x 5½″	16 lbs.	450.00
1164†	30-2,000	60 @ 300	0.1 h	111 h	±1%	15″ x 7″ x 5½″	28 lbs.	325.00

† Type 1164 inductors are wound on special nickel alloy laminated cores.

Inductance per step:	1 mh	10 mh	100 mh	1 h	10h
Nominal Accuracy:	±2%	±2%	±1%	±0.5%	±0.5%

*Maximum Q depending on inductance value and a.c. voltage across coil.

SHORTED TURNS INDICATOR

*type 134 shorted turns indicator is a high sensitivity instrument which will detect the presence of one or more shorted turns in a coil using up to #44 wire. Eddy current losses are minimized by the use of a very low frequency built in test oscillator. The instrument will test most types of audio, power, IF chokes, relays and other coreless coils. Power requirement: 115 Volt, 60 Hz; Wt.: 13.5 lbs.; Dimension: 11″ x 9″ x 10″; Price: $395.00.

TRANSFORMER RATIO METER

The *type 227 will measure transformer ratio of 1 to 1011 in three decade ranges with an accuracy of 0.1%. The instrument can also be operated as a ratio comparison tester with a deviation range of ±1%. Power requirements: 115 volts, 60 Hz; Size 17″ x 13″ x 6″; Wt.: 25 lbs.; Price: $925.00.

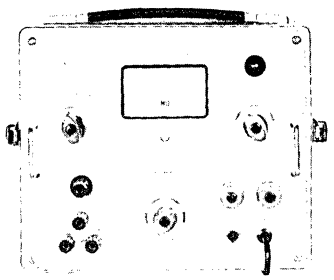
*Norma Instruments, Freed Exclusive U.S. Agent.

Prices quoted are subject to change without notice

FREED TRANSFORMER CO., INC.

Norma Instruments

TERAOHMMETER, NO. 1808 20101 (266)



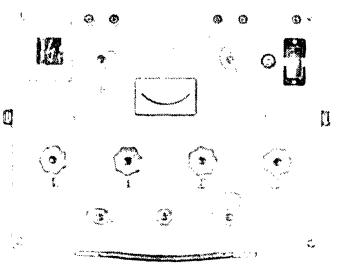
For measuring high values of insulation and other resistances in the range of 0.6 megohm to 500 million megohms (500 teraohms). Two test voltages are available: the 100 volt setting for tests requiring low test voltage (0.6 megohm through 100 teraohms) and the 500 volt setting for general testing (0.6 megohm to 500 teraohms). Line operated: 115 V., 50/60 Hz. Weight: 18 lbs.

Price: $ 425.00

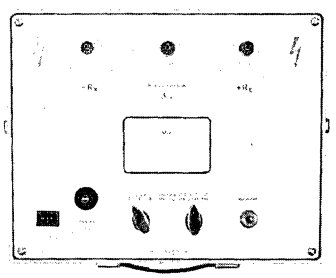
TRANSFORMER RATIO METER, NO. 4104 12909 (277)

Transformer ratio of 1 to 1011 in three decade ranges with an accuracy of 0.1%. The instrument can also be operated as a ratio comparison tester with a deviation range of ± 1%. Line operated: 115 volts, 60 Hz.

Price: $ 925.00



HIGH VOLTAGE INSULATION TESTER, NO. 1807 30402 (668)



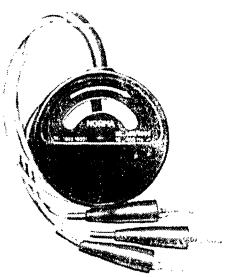
The Norma high voltage insulation tester has three measuring voltages: 1000 (0 to 20,000 megohms), 2500 (0 to 50,000 megohms), and 5000 volts (0 to 100,000 megohms). The instrument comes complete with built-in storage cells and charger for 115 V. AC. Weight: 23 lbs.

Price: $ 850.00

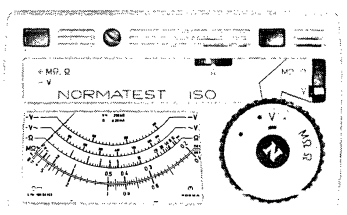
PHASE SEQUENCE INDICATOR, NO. 1803 10001 (206)

For determining the proper connections of motors, meters and relays operating in the 3 phase system. Operates over a voltage range of 80 to 400/500 volts, 16 to 400 Hz. Comes complete with leather carrying case.

Price: $ 36.50



NORMATEST ISO, NO. 1811 50303



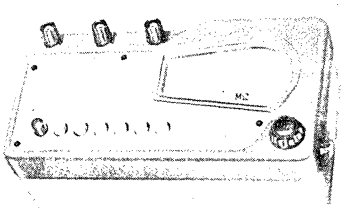
An ideal maintenance and service instrument providing insulation resistance, ground and continuity testing and a. c.-d. c. voltage measurements. Transistorized regulated battery supply. Resistance range: 0.2 to 50 megohms at 250 v.d.c., 0.4 to 100 megohms at 500 v.d.c.; Continuity: 0.5 to 150 ohms; Voltage: d. c. 0 to 300, a. c. 0 to 600.

Price with carrying case and test leads: $ 145.000

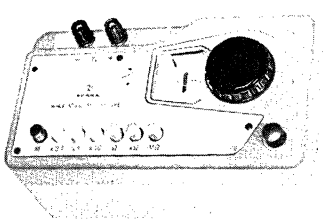
INSULATION TESTER, NO. 1806 30301 (667)

A portable transistorized insulation tester for field and shop use. Provides four separate measuring voltages of 100, 250, 500 and 1000 v.d.c. Insulation resistance range from 0 to 10,000 megohms at 500 volts.

Price, including leather case, batteries and test leads: $ 175.00



WHEATSTONE BRIDGE, NO. 1802 30301 (665)



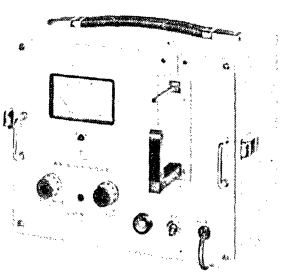
Precision d. c. resistance measurements to 120 megohms without external batteries. Single dial resistance indication combined with a sensitive mirror scale galvanometer provides rapid measurements. Resistance range: 0.08 ohms to 120 megohms; ± 0.5% accuracy, 0.8 to 12 megohms.

Price: $ 205.00; with leather case, $ 220.00

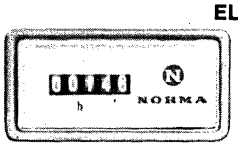
SHORTED TURN TESTER, NO. 1801 20101 (134)

A high sensitivity instrument for detecting shorted turns in audio, power, IF, Chokes, relays and other coreless coils. Line operated: 115 volts, 50/60 Hz.

Price: $ 395.00



ELAPSED TIME METER, NO. 1900 00009



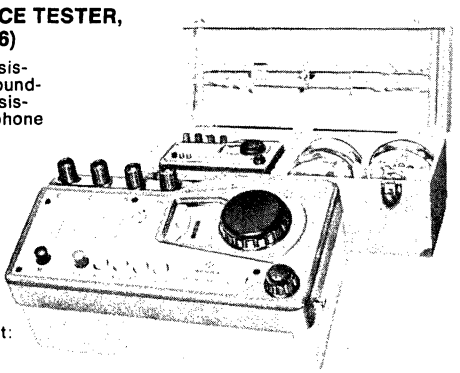
The NORMA Elapsed Time Meter is a rugged synchronous drive elapsed time indicator which indicates hours to 9999.9. For 115 volts, 60 Hz. operation.

Price: $ 14.50

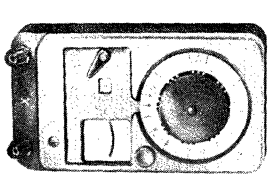
EARTH RESISTANCE TESTER, NO. 1805 30303 (666)

For measuring soil resistance for effective ground- For measuring soil resising of power and telephone lines, geophysical exploration, corrosion control and all lightning protective equipment. Fully transistorized operation. Resistance 0–5000 ohms in four ranges.

Price: $ 245.00 with leather carrying case $ 260.00; Accessory Kit: $ 110.00



WHEATSTONE BRIDGE, NO. 1802 30201 (185 R1)



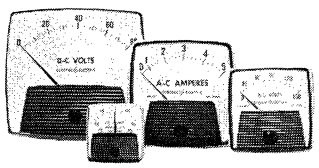
A portable general purpose bridge for accurate d. c. resistance measurements. Can be used for measuring electrolytes and other components requiring a. c. with available accessories. Resistance range: 0.08 to 60,000 ohms; Accuracy ± 0.5%, ± 2% extreme ends of dial.

Price: $ 98.50

Write or call for complete specifications, Tel. Evergreen 6-1300

PANEL, SWITCHBOARD, AND RECORDING INSTRUMENTS

BIG LOOK® PANEL METERS

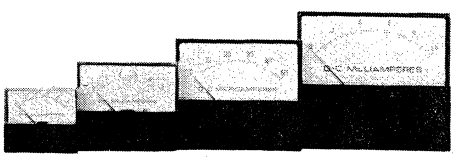


features: 1½-, 2½-, 3½-, and 4½-inch sizes . . . a-c, d-c, and rectifier types . . . iron-vane mechanism in a-c models . . . pivot and jewel, or taut band mechanism for d-c models . . . expanded scales available.

specifications: accuracy ±2% (3% on rectifier types) . . . meets ANSI Spec C39.1 . . . displays a-c and d-c volts, amperes, milliamperes, percent motor load, and other parameters equivalent to d-c microamperes, milliamperes, etc. Self-contained frequency meters available in 3½- and 4½-inch sizes.

Write for Bulletin GEC-1076

HORIZON LINE® PANEL METERS



features: 1½-, 2½-, 3½-, and 4½-inch sizes . . . a-c, d-c, and rectifier types . . . iron-vane mechanism in a-c models . . . pivot and jewel, or taut-band mechanism for d-c models . . . expanded scale available for all models . . . all meters have snap-on snap-off masks. Available for front or back-of-panel mounting.

specifications: accuracy ±2% (3% on rectifier types) . . . meets ANSI Spec C39.1 . . . displays a-c and d-c volts, amperes, percent motor load, and other parameters equivalent to d-c microamperes, milliampers, etc.

Write for Bulletin GEC-1076

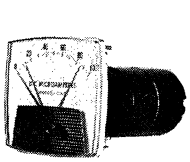
TYPE 185 EDGEWISE PANEL METERS

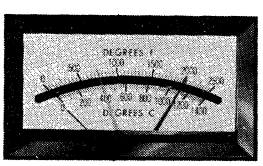
features: 2¼-inches wide by 1-inch high by 3-inches deep . . . horizontal or vertical scale . . . d-c meters have moving-coil D'Arsonval mechanism . . . rectifier-type D'Arsonval mechanism in a-c meters . . . shielded, dust-tight, one-piece molded cycolac window . . . flush case sides permit mounting of two, three or more units.

specifications: accuracy d-c meters 2% of full scale (3% on a-c meters) . . . meets ANSI Spec C39.1 . . . displays a-c and d-c volts, amperes, microamperes and milliamperes.

Write for Bulletin GEC-1076

TYPE 195 AND 196 METER RELAYS





features: 2½-, 3½-, and 4½-inch sizes in BIG LOOK Type 195 styling and 3½- and 4½-inch sizes in HORIZON LINE Type 196 . . . d-c type with pivot and jewel mechanism . . . single and double set-points . . . contactless control . . . "piggyback" mounting of relay and meter on 3½- and 4½-inch sizes.

specifications: accuracy ±2% . . . ON/OFF contact standard . . . DPDT relay rated at 5 amps, 120 volts a-c . . . displays a-c parameters.

Write for Bulletin GEC-1076

TYPE 236 ELAPSED-TIME METERS

Commercial case, with reset knob

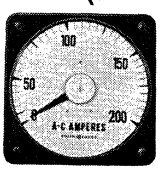
In conduit-mounted case

features: distinctive appearance and excellent readability designed to match BIG LOOK ammeters and voltmeters . . . wide selection of mounting styles including 2½ and 3½-inch sizes for panel mounting and 2½-inch size mounted in conduit case or portable stand . . . sealed models, both 2½- and 3½-inch sizes.

Write for Bulletin GEC-1076

SWITCHBOARD A-C TYPES AB-16; D-C TYPES DB-16 (semiflush)

Type AB-16



features: non-parallax scale plates . . . self-contained transducers . . . magnetic damping . . . rugged, taut-band construction . . . self-contained resistors to simplify wiring of transformer-rated instruments . . . magnetic shielding . . . rugged, dust-tight, moisture-resistant cases.

specifications: accuracy ±1% of full scale . . . scale length 14.2 in. (AB-16, DB-16).

Write for Bulletin GEC-1507

SWITCHBOARD A-C TYPE AB-30, D-C TYPE DB-30 (semiflush)

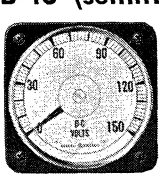
features: non-parallax scale plate . . . self-contained transducers . . . easy-to-read, large, black numerals and pointer plus convex, shadow-proof cover . . . magnetic shielding . . . rugged drawn-steel case and molded lucite cover resist shock, dust, and moisture. Predetermined scales for 5A and 150V transformer-rated instruments.

specifications: accuracy ±1% of full scale . . . scale length 5.1 in. . . . size 4¼ x 4¼ in.

Write for Bulletin GEC-1507

SWITCHBOARD A-C TYPE AB-40 D-C TYPE DB-40 (semiflush)

Type DB-40



features: High sensitivity . . . ratings as low as 50 microamperes . . . taut-band suspension on a-c and d-c ammeters and voltmeters eliminates mechanism friction and jewel roll . . . permits higher sensitivities . . . insures greater resistance to shock and vibration . . . weather-tight construction . . . non-parallax scale plate . . . self-contained transducers.

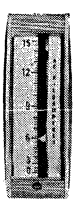
specifications: accuracy ±1% of full scale . . . scale length 7.1 in. . . . size 4¼ x 4¼ in.

Write for Bulletin GEC-1507

SWITCHBOARD TYPE 180 EDGEWISE INSTRUMENTS (semiflush)

features: space-saving, slimline design . . . cluster mounting . . . flush case-sides for easy stacking . . . vertical or horizontal models . . . non-parallax scale plate . . . magnetic shielding . . . durable, one-piece molded lucite case . . . gasketed to resist moisture, dust and fungus . . . large 4½ in. scales. Illumination available.

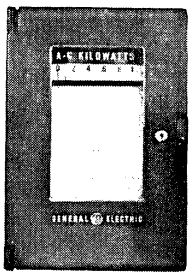
specifications: accuracy a-c 1.5% horizontal . . . 2.0% vertical, d-c 1.5% vertical or horizontal . . . scale length approx. 4.5 in. . . . size (flange) 1¾ in. wide x 6 in. long.



Write for Bulletin GEC-1507

PANEL, SWITCHBOARD, AND RECORDING INSTRUMENTS

DIRECT-OPERATED RECORDERS, TYPE CH

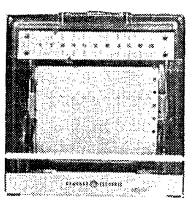


features: ink-type marking mechanism with throw-away inkwell or . . . Telechron motor-driven tapper-type inkless mechanism . . . 110 ft. record roll . . . multispeed synchronous motor or optional spring-clock drives . . . high readability . . . fast response: inking ¾ second, inkless 2 seconds . . . heavy-duty cases . . . rugged, spring-mounted jewel bearings . . . this recorder available in portable case or for panel mounting.

specifications: accuracy 1% . . . record roll size 6 in. overall width, 4½ in. calibrated width 110 ft. long . . . AC voltmeter, wattmeter and varmeter; ammeter, power factor, frequency, and speed . . . DC instruments: permanent magnet, moving-coil mechanism.

Write for Bulletin GEA-8619

4" SOLID-STATE SERVO-OPERATED RECORDERS TYPES 520, 521



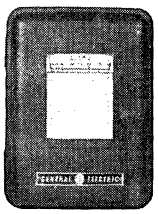
Type 520 recorder, single pen

features: measure, indicate and record any variable represented by a d-c millivolt signal . . . null-balance, servo-operated . . . solid state amplifiers . . . wide range of chart speeds (½ in/hr. to 1440 in/hr . . . up to 8 control and alarm switches . . . control or transmitting slidewire . . . companion to GE-MAC controller Type 524 . . . printed wire boards . . . highly sensitive . . . compact, flexible process instrumentation, reliable . . . easy to maintain.

specifications: accuracy ±½% of full scale . . . response time: one or 5 seconds nominal full scale response as specified . . . optional quick change dual response of 1 and 5 seconds nominal . . . input signal: spans of 1 mv to 1 volt d-c . . . amplifier: plug-in type, transistorized amplifier 4 x 10^5 gain . . . chart size 4⅜ in., calibrated width 4 in., length 65 ft. . . . chart speeds: ½ in./hr. to 1440 in./hr. . . . maximum sensitivity 1 millivolt d-c full scale . . . refillable plastic inkwell . . . writing capacity up to 3 months . . . Type 520 single pen. Type 521 two-pen.

Write for HBK-8115

DIRECT-OPERATED RECORDERS, TYPE CF

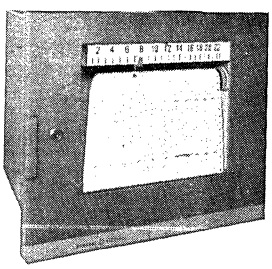


features: tapper-type inkless recording mechanism . . . sturdy case . . . dependable Telechron motor drives . . . this recorder available in portable case or panel mounting for practically all AC and DC values.

specifications: accuracy ±2% . . . record roll 4 in. wide, 3½ in. calibrated width, 65 ft. long . . . AC motor driven chart drive . . . 3 in. per hour standard chart speed . . . other chart speeds available.

Write for Bulletin GEA-8619

12" SERVO-OPERATED RECORDERS TYPES HF, HR, HL, HT, HG

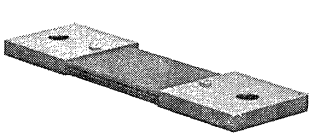


features: same basic amplifier for AC and DC measuring circuits . . . interchangeable universal slidewire . . . 3000-turn measurement slidewire provides high degree of resolution and sensitivity . . . simple conversion from potentiometric to bridge-measuring circuits . . . individual switch set-point adjustments . . . continuous standardization . . . unit mounted components, isolated by function . . . all measurement and recording elements including amplifier are mounted on swing-out panel for convenience . . . printed circuits speed trouble-shooting work . . . range resistors are mounted on replaceable card . . . no soldering required . . . high accuracy measurement plus sufficient torque to operate a variety of control devices.

specifications: accuracy ¼% of full scale . . . response time: strip chart ink types 1, 2, 4, 10, 24 sec. full scale, printed types 1.2, 2.4, 5, 12, 30, 60, 144 sec/point print speed . . . round chart 4, 10, 24 seconds, full-scale . . . input signal: direct input 1.0 millivolt to 1.0 volt d-c. (higher inputs available using voltage-divider circuits) . . . amplifier: plug-in unit, transistorized, printed wiring . . . power gains $5x10^{13}$ . . . strip chart size 12 in. wide (10¾ in. calibrated width) 130 ft. long . . . round chart 12 in. diameter (4$^{9}/_{16}$ in. calibrated radius) . . . synchronous motor chart drives . . . chart speeds: ½ to 60 motor rpm, ½ in. to 360 in. per hour strip-chart speed . . . round chart speeds standard 24 hours . . . ink-type marking mechanism . . . maximum sensitivity one millivolt d-c full scale . . . meets ASA specifications C39.4.

Write for HBK-8117

TYPE 140 SHUNTS



features: lighter and smaller than earlier designs, easy to handle and install . . . full length manganin strips provide greater structural strength . . . silver-plated terminals on larger ratings provide low-resistance contact . . . "chimney" design for maximum self-cooling.

specifications: accuracy ¼% (calibrated) of rated millivolts . . . ratings minimum 10A, 50MV, 100MV, maximum 10KA, 50MV, 100MV (for 5A, 50MV use 10A, 100MV) . . . standard 6-ft. leads for back-of-panel wiring feature machined terminals and FLAMENOL® insulation, suitable for operating temperatures up to 75C and when base included line-to-ground voltages up to 600 volts maximum.

Write for Bulletin GEC-1076

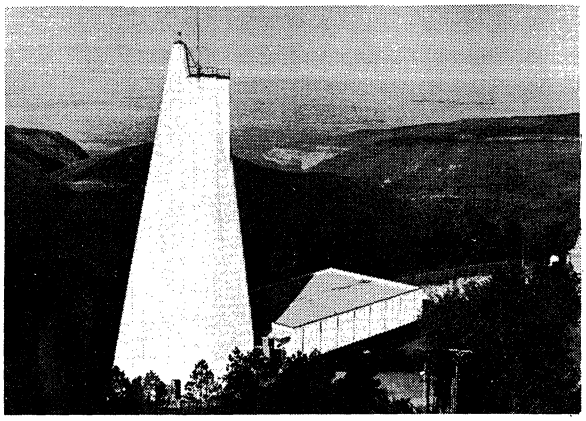
For complete information contact nearby GE Sales Office, or write to General Electric Co., Section 998-80, Schenectady, N. Y. 12305.

GENERAL ELECTRIC

GEO SPACE SYSTEMS, INC.

PRECISION INSTRUMENT SYSTEMS AND EQUIPMENTS

COMPLETE INSTRUMENT CONTROL SYSTEMS



MOVABLE TURRET ASSEMBLY & CONTROL SYSTEM SACRAMENTO PEAK OBSERVATORY

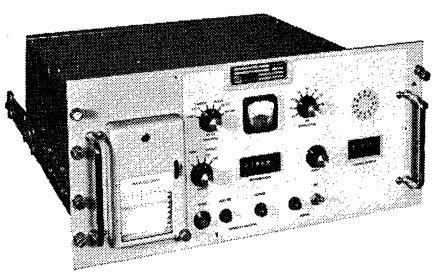
The Air Force Cambridge Research Laboratories' Sacramento Peak Vacuum Telescope is a vivid demonstration of the Company's depth of diversified talent and systems capability.

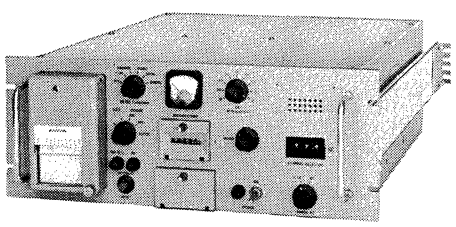
This telescope, with associated instrumentation and electronics, is located at Sunspot, New Mexico, 9200 feet above sea level. It stands 136 feet above ground level and extends 221 feet into the heart of the mountain.

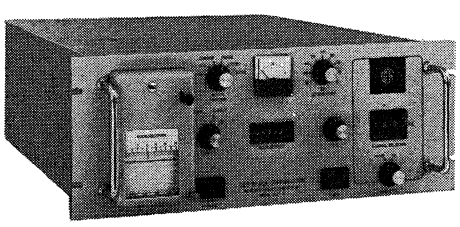
The instrumentation and electronics furnished by Geo Space Systems, Inc., will serve as the operating controls of the telescope. It is designed to auto-track or track on a programmed basis, the sun, other stars or planets and will enable scientists to learn more about the physical composition and activity of these bodies. The instruments can provide continuous automatic compensation for the rotation of these bodies with respect to their celestial coordinates during all tracking phases. One hoped-for result of these studies will be the ability to forecast accurately solar flares. This ability will be of great importance to world-wide communications and to space programs.

The GSS role in this program involved design, production and installation of an optimum switched, non-linear servo control system to drive the 10,000 ft/lb torque motor which rotates the 230 ton evacuated optical tube forming the lower part of the telescope; and the servo control systems operating the upper turret section and its precision components, including solar-optical error detectors yielding auto-track accuracy within 30 arc sec. GSS also built and installed the large spectograph and the Echelle spectograph.

TIME/FREQUENCY CONTROL EQUIPMENT

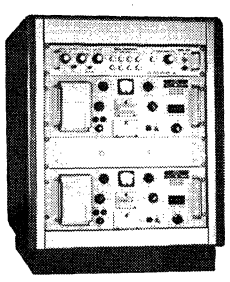






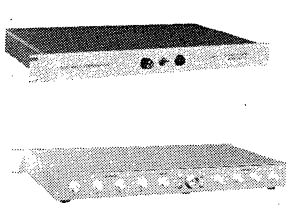
GSS VLF RECEIVERS

The GSS VLF receivers are designed for precision phase monitoring of VLF stations or rating of local standards. They are also capable of monitoring the new Omega stations when used with a suitable commutator. Characteristics are standard inputs of 100 kHz or 1 MHz, tuning range of 10 to 30 kHz in 50 Hz increments, mechanical or electronic servo, .006 Hz servo bandwidth, 10 nanovolt sensitivity and a built-in chart recorder for read-out. Units are line operated with optional DC standby input available.



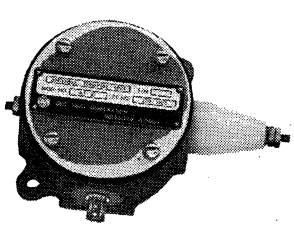
OMEGA SYSTEM

The Omega Navigation System provides navigation for ships and aircraft with excellent accuracy. Results are obtained with readouts of "lane crossings" and an analog position voltage. Suitable outputs are also provided for interfacing with a computer for more sophisticated readout and data analysis.



VLF ANTENNA MULTICOUPLER

This multicoupler can reduce such problems as desensitization, phase shift, cross-coupling interference, and coherent ground circuit interference. Input impedance is 50Ω, with 8 independent 50Ω outputs featuring 50 db isolation, and a gain of 3 db.



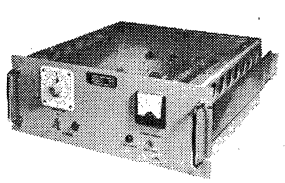
VLF LONG-WIRE AND WHIP ANTENNAE

The AT-10 long wire antenna and matching network provide excellent VLF reception, and allows use of a 50Ω coaxial transmission line.

The WA-10 whip antenna excels in areas of heavy horizontally polarized man-made noise.

COHERENT SIGNAL GENERATOR

This instrument furnishes a stable and controllable input signal for complete, rapid testing of performance characteristics of VLF receivers, including sensitivity, stability, accuracy, time constant and lag, deadband, noise rejection, adjacent channel rejection, intermodulation distortion, image response, and desensitization. The reference and the GSC-12 outputs are simultaneously monitored by the receiver under test, yielding data that is an absolute measure of the receiver's response.



BATTERY POWER SUPPLY

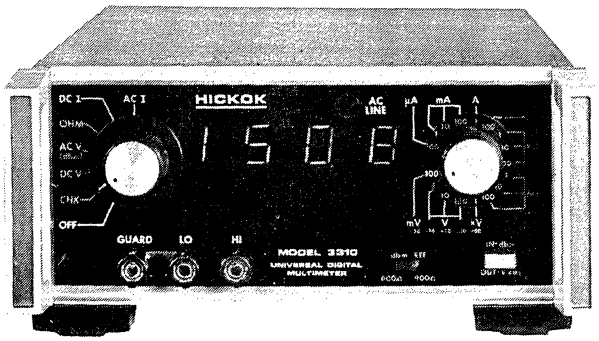
The GSS standby battery power supplies have been designed to furnish emergency DC power to critical equipment when primary AC power fails. Stable output voltage is obtained from nickel-cadmium batteries for long periods. Integral circuits provide fast and trickle charge. In the fast charge mode, batteries are restored to full charge in less than 8 hours. Full voltage life is dependent upon Amp/Hour rating of batteries supplied and the load current. Indication of approximate charge status is provided by a front panel meter and indicator lights.

As a leading manufacturer of standard frequency correlation and time signal synchronization equipment, Geo Space Systems, Inc. has successfully met the growing needs for time synchronization between geographically separated stations.

With its equipment serving the U. S. Army, Navy, NASA and FAA, and by meeting their stringent requirements, Geo Space is continually expanding its efforts to develop new approaches and instrumentation in this field.

GEO SPACE SYSTEMS, INC.
4715 GEORGE ROAD, P. O. BOX 23117
TAMPA, FLORIDA 33622
PHONE: 813/884-0492

HICKOK DIGITAL MULTIMETERS



TRUE RMS AND DIRECT READING dBm — BATTERY OR BCD OPTIONS

Model 3310 measures true RMS voltage and current from 20 Hz to 50 kHz. dBm measurements are directly displayed, referenced to either 600 or 900 ohms, from −45 to +65 dBm. A rechargeable internal battery option provides up to 20 hours continuous operation. A BCD output option makes the unit systems compatible. Overranging is 100%, with automatically positioned decimal point and polarity. Accessories include a 30-kV probe and clamp-on current probe.

MODEL 3310 BRIEF SPECIFICATIONS

RANGES:

True RMS and DC Voltage: 100-microvolt resolution to 1 kV (AC), 1.5 kV (DC).

True RMS and DC Current: 100-nanoampere resolution to 1.999 amperes.

Resistance: 0.1-ohm resolution to 199.9 megohms.

Decibel: 0.1-dB resolution from −45 to +65 dBm.

ACCURACY:

True RMS Voltage and Current: 0.5% of reading ±1 count.

DC Voltage: 0.1% of reading ±1 count.

DC Current: 0.2% of reading ±1 count.

Resistance: 0.3% of range ±1 count.

Decibel: ±0.2 dBm.

OVERLOAD PROTECTION:

True RMS Voltage and Decibel: 1000 V RMS.

DC Voltage: 1500 volts peak.

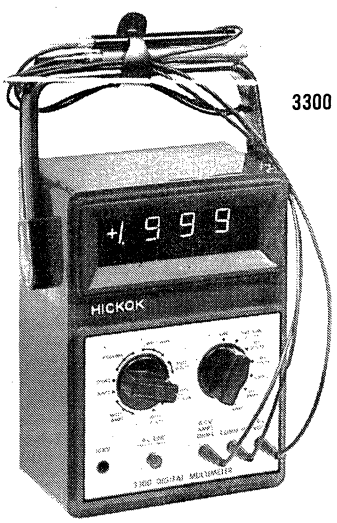
True RMS and DC Current: 10 times full scale.

Resistance: 250 volts RMS.

POWER: 115/230 V ±10%, 50—400 Hz. Internal battery option: 8 hours minimum use. More than 1000 recharge cycles.

SIZE, WEIGHT: 3½″Hx8⅜″Wx13″D. 12 pounds (with battery).

WIDE DYNAMIC RANGES FOR MEASURING AC/DC V, I AND OHMS — BATTERY OR BCD OPTIONS



3300 for Field Use

3301 for Bench or Systems Rack Mounted

Model 3300 is a truly portable, rugged multimeter designed for the rough handling found in field applications. The circuitry is shock-mounted in an impact resistant case. No metal parts are exposed, allowing for safe off-ground measurements. The internal rechargeable batteries provide 24 hours operation. Price includes battery and probes.

Model 3301 is a bench and rack-adaptable version of the 3300. An internal rechargeable battery pack or BCD output option is available.

Many features are common to both models. Complete overload protection is provided on all ranges. Bandwidth for AC measurements is to 100 kHz. Even on line operation, both models will float to 1500 volts off ground. The display permits readings to 1999 with automatically positioned decimal point and polarity indicator. Accessories for the 3301 include a clamp-on current probe and an AC/DC 30-kV probe.

MODELS 3300, 3301 BRIEF SPECIFICATIONS

RANGES:

AC/DC Voltage: 100-microvolt resolution to 1 kV (AC), 1.5 kV (DC).

AC/DC Current: 100-nanoampere resolution to 1.999 A.

Resistance: 0-1-ohm resolution to 199.9 megohms.

ACCURACY:

DC Voltage: 0.1% of reading ±1 count.

AC Voltage and Current: 0.5% of reading ±2 counts.

DC Current: 0.2% of reading ±2 counts.

Resistance: 0.3% of range ±1 count.

OVERLOAD PROTECTION: Same as for Model 3310.

SIZE, WEIGHT (with batteries):

3301: 8″Hx5⅞″Wx4″D; 6 pounds.

3301: 3½″Hx8⅜″Wx10″D; 11 pounds.

See page 351 for Hickok Data Terminals and Card Readers. For complete details on above models, contact:

HICKOK

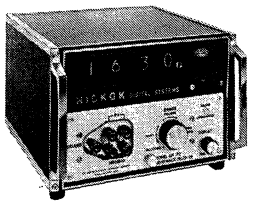
THE HICKOK ELECTRICAL INSTRUMENT CO.
10514 DUPONT AVENUE • CLEVELAND, OHIO 44108
(216) 541-8060

HICKOK 3½-DIGIT PLUG-IN SYSTEM

DC MICROVOLTMETER AND AMMETER

DP110 provides 4½-digit display from 1 microvolt to 1300 volts with its expansion feature. Accuracy is 0.05% of reading ±1 digit. The DP110 can safely float up to 3000 volts off ground. Common mode rejection is 120 dB at 60 Hz. D310 Current Adapter allows 4½-digit off-ground measurements from 100 picoamperes to 13 amperes.

DP110, $475. D310, $100.



RESISTANCE BRIDGE

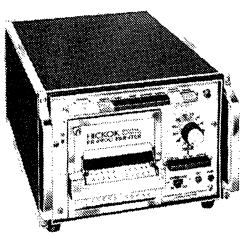
DP170's wide dynamic range is from 1 milliohm to 1000 megohms. Accuracy is 0.1% of reading ±1 digit. The DP170 provides four terminals for low resistance measurements, and a guard terminal for high resistance measurements. Response time is less than 1 second for most ranges. Low power output makes the unit useful for safe measurements of semiconductors.

DP170, $305.

100 MHz COUNTER

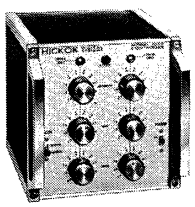
DP160 displays frequencies from 0.1 Hz to 100 MHz with up to 7-digit resolution. Input sensitivity is 20 millivolts RMS. Accurate readings are obtainable over a wide range of input voltages by use of an internal attenuator. Accuracy is 0.00005% ±1 digit. When the DP160 is used with the DP140 Counter, it provides 7-digit displays. Input impedance is 1 megohm, 25 picofarads.

DP160, $395.



DIGITAL PRINTER

Model 4900 is available in single and dual channel versions, with 3 to 8 numeric columns. It can be used with any device which provides 10-line decimal or BCD coded data outputs. The 4910 is a 4 or 8-column BCD version. Both printers have an internal timer ranging from 10 seconds to 120 minutes. The printing mechanism slides out to permit changing of paper rolls and ink cartridges with ease. Price depends upon the version chosen, ranging from $760 to $1290.



DIGITAL SET POINT CONTROLLER

Model 1050 has upper and lower 3-full digit set points. It provides a feed-back control signal to adjust the operation of a peripheral function.

1050, $175.

AC VOLTMETER

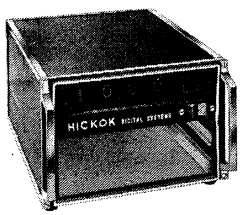
DP130 measures from 10 microvolts to 1 kilovolt with 0.1% accuracy over a wide bandwidth of 22 Hz to 1 MHz. Specifications include effects of temperature changes, line voltage and frequency variations. Input impedance is 1000 megohms, 20 picofarads. The DP130 is overload protected to 1500 volts peak; it has 40% overranging.

DP130, $395.

CAPACITANCE METER

DP200 measures true capacitance from 1 picofarad to 10 millifarads by means of the charge transfer method, similar to that used by NBS. Accuracy is 0.1% of reading ±1 digit. Response time is 1 second for most ranges. Test lead capacity can be balanced out for low capacitance measurements. Low test current and voltages are used to protect components and operator.

DP200, $305.

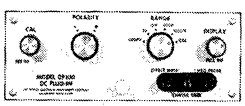


MAIN FRAMES

The 3202 and 3202P contain the digital display system and power supplies to accept all Hickok DP plug-ins. Both frames are similar, but the 3202P has buffer-storage circuits for non-blinking display, and a 10-line decimal data output. Both frames have polarity and overrange indicators. Size is 6⅞" high x 9⅝" wide x 12⅞" deep.

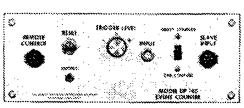
3202, $385. 3202P, $475.

OTHER PLUG-IN UNITS

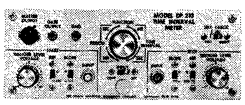


DC Voltmeter DP100 measures from 0.1 millivolt to 1500 volts with 0.1% accuracy, with 80 dB AC rejection. $150.

1 MHz Counter DP150A has 10 millivolts input sensitivity, .0005% accuracy, and 7-digit resolution. $255.



Event Counter DP140 expands the display of the DP counters, or it can be used to count events. $100.



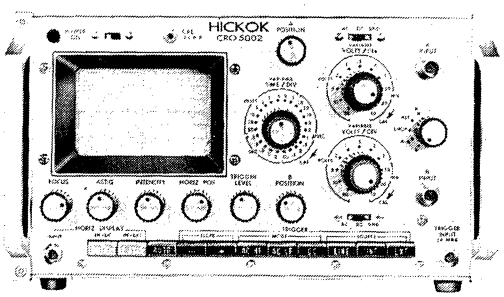
Time Interval Meter DP210 ranges from 10 microseconds to 1999 seconds. Accuracy is .0005%. $295.

See page 351 for Hickok Data Terminals and Card Readers. For complete details on above models, contact:

HICKOK

THE HICKOK ELECTRICAL INSTRUMENT CO.
10514 DUPONT AVENUE • CLEVELAND, OHIO 44108
(216) 541-8060

HICKOK WIDEBAND OSCILLOSCOPES



Models 5000A and 5002A (shown) are precise 25-MHz oscilloscopes. Both have similar features, except the 5002A is dual channel and the 5000A is single channel. Both models have simplified, exceptionally stable triggering from DC to 50 MHz. Trigger modes are quickly and conveniently selected with push button switches. Accuracy is 3%; waveform aberrations are less than 3% of applied signal at 3 times screen height. Vertical delay line assures that leading edge of pulses will be displayed. Simplified sweep delay of up to 40 divisions is furnished. Optional portable accessory pack protects unit for field use. Both models are compact for aircraft carry-on luggage.

MODELS 5000A, 5002A BRIEF SPECIFICATIONS

VERTICAL RANGES:
5000A: 10 mV/division to 50 V/division.
5002A: 10 mV/division to 20 V/division.

DISPLAY MODES, 5002A: Channel A only; Channel B only; Alternate A and B; chopped A and B; A-B.

INPUT IMPEDANCE: 1 megohm, 30 picofarads.

OVERLOAD PROTECTION:
5000A: 600 VDC plus peak AC.
5002A: 500 VDC plus peak AC.

RISE TIME: 14 nanoseconds.

SWEEP RANGES: 0.05 microsecond/division to 2 seconds/division. Continuously variable between ranges.

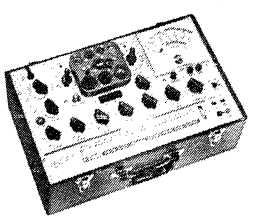
TRIGGERING MODES: Automatic; DC; high frequency pass filter; low frequency pass filter.

CRT: 4″ diameter, 6x10 division display area.

SIZE, WEIGHT: 6⅞″Hx11¼″Wx19″D. 24 pounds (5000A), 27 pounds (5002A).

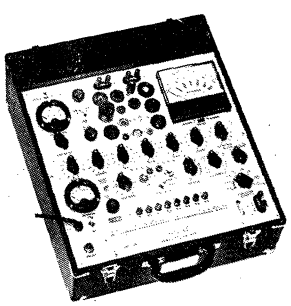
PRICE: 5000A; $595. 5002A: $845.

HICKOK SERVICE TEST EQUIPMENT



Technician's High Speed Deluxe Portable Tube, Transistor and Diode Tester

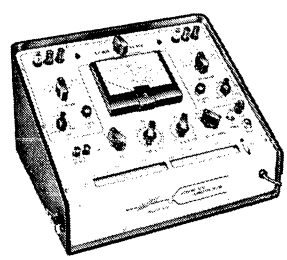
Model 6000A tests the latest tubes, including Compactrons, Novars, 5- and 7-pin Nuvistors, and 10-pin headers. The unit is useful for sensitive instantaneous inter-element leakage and shorts tests. Other features include constant indication of line voltage, filament continuity test, and replaceable socket plate to accomodate future tube types. G_m ranges are available to 15,000 micromhos. The 6000A provides good-bad tests for transistors and forward conduction efficiency tests on diodes. $297.50.



Industrial and Laboratory Portable Tube Tester

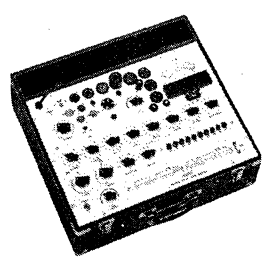
Model 539C tests all the latest tubes, including Compactrons, Novars, 5- and 7-pin Nuvistors, 10-pin headers, VR, low-power thyratrons and 4-digit types. It has 6 micromho ranges from 600 to 60,000. Dual leakage readings are obtained on the meter or with a neon short indicator. Panel terminals provide access to tube elements for custom testing, such as plate current and heater current measurements. The 539C has four AC signal voltages. $625.

Hickok Roll Charts are published semi-annually and are mailed automatically to subscribers of Subscription Plan. Price is only $12.50 for two years.



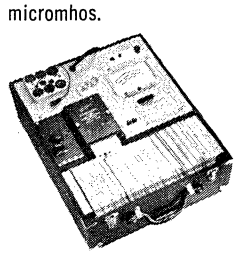
Dynamic Beta Transistor Tester

Model 870 measures AC and DC Beta, and tests at specified I_c, V_{ce} and I_b. The 870 checks collector saturation voltage; collector test current is variable up to 2 amperes. Beta ranges extend to 600 by reducing the AC test signal to 2.5 microamperes. Roll chart contains data for more than 1150 transistors. $425.



Industrial and Communications Portable Tube Tester

Model 752A is designed for use in maintaining communications equipment and industrial electronic apparatus. Dual section tubes can be tested without set-up change. The 752A has a simplified G_m scale with multiplier ranges to 30,000 micromhos. $475.



Industrial and Laboratory Cardmatic® Automatic Tube Tester

Model 123R provides card-programmed testing of tubes to handbook standards. Custom-programmed cards determine tube performance in special purpose circuit. The 123R provides fringe, saturation, cut-off and standard G_m tests. The 123R also allows sensitive instantaneous shorts and leakage tests. $795.

Contact Hickok Indicating Systems, Inc., Gardena, Calif., (213) 321-5891 for information on **aircraft, simulator** and **custom meter requirements.**

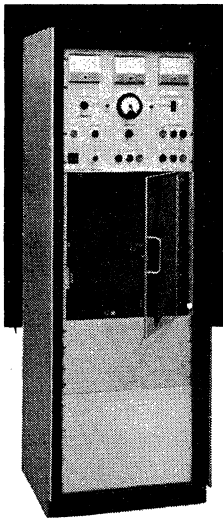
See page 351 for Hickok Data Terminals and Card Readers. For complete details on above models, contact:

HICKOK

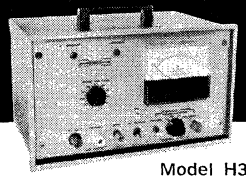
THE HICKOK ELECTRICAL INSTRUMENT CO.
10514 DUPONT AVENUE • CLEVELAND, OHIO 44108
(216) 541-8060

AC insulation testers

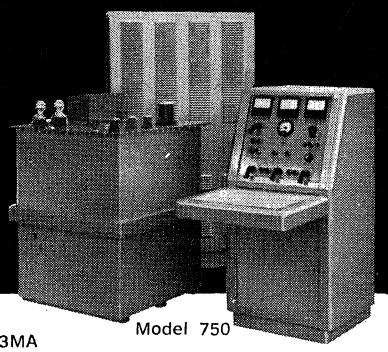
COMPLETE RANGE
OF TEST SETS . . .
FROM 0.5 TO 3000 KVA FOR
TESTING TO UL, CSA, MIL, ASTM, AEIC,
AND IPCEA SPECIFICATIONS.



Model 750-2CT



Model H3MA



Model 750

Hipotronics' AC Insulation Testers are conservatively engineered to insure quality and dependability.
Using Hipotronics' own HV transformers, corona-free performance to full rating is guaranteed.

DESIGN FEATURES

- Corona-free to full output.
- Less than 5% waveform distortion on all models.
- Continuously adjustable output control.
- Triple range, output-connected KV meter, 2% accuracy.

PERSONNEL SAFETY FEATURES

- Zero start interlock — compels operator to always raise voltage from zero.
- External interlock provision.
- Back-up magnetic overload circuit breaker.

EQUIPMENT SAFETY FEATURES

- Continuously adjustable thyratron operated overload — prevents excessive burning of cable or insulation when failure occurs.
- Surge and transient protection on all meters, transformers etc.
- Circuit breaker input.

SERIES RESONANT TYPES FOR CAPACITIVE LOADS

Series resonant AC insulation/dielectric test sets involve a revolutionary new approach to capacitive load testing. Each system consists of a variable inductor, a high voltage transformer, and an exciter supply. The heart of the system is Hipotronics' own variable inductor, consisting of a patented steel core reactor with a variable air gap. The required input power is only 5 percent of the output KVA requirements. i.e. To test at 3000 KVA, would require a system input of only 150 KVA. For more information on series resonant testing, write for brochure HP 7109.

CORONA TEST

To insure high reliability and long life, all equipment is tested to Hipotronics' specification #2514 or #2515. These specifications require a corona detector with a basic sensitivity of 1 picocoulomb per centimeter.

OPTIONAL EXTRAS

- Corona Detection Equipment: Any AC or AC/DC units may be supplied with Hipotronics' own advanced corona detector as part of an integrated system. See bulletin HP 7110 for features and prices of Hipotronics' Corona System.
- Motorized output control, single speed.
- Motorized output control with 10 to 1 range of adjustment.
- Burn feature — bypasses overload and inserts line reactor in series with HV transformer primary.
- Multi-pi secondary — quadruples secondary current capability at quarter output, doubles at half output, thus increasing test capacity.
- DC output channel for 1.3 or 2.6 times AC rating, with current capability of 10 ma.
- Test fixtures and jigs to meet any ASTM, UL, MIL, CSA, or customer specification.

SPECIFICATIONS

The specifications listed below are intended to convey a general representation of the entire range of AC insulation testers. Standard models are available for MIL, IPCEA, CSA, UL, ASTM, and AEIC test specifications. **Write for brochure HP 7108 for full details.**

Power Rating KVA	No. of Models	AC Voltage Range (KV)	Power Rating (KVA)	No. of Models	AC Voltage Range (KV)
0.5	12	1-30	100	23	1-400
1	12	1-30	150	24	1-500
2	13	1-50	200	25	1-600
5	16	1-100	250	26	1-750
10	18	1-150	300	26	1-750
20	19	1-200	400	26	1-750
40	21	1-300	500	26	1-750
60	22	1-350			

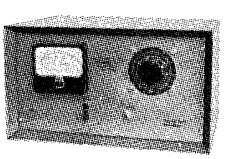
Insulation: Smaller units (up to 30 KV and 5 KVA), generally air insulated; larger units, oil insulated.

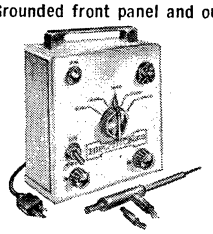
UL, ASTM, & CSA portable AC testers

C Series:

- Continuously adjustable output.
- Output connected KV meter with 3% accuracy.
- Instantaneous overload circuit breaker.
- Grounded front panel and output voltage return.

Model	Output Voltage	(KVA)	Size (in.) WxHxD	Price ($)
C1	0-1500	0.5	17x9x11	350
C2	0-2500	1.0	17x9x11	425
C5	0-5000	1.0	22x13x15	495
C10	0-10000	2.0	22x13x15	625





D Series:

- For early detection of insulation weaknesses, shorts, and grounds during production . . . or during use.
- Six test voltages available.
- Audible & visible fault indicators.
- On-Off switch with pilot light.

Model	Test Voltage	Size (in.) WxHxD	Price ($)
D2	0-500/1000/1250/1500/2000/2500	5½x6½x4¾	90
D5	0-1000/1500/2000/3000/4000/5000	6½x9½x5¾	150

Prices and specifications subject to change without notice.

HIPOTRONICS®

HIPOTRONICS, INC.
Brewster, N. Y. 10509 / (914) 279-8091

Call or write our Marketing Department for more data and descriptive literature. See other Hipotronics' listings under Power Supplies, Transformers, and Capacitors.

HIPOTRONICS®

DC insulation testers

. . . COMPLETE RANGE OF TEST SETS, STANDARD MODELS FROM 0 TO 1000 KV. FOR TESTING TO UL, CSA, MIL, ASTM, AEIC, AND IPCEA SPECIFICATIONS.

Model 250, shown with optional, deluxe, slope-front cabinet

All units are designed for maximum equipment and operator protection. The surge devices preclude damage to any component from repeated short circuits at full output, and the many safety features insure against operator injury. An instantaneous overload relay turns the high voltage off and the internal shorting relay discharges the sample under test immediately after failure. All units are ruggedly constructed for plant or field use and are designed for long life trouble free operation. Every unit is shorted many times at full output before shipping to insure the effective operation of all surge devices.

EQUIPMENT SAFETY FEATURES

- Instantaneous adjustable overload relay in grounded return.
- Instantaneous overload circuit breaker in primary of HV transformer.
- Surge limiting resistor in HV output.

PERSONNEL SAFETY FEATURES

- Output shorting relay with discharge resistor, gravity operated.
- Zero start interlock — compels operator to always raise voltage from zero.
- External interlock provision for test cage door or "dead man" switch.
- Shielded output cable or bushing.
- Three wire grounding type cord and plug on 115-volts units.
- 115-volt control circuitry in 220-volt models.

CONVENIENCE FEATURES

- Solid state rectifiers
- Triple range output connected KV meter with recalibration facilities.
- Triple range current meter in grounded return.
- Continuously adjustable output control.
- Hermetically sealed, oil-filled HV section on all models 30 KV and up.
- 4½" square meters with 2% accuracy.

CORONA TEST

To assure high reliability and long life, all equipment is tested to Hipotronics' specification #2514 or #2515. These specifications require a corona detector with a basic sensitivity of 1 picocoulomb per centimeter.

SPECIFICATIONS

Input	Voltage	Current	Model	Insulation	Size		KV Meter	Current Meter	Price
					Control	HV Section			
115 Volt 60 Hz	0-5 KV	10 ma.	25	AIR	17"x9"x11"H	None	0-1/2.5/5	0-100 ua/1ma/10ma.	$330
	0-10 KV	10 ma.	210	AIR	17"x9"x11"H	None	0-2.5/5/10	0-100 ua/1ma/10ma.	385
	0-20 KV	10 ma.	220	AIR	17"x9"x11"H	None	0-5/10/25	0-100 ua/1ma/10ma.	495
	0-30 KV	10 ma.	230	AIR		None	0-6/12/30	0-100 ua/1ma/10ma.	550
	0-50 KV	10 ma.	250	OIL		None	0-10/25/50	0-100 ua/1ma/10ma.	825
	0-60 KV	10 ma.	260	OIL		None	0-12/30/60	0-100 ua/1ma/10ma.	880
	0-75 KV	10 ma.	275	OIL		17"dia.x20"H	0-15/37.5/75	0-100 ua/1ma/10ma.	1045
	0-100 KV	10 ma.	2100	OIL		17"dia.x20"H	0-25/50/100	0-100 ua/1ma/10ma.	1540
	0-120 KV	10 ma.	2120	OIL		19"dia.x30"H	0-30/60/120	0-100 ua/1ma/10ma.	1870
	0-150 KV	10 ma.	2150	OIL	22"x18"x18"H	19"dia.x30"H	0-37.5/75/150	0-100 ua/1ma/10ma.	2310
220 Volt 60 Hz	0-200 KV	10 ma.	2200	OIL		30"Wx30"Dx35"H	0-40/80/200	0-100 ua/1ma/10ma.	3850
	0-250 KV	10 ma.	2250	OIL		36"Wx34"Dx38"H	0-50/100/250	0-100 ua/1ma/10ma.	5500
	0-300 KV	10 ma.	2300	OIL		40"Wx36"Dx40"H	0-60/120/300	0-100 ua/1ma/10ma.	7920
	0-400 KV	10 ma.	2400	OIL		48"Wx38"Dx44"H	0-80/200/400	0-100 ua/1ma/10ma.	10,450
	0-500 KV	10 ma.	2500		CHECK FACTORY FOR INFORMATION				
	0-600 KV	10 ma.	2600						
	0-750 KV	10 ma.	2750						
	0-1000 KV	10 ma.	21000						

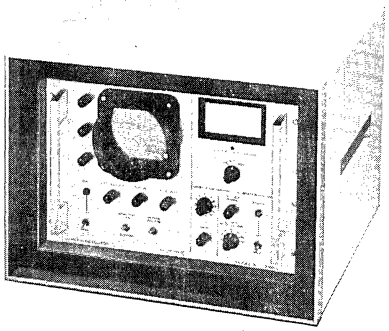
Standard output voltage is negative polarity. Positive or reversible polarity available.
All units available with deluxe, slope-front cabinet.

corona detectors

All Hipotronics' AC, DC, or AC/DC Insulation Test Sets are corona free to full rating and can be supplied with Hipotronics' advanced Corona Detector Oscilloscope to provide a complete and integrated corona test system. These systems meet or exceed testing requirements as specified by ASTM, IPCEA, AEIC, MIL-C-17D, and MIL-T-27 Request a complete quotation to fill your requirements.

SPECIFICATIONS:

PARAMETER	CDO-68-C	CDO-3-68
Input	115 volt, 50/60 Hz, 1 amp.	
Bandpass	Three bands selectable from front panel: 1. AEIC Interim Spec. No. 5 2. 70 KHz ± 15% KHz slot filter 3. 30 KHz ± 15% KHz slot filter	30-300 KHz 70 KHz ± 15% slot filter optional
System sensitivity	Full reel cable load: 20 pc/cm or 0.1 mfd: 5 pc/cm, 0.5 mfd: 25 pc/cm	
KV meter (optional)	Analog: 4½" with 2% accuracy; triple range, with ranges to fit voltage rating of separation filter. Digital: Digital kilovoltmeter also available on request.	
Separation filter (optional)	3000 pfd @ 50, 100, 150, & 200 kv	
Calibrator output	1, 2, 4, 20, 40, 100 & 250 picocoulombs, 200 μsec wide, with 5 nanosec rise time	
Calibrator capacitor (optional)	100 pfd with 50-, 100-, 150- or 200-kv rating	
Input sensitivity	5 microvolts/cm at 2:1 signal-to-noise ratio	15 microvolts/cm at 2:1 signal to noise ratio
CRT	5" diameter	3" diameter
Presentation	Straight line & elliptical, with 90° phase shift switch	Straight line & elliptical
Size	Relay rack mount on 10" x 19" panel. (Custom cab. available.)	22"W x 25"D x 14"H



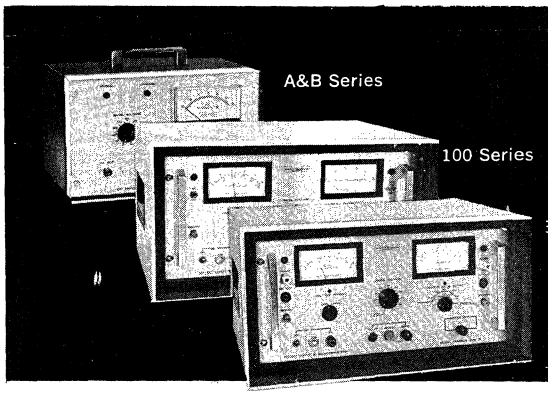
Model CDO-68C, shown with optional KV meter

Prices and specifications subject to change without notice.

HIPOTRONICS®

HIPOTRONICS, INC.
Brewster, N. Y. 10509 / (914) 279-8091

For more data on DC Insulation Testers and Corona Testers, call or write our Marketing Department and ask for descriptive literature. See other Hipotronics' listings under Power Supplies, Transformers, and Capacitors.



HIPOTRONICS

AC/DC hipot & insulation testers

NON-DESTRUCTIVE UNITS FOR PRODUCTION OR LABORATORY USE . . . IN RANGES UP TO 10 KV AC AND TO 25 KV DC

AC/DC HIPOT TESTERS & MEGOHMMETERS (300 Series)

■ Three test functions . . . with one flexible unit: (1) AC dielectric/insulation tests, (2) DC dielectric/insulation tests, and (3) insulation/resistance tests with direct megohmmeter readings.

■ Two versions available . . . to fit all requirements:
A Series — current readings as low as 1 ua on four range meter, resistance to 1,000 megohms on two range megohmmeter.
B Series — current readings as low as 0.01 ua on six range meter, resistance to 100,000 megohms on four range megohmmeter.

■ Bench-top or rack mount . . . fits any standard 19-inch equipment rack.

FEATURES:

■ Overload circuit has continuously adjustable sensitivity from 50 ua to 5 ma, allowing non-destructive testing of insulation and dielectrics.

■ Dual range output connected KV meter, with calibrated set point for megohmmeter readings clearly marked.

■ Reset button and failure indicator.

■ Recalibration facilities.

■ Guard circuit for grounded or ungrounded operation.

■ Front panel re-entrant test lead connections.

■ AC/DC function indicator lights.

■ Zero start interlock — compels operator to start tests at zero volts.

SPECIFICATIONS:

Input . . . . . 115 VAC, 60 Hz, 1 amp max.
Size & Weight . . . . . 21″W x 19″D x 10″H; approx. 50 lbs.
Meters . . . . . 2% full scale accuracy, 4½″ meter.
Current meter ranges:
A Series . . . . . Ranges of 0-50/500/5000 ua, DC, 0 to 5 ma AC, 1 to 1000 megohms in 2 ranges
B Series . . . . . Ranges of 0-0.5/5/50/500/5000 ua, 0 to 5 ma AC, 1 to 100,000 megohms in 4 ranges

Model	Output Voltage (KV) AC	DC	Current Meter Range AC	DC	Megohm Ranges	Price ($)
H 301A	1.0	1.5	0-5 ma	0-50/500/5000 ua	2	390
H 301B	1.0	1.5	0-5 ma	0-0.5/5/50/500/5000 ua	4	495
H 303A	2.5	3.0	0-5 ma	0-50/500/5000 ua	2	410
H 303B	2.5	3.0	0-5 ma	0-0.5/5/50/500/5000 ua	4	530
H 306A	5.0	6.0	0-5 ma	0-50/500/5000 ua	2	430
H 306B	5.0	6.0	0-5 ma	0-0.5/5/50/500/5000 ua	4	565

OPTIONAL EXTRAS (ALL UNITS):
■ HV test probe $10
■ Gravity operated output shorting solenoid with discharge resistor . . . $35
■ Audible failure signal $15

AC/DC HIPOT TESTERS (100 Series)

■ Similar to our 300 series . . . without the direct reading megohmmeter. Megohms can be calculated from the accurate readings on the KV and DC current meters.

■ Two versions available . . . a standard unit with simplified control features, and a more deluxe unit with all the necessary controls for laboratory precision testing programs.

■ Bench top or rack mount . . . this attractive bench-top unit fits any standard 10-inch equipment rack.

FEATURES:

■ Overload circuit has continuously adjustable sensitivity from 50 ua to 5 ma permitting non-destructive testing of insulation and dielectrics.

■ KV meter recalibration facility.

■ Output control continuously adjustable from zero to maximum.

■ Front panel re-entrant test lead connections.

■ AC/DC function indicator lights.

ADDITIONAL FEATURES IN DELUXE HD MODELS:

■ Zero start interlock with HV on and off switches — compels operator to start tests at zero volts.

■ Triple range KV meter and DC current meter.

SPECIFICATIONS:

Input . . . . . 115 VAC, 60 Hz, 5 amps max.
Size & Weight . . . . . 21″W x 19″D x 10″H; approx. 60 lbs.
Meter . . . . . 2% full scale accuracy. 4½″ meter.

Model	Output Voltage (KV) AC	DC	Output Current Meter DC	AC	KV Meter Ranges	Price ($)
H 103	2.5	3.0	0-5 ma	0-5 ma	0-3 KV	270
HD 103	2.5	3.0	0-50/500/5000 ua	0-5 ma	0-0.6/1.2/3 KV	340
H 106	5.0	6.0	0-5 ma	0-5 ma	0-6 KV	290
HD 106	5.0	6.0	0-50/500/5000 ua	0-5 ma	0-1.2/3/6 KV	360
H 115	12.0	15.0	0-5 ma	0-5 ma	0-15 KV	370
HD 115	12.0	15.0	0-50/500/5000 ua	0-5 ma	0-3.75/7.5/15 KV	410
H 125	10.0	25.0	0-5 ma	0-5 ma	0-25 KV	445
HD 125	10.0	25.0	0-50/500/5000 ua	0-5 ma	0-5/10/25 KV	490

OPTIONAL EXTRAS (ALL UNITS):
■ HV test probe $10
■ Gravity operated output shorting solenoid with discharge resistor . . . $35
■ Audible failure signal $15

AC & DC PRODUCTION HIPOT TESTERS (A and B Series)

■ Simple to operate . . . reliable for go-no/go testing. Designed for use by unskilled or semi-skilled personnel in mass testing of electrical components, transformers, etc.

■ Visual indicators . . . illuminate on front panel when component leakage or internal arcing is detected . . . audible alarm optionally available.

■ Compact, lightweight, and rugged . . . this unit goes where the problem is.

Hipot testers are available in all models which comply with revised UL specification 499, paragraph 280B. Consult factory for details.

FEATURES:

■ Arcing detector employs corona pick-up network for optimum sensitivity.

■ Leakage detector sensitivity continuously adjustable from 500 ua to 5 ma permitting non-destructive testing of insulation and dielectrics.

■ Output connected KV meter for maximum accuracy.

■ Shielded output lead through re-entrant jack.

ADDITIONAL FEATURES IN HD MODELS:

■ Audible failure alarm circuit incorporated into design of all deluxe models.

Hipotronics manufactures AC/DC dielectric and insulation testers from 10 volts to 2 million volts with KVA ratings to 10,000 KVA.
Contact factory for customized designs.

SPECIFICATIONS:

Input . . . . . 115 VAC, 60 Hz, 3 amps max.
Size & Weight . . . . . 7″H x 12″W x 8″D; approx. 20 lbs.
Meter . . . . . 3% full scale accuracy, 4″ meter.

AC Models	Output Voltage	Short Circuit Current	Price ($)
H A1	1 KV AC	18 ma	110
H A2	2 KV AC	18 ma	125
H A3	3 KV AC	18 ma	145
HD A3	3 KV AC	18 ma	170
H A5	5 KV AC	18 ma	160
HD A5	5 KV AC	18 ma	185
H A10	10 KV AC	18 ma	190
HD A10	10 KV AC	18 ma	215
DC Models	**Output Voltage**	**Short Circuit Current**	**Price ($)**
H B1	1 KV DC	5 ma	115
H B2	2 KV DC	5 ma	125
H B3	3 KV DC	5 ma	135
H B4	4 KV DC	5 ma	150
HD B4	4 KV DC	5 ma	175
H B6	6 KV DC	5 ma	170
HD B6	6 KV DC	5 ma	195
H B12	12 KV DC	5 ma	210
HD B12	12 KV DC	5 ma	235

Prices and specifications subject to change without notice.

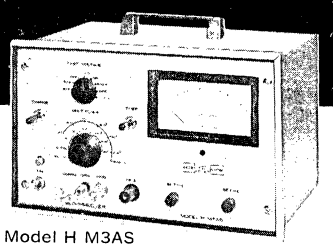
HIPOTRONICS®
HIPOTRONICS, INC.
Brewster, N. Y. 10509 / (914) 279-8091

For more data call our Marketing Department and ask for descriptive literature. See other Hipotronics' listings under Power Supplies, Transformers, and Capacitors.

megohmmeters/insulation testers

HIPOTRONICS

PORTABLE HIGH RESISTANCE SERIES COVERING RANGES FROM 100,000 OHMS TO 20,000,000 MEGOHMS



Model H M3AS

. . . FOR TESTING INSULATION RESISTANCE TO ASTM SPECIFICATION D-257 AND TO APPLICABLE UL, CSA, AND MIL STANDARDS

FEATURES

- No meter bounce; therefore, meter averaging not required, even with large capacitive loads or any input voltage change in 20,000,000-megohm range . . . Output voltage is double regulated with both a ferro-resonant line and solid state electronic regulators.
- Dead shorts on megohmmeter output will not damage components . . . short circuit protection will handle continuous shorting without injury to any component.
- Grounded or ungrounded testing . . . with three-terminal output (positive, negative, and guard).
- Verify the calibration at any time . . . self-contained calibration resistors permit operator to periodically verify the calibration.
- Discharge internal and load capacitance . . . switch position and resistor provided for complete capacitive discharge.
- No zero shift . . . on any range. VTVM circuit drives the meter on this high quality megohmmeter.
- Better than 2% accuracy on all readings below 1 million megohms, with 3% on 20 million megohms.

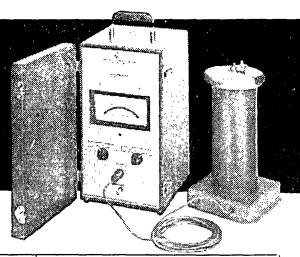
SPECIFICATIONS:

Input: (all models) . . . . . 115 volts, 60 Hz.
Weight: (all models) . . . . . 20 lbs. (approx.)
Size: (all models) . . . . . 7″H x 12″W x 8″D

Model No.	Output Voltage	Megohm Range	Megohm Ranges	Price ($)
H M1	500	1 to 1,000 megohms	2	160
H M3A	50 100 500 1000	0.1 to 1,000,000 megohms 0.2 to 2,000,000 megohms 1 to 10,000,000 megohms 2 to 20,000,000 megohms	6 6 6 6	315
H M3AS		Same as H M3A, but with mandatory 2 hand operation		340
H M6B	50 250 500	0.1 to 1,000,000 megohms 0.5 to 5,000,000 megohms 1 to 10,000,000 megohms	6 6 6	275
H M6S		Same as H M6B, but with mandatory 2 hand operation		300
M6C	250	0.1 to 1,000,000 megohms	6	250

AC/DC kilovoltmeters

. . . SELF-STORING ANALOG SERIES WITH ACCURACY GUARANTEED TO 0.5% DC AND 1.0% AC (TRACEABLE TO NBS)



FEATURES

- Precision instruments for laboratory use — yet ruggedly designed and packaged for field and portable service.
- Models to 200 KV available from stock; eight other models with ratings to 1000 KV available.
- Unique packaging concept permits one-hand portability for field use . . . plus safe storage for dividers behind front panel . . . yet operator safety is assured with two-piece construction.
- Average-reading meter calibrated in rms.
- Ripple measurements . . . merely turn the switch to AC.
- Burn-out proof . . . cannot be injured by over voltages or sharp rise time transients.
- Digital models available.

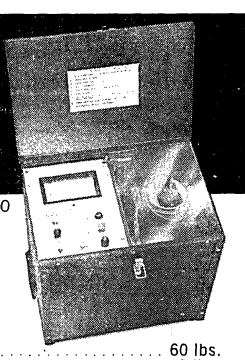
SPECIFICATIONS:

	Model KV50A	Model KV100A	Model KV200A
DC accuracy	0.5%	0.5%	0.5%
AC accuracy	1.0%	1.0%	1.0%
Tracking	0.5%	0.5%	0.5%
DC temp. coefficient	0.025%/C°	0.025%/C°	0.025%/C°
AC temp. coefficient	0.1%/C°	0.1%/C°	0.1%/C°
Frequency response	DC and 40 to 1000 Hz	DC and 40 to 1000 Hz	DC and 40 to 1000 Hz
Meter ranges (kV)	0-10/25/50	0-20/50/100	0-40/100/200
Volts division	100/250/500	200/500/1000	400/1000/2000
Impedance	190 megohms @ 200 pfd.	380 megohms @ 100 pfd.	760 megohms @ 50 pfd.
Size	8½″W x 10½″D x 15½″H	8½″W x 10½″D x 15½″H	9½″W x 10½″D x 40″H
Weight	20 lbs.	21 lbs.	40 lbs.
Price	$580	$850	$1900
Delivery	From stock	From stock	From stock
Warranty	One year free parts and service		

Prices and specifications subject to change without notice.

liquid dielectric tester

MODEL OC-50: A 50 KV PORTABLE UNIT DESIGNED TO TEST THE BREAKDOWN VOLTAGE OF INSULATING OILS IN ACCORDANCE WITH ASTM SPECIFICATIONS



Model OC-50

FEATURES

- Performs tests to ASTM D149, ASTM D877, and ASTM D1816.
- Fully automatic — just select motorized rate of rise.
- Accuracy assured — memory meter records breakdown point.
- Wide range — 50 KV rating is standard to accommodate the dielectrics now being used in transformers, bushings, capacitors, etc.
- Cup options — accepts all standard cups, including Doble and G.E.
- Also available: Model OC-90 (0-90 KV rms) and Model OC-60 (0-60 KV rms).

SPECIFICATIONS:

Input: 115 volts, 50/60 Hz, 2 amps, single phase
Output: 0-50,000 volts rms at 2 KVA
Accuracy: 2% at full scale
Dimensions: 15½″W x 14″ x 11½″D
Weight: Units without test cell . . . . . 60 lbs.
Test cell with disc electrode (oil cup) . . . . . 2 lbs.
Test cell with VDE electrode . . . . . 4 lbs.
Price: OC-50 unit without test cell (accepts any standard test cell) . . . $595
TC/VDE test cell, with VDE electrodes (tests to ASTM D1816) . . . $195
TC/DE test cell, with disc electrodes (tests to ASTM D877) . . . . . $ 75

Prices and specifications subject to change without notice.

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HIPOTRONICS, INC.
Brewster, N. Y. 10509 / (914) 279-8091

Call or write our Marketing Department for more data and descriptive literature. See other Hipotronics' listings under Power Supplies, Transformers, and Capacitors.

Hoyt HOYT ELECTRICAL INSTRUMENTS

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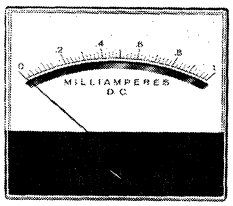
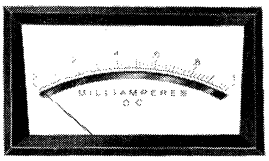
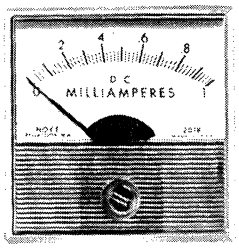
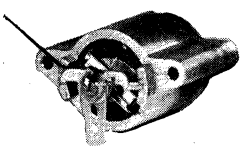




CUSTOM PANEL METERS

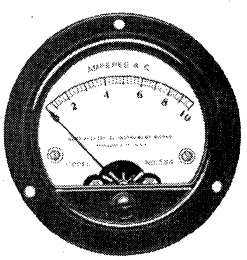
Available in sizes of 1½", 2½", 3½", 4½", 6" and 8". These smartly styled meters are available with die cast metal bezels for mounting the 1½" to 4½" meters behind equipment panels. They can also be supplied with an illumination provision. Other options include painted fronts and mirror dials. Four stud mounting permits interchangeability with most other meter types. Refer to dimensions on bottom of page. 2% A.C. Repulsion, 2% and 1% Moving Coil D.C. and VU meters available.





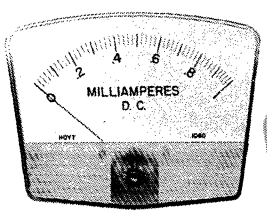
SELF-SHIELDED TAUT BAND PANEL METERS

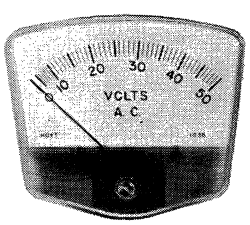
These new Taut Band Self-Shielded meters are for applications requiring a friction-less movement at very reasonable prices. Available with clear polystyrene cases in the 1½", 2½", 3½", and 4½" sizes. They may be mounted on the panel or behind the panel with bezel.



BAKELITE PANEL METERS FOR INDUSTRIAL APPLICATIONS

For more industrial panels Hoyt has a complete line of both round and square Bakelite Panel Meters. Square and Round Bakelite styles are available in 2½", 3½", and 4½" cases. Both A.C. Repulsion and D.C. D'Arsonval Movements available in most ranges. Some metal case styles also available in 2½" to 8" round sizes.





MODERN DESIGN PANEL METERS

These modern designed meters are available in sizes ranging from 2½" to 6". The clear plastic provides maximum scale length and readability, yet occupies a minimum of space on a panel. Standard meters have a plain lined case front. Standard or panel-matched colors for the case front can be supplied.

POPULAR RANGE DEALER PRICES

Range	2½"	3½"	4½"
0-1DCmA	15.50	16.45	18.25
0-300DCV or under	16.85	17.60	19.20
0-100DCUA	19.20	20.55	22.30
0-5 ACA or ACV	16.15	17.00	18.00
0-150 ACV	17.25	18.00	19.00
VU Meters	28.30	29.50	30.60

A complete AC and DC price sheet for all meter styles, sizes and movements is available on request.

Please write or phone for quotations covering your specific requirement. Substantial discounts will apply on quantity orders.

Sample meters are available for electrical test and evaluation.

HOYT ELECTRICAL INSTRUMENT WORKS, INC.

BURTON-ROGERS COMPANY Sales Division

HOYT ELECTRICAL INSTRUMENTS

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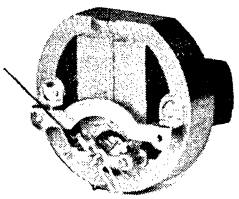
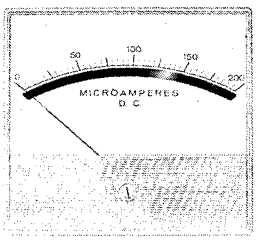
NO. 2025-19, NO. 2035-19, NO. 2045-19, NO. 2060-19
HIGH TORQUE-SHIELDED PANEL METERS

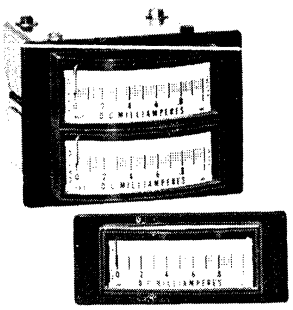
Here is the New completely shielded high torque D.C. movement for those applications requiring higher accuracies, rugged applications, higher torque, and the best in dependability and long life. Hoyt's own design employs a Super V Alnico Bar Magnet electronically bonded to machined and plated soft iron shielding pole pieces. Hoyt's best meter movements for special applications.

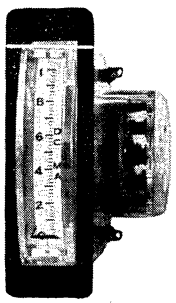




EDGEWISE PANEL METERS

The newest Hoyt Edgewise Meter No. 685 is designed without any barrel projection so that the meter may be used as a single unit or mounted together horizontally or vertically in quantities of two or more. Mounting bezels are available for one, two, or three stack units. This is completely shielded from interaction and stray magnetic fields. Our other Edgewise No. 673/S with a narrower .64" front is best for limited front panel space. Both types available in 2% Moving Coil ranges or VU Meters.



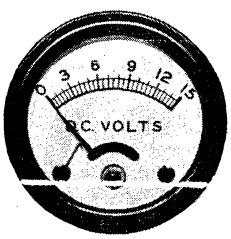


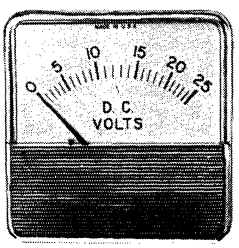
MOVING MAGNET INDICATORS

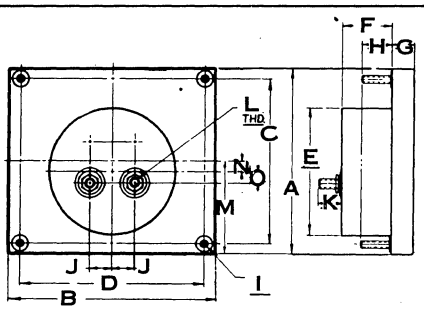
These inexpensive indicators feature rugged movements, round or square cases with a variety of mounting arrangements. The newest indicator, Model No. 795 is available with die cast metal bezel for behind panel mount.

SHUNTS & TRANSFORMERS

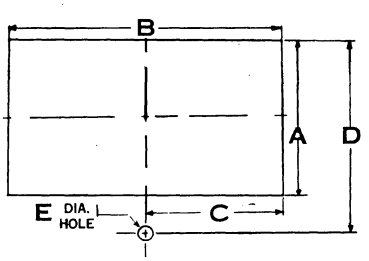
For D.C. or A.C. Ammeters Hoyt has a complete stock of 50 Millivolt drop shunts with leads and 5 amp ratio donut transformers.







DC Model	AC Model	DIMENSIONS FOR METER CASES A	B	C	D	E	F	G	H	IJKL-Below M	N	O
2015	2016†	1.74	1.74	1.31	1.31	1.50	1.00	.33	.50	.87	O.C.	—
2025	2026	2.37	2.81	1.87	1.87	2.16	1.12	.42	.50	1.18	O.C.	O.C.
2035	2036	2.97	3.50	2.25	2.25	2.75	1.10	.45	.56	1.48	.03	.28
2045	2046	4.03	4.50	3.56	4.00	2.75	1.09	.48	.62	2.01	.24	.49
2060	2061	4.49	5.72	3.00	5.25	2.75	1.10	.51	.66	2.24	.65	.71
2080	2081†	6.50	7.75	4.50	6.00	3.50	1.10	.66	.62	3.25	1.25	.187



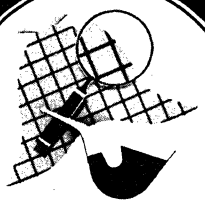
DC Model	AC Model	A	B	C	D	E
2015-B	2016-B†	1⅛"	1 29/32"	61/64"	1.480"	13/64
2025-B	2026-B	1 39/64"	3"	1½"	2.061"	¼"
2035-B	2036-B	2 3/16"	3¼"	1⅞"	2.646"	¼"
2045-B	2046-B	2¾"	4 13/16"	2 13/32"	3.390"	¼"

DIMENSIONS FOR BEZEL CUTOUTS

1=4½", 6", 8" use 6-32, others 4-48
J=.48*
†Rectifier type movement only.
L=10-32*
*Except 2015-16 Solder Lugs
K=.50*

HOYT ELECTRICAL INSTRUMENT WORKS, INC.

BURTON-ROGERS COMPANY Sales Division

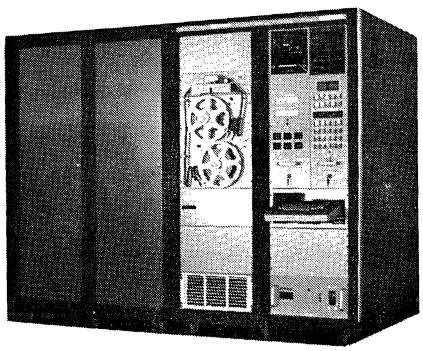


FACT

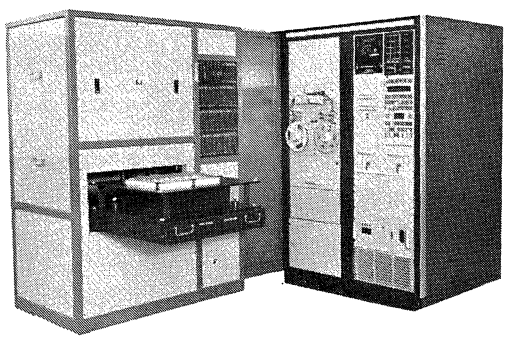
(FLEXIBLE AUTOMATIC CIRCUIT TESTER)

SYSTEMS APPROACH TO WIRE ANALYSIS

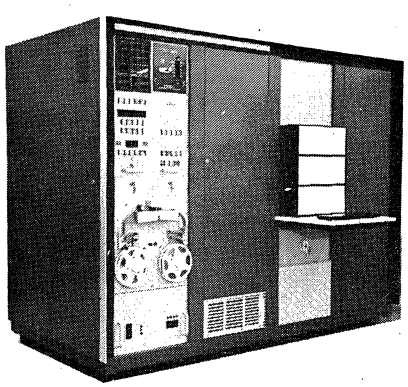
High Speed Circuit Analyzers, Fixturing, Cable Adapters and Facility Layouts customized to meet your requirements. Test systems provide greater productivity, assure product validity and better return on investment.



The Hughes FACT-II (Flexible Automatic Circuit Tester) is a versatile, high speed test system, completely programmable with random access modular switching, for automated continuity and leakage testing of complex wired assemblies, computer backplanes and multilayer printed circuit boards. Punched tapes supply programmed test instructions. Test speeds are 4000 tests/minute for continuity and 2000 tests/minute for leakage. Test capability can be enhanced to meet peculiar test requirements by system expansion and inclusion of optional equipment.



Hughes Semi-Automatic Spring Probe Fixtures are integrated with many FACT Test Systems to provide the user with the capability of rapidly interfacing printed circuit boards, multilayer boards and the wiring side of backplane wiring panels. Completely automated handling systems are available to meet your specific needs.



LIFT (Low Insertion Force Technique) adapters are commonly used with FACT Test Systems to provide customers with a quick means of adapting to the connector side of wired backplanes. The product is loaded with extender cards and the entire unit is then inserted into the LIFT connector panel with almost zero force. Any number of connections can be made simultaneously by operation of a pneumatic bladder. Quick interconnect/disconnect enables off-line product hook-up or rework resulting in optimum use of the analyzer.

HUGHES AIRCRAFT COMPANY
Industrial Products Division
FACT Systems

HUGHES
HUGHES AIRCRAFT COMPANY

P.O. Box 92904
Los Angeles, California 90009
Area Code (213) 670-9040, Ext. 6661

PHAZOR

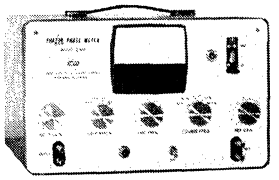
The operation of the Phazors is unique in that the input and reference signals are applied to an electronic multiplier which derives the instantaneous product of their amplitudes. The multiplier output is then applied to a DC meter which produces a deflection proportional to the time average of this product.

Expressing this function mathematically we have: Meter Deflection = $\frac{k}{T}\int_0^T V_S \cdot V_R \, dt$

PHASE METERS

High Accuracy and Resolution • Measures 0°-360° Without Ambiguity • Rejects All Noise and Harmonics (without filters) • Wide Input Voltage and Frequency Range • Self Calibration Assures Accuracy

MODEL 200A



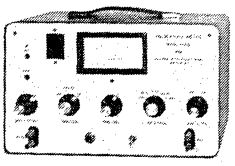
$505.00

APPLICATIONS: Measures phase shift in transformers, amplifiers, etc. • Readings not affected by noise and harmonics • Measures in-phase or quadrature voltage components • .01 degree can be measured employing special techniques.

SPECIFICATIONS

ACCURACY: ..... ±2 degrees
FREQUENCY: ..... 20 Hz to 20 KHz

MODEL 210AB



$840.00

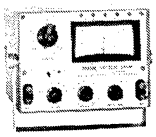
This instrument retains the essential feature of other Phazor models in that accurate measurements can be made even though signals may be complicated by noise and harmonics. The quadrant is read directly on a projection readout. The angle within the quadrant is displayed on the meter.

SPECIFICATIONS

ACCURACY: ..... ±2 degrees
FREQUENCY RANGE: 15 Hz–30 KHz
SENSITIVITY: ..... 5 millivolts

VECTOR VOLTMETERS

Precise Measurement of:
IN-PHASE VOLTAGE • QUADRATURE VOLTAGE
TRUE RMS VOLTAGE • PHASE ANGLE
NULL VOLTAGE



MODEL 300PB

$1,200.00

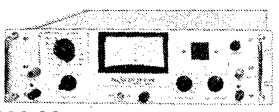
- Portable — All Solid State
- Direct Reading Phase and Quadrant Indicator
- Battery Operated — Eliminates Power Line Ground Loops

SPECIFICATIONS

INPUT VOLTAGE: ..... 1 MV–300 V
INPUT IMPEDANCE: ... 1 megohm
VOLTAGE ACCURACY: 2% full scale
PHASE ACCURACY: ... ±1 degree
FREQUENCY RANGE: 60 Hz–10 KHz
NULL SENSITIVITY: ... 10 microvolts
HARM. REJECTION: .. 40 db down without filters
WEIGHT: ..... 9 lbs., approx., with batteries

AC Power Pack Available — $150.00

MODEL 300C



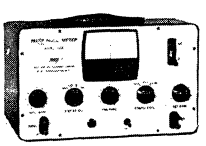
$1700.00

- All Solid State
- Direct Reading Phase Angle
- Wide Frequency Range
- Rejection of Noise & Harmonics
- Input & Reference Isolation

SPECIFICATIONS

INPUT VOLTAGE:.....300 μV to 300 V
INPUT IMPEDANCE:....10 Megohm
VOLTAGE ACCURACY:....2% Full Scale
PHASE ACCURACY:.....±1 degree
FREQUENCY RANGE:....15 Hz to 100 KHz
REF. VOLTAGE:.....100 MV to 130 V
NULL SENSITIVITY:.....Less than 2 μV
HARM. REJECTION:.....40 DB without filters
RACK PANEL SIZE:.....19″ W x 5¼″ H

NULL METERS



A PHASE SENSITIVE NULL METER

MODEL 100A

$395.00

SPECIFICATIONS

Input Impedance
High Gain . . . 2 megohm shunted by 30 MMF.
Low Gain . . . 2.5 megohm shunted by 15 MMF.
Sensitivity—6 millivolts off-scale deflection
Frequency Range—30-10,000 Hz
Selectivity—40 DB down on all noise and harmonics
Reference Voltage—8 volts to 120 volts
Maximum Input Voltage—120 Volts RMS
Peak Input Voltage—400 Volts
Power Supply—105-125 Volts, 50-400 Hz, 25 Watts
Dimensions—Height 9 inches, Width 15 inches, Depth 8 inches (19″ rack avail.)
Weight—25 pounds
Also available:
Model 100AH (similar to 100A with freq. range of 30 Hz to 50 KHz)

Powertron ELECTRONIC GENERATORS

A complete line of 1ϕ, 2ϕ & 3ϕ models with power output ratings from 3 VA to 9 KVA and frequency accuracies to .0001%.

These AC Power Supplies provide stable, low distortion AC power at frequencies within the audio frequency spectrum. The highly reliable and versatile power sources find wide application in calibration and test stations, motor drives, gyro wheel supplies, laboratory use, military component testing, and operating foreign equipment.

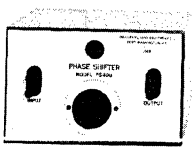
FOR ADDITIONAL INFORMATION SEE SECTION 4000—OR REQUEST COMPLETE CATALOG #969.

PHASE SHIFTERS

MODELS PS 60 and PS 400

FOR MEASUREMENT AND COMPARISON OF PHASE ANGLES OR AS A SECONDARY PHASE STANDARD.

$375.00



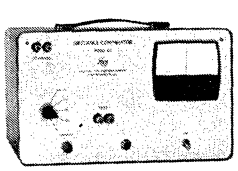
SPECIFICATIONS

Range .....0° –360° (continuously variable)
Accuracy ..... ± 1.0 degrees
Supply Frequency
60 C. P. S. for Model 60, 400 C. P. S. for Model 400 (other frequencies on request)
Input Voltage ..... 26 to 115 volts
Input Impedance ...
Approx. 1500 ohms for Model 60
Approx. 500 ohms for Model 400
Output Voltage .....⅓ input voltage Approx.
Output Load ..... 1 megohm or greater
Dimensions ..... Height 5 1/16 inches, Width 9 inches, Depth 6⅛ inches.

IMPEDANCE COMPARATORS

PRECISE, RELIABLE AND RAPID COMPARISON OF COMPONENTS

MODEL 60



$265.00

The circuit consists of a bridge, two arms of which are precision resistors matched to .01%. The two remaining arms are the standard and the component under test. Any voltage resulting from bridge unbalance is amplified and fed to a phase discriminator. The percentage deviation is read directly in both sign and magnitude on a meter.

FEATURES: High Accuracy & Stability • Fast Response • Linear Meter Scales • Self Calibrated

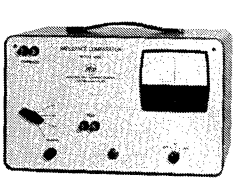
SPECIFICATIONS

FREQUENCY: ..... 60 Hz
FULL SCALE RANGES: ±1%, 5%, ±0%, 20%
IMPEDANCE LIMITS:
Resistance ..... 5 ohms to 5 megohms
Capacitance ..... 500 mmfd. to 500 mfd.
Inductance ..... 15 milihy to 10,000 hy

SPECIFICATIONS

FREQUENCY: ..... Either 1 KHz or 10 KHz
FULL SCALE RANGES: ±5%, 10%, 20%
IMPEDANCE LIMITS:
Resistance ..... 5 ohms to 5 megohms
Capacitance ..... 50 mmfd. to 10 mfd.
Inductance ..... 100 microhy to 100 hy

MODEL 1010



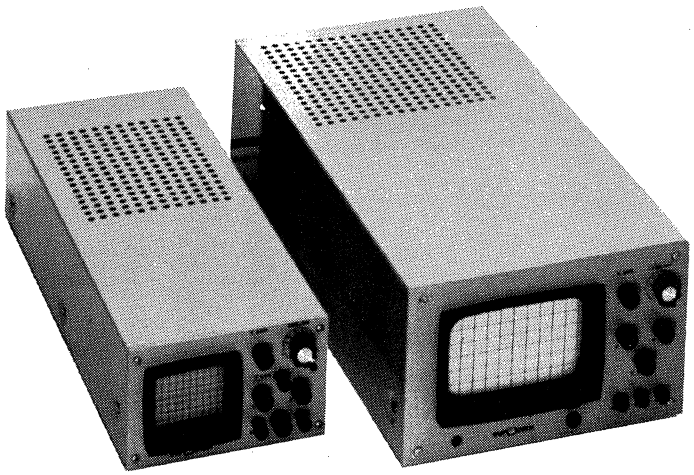
$395.00

OTHER MODELS AVAILABLE } **MODEL 1000—1000 Hz—±1%, 5%, 10%—$395.00**
MODEL 1025—1KHz, 25 KHz—±5%, 10%, 20%—$455.00

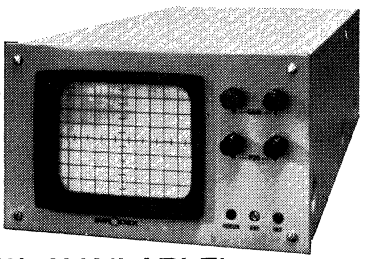
WRITE FOR CATALOGS

Manufacturers of: PHASE SHIFTERS, FREQUENCY STANDARDS, NULL DETECTORS, AUTOMATIC HI-POT TESTERS AND OTHER ELECTRONIC TEST EQUIPMENT

ITECO INDUSTRIAL TEST EQUIPMENT CO. 20 Beechwood Ave., Port Washington, N. Y. 11050
Phone: (516) PO 7-5253



Series 8602 (3") and 8622 (5") have vertical bandwidth to 2½MHz (4HMz optional), TTL compatible Z axis control, and 12-step multirange sweep that also provides DC-1MHz horizontal channel for X-Y operation. Fixed sweep models also available (Series 8601 and 8621).



NOW AVAILABLE!

Series 9620 oscilloscopes are similar to the 8620 series, but feature a full 8 x 10 cm screen, plus phase-matched vertical and horizontal deflection amplifiers.

CRT DISPLAY

Infodex offers a standard line of 3" rectangular and 5" rectangular scopes. Each series embraces 22 standard models, ranging from X-Y indicators with AC coupled Z axis for grey scale modulation, through a choice of 18 triggered sweep ranges, to three models with 12-step multi-range sweep. All sweep models have TTL-compatible Z axis controls. General specifications include:

Vertical bandwidth — 2½ MHz
Horizontal bandwidth — 1 MHz
Sensitivity — 100μV/div
Sweep rates — 1μs/div to 500 ms/div

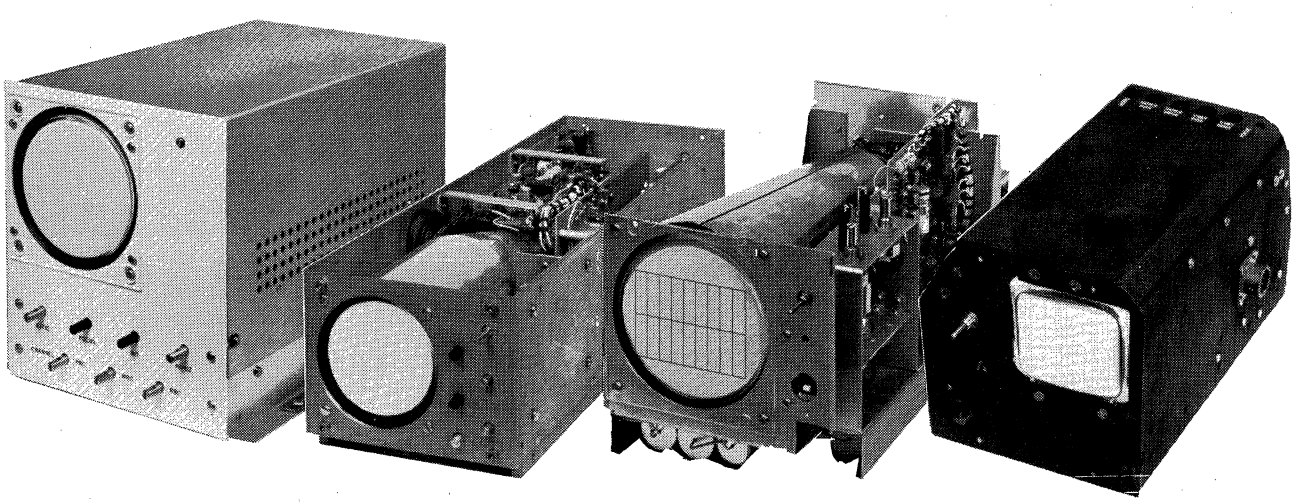
Plus many options.

However — many customers need something a little different. Infodex circuit design and packaging gives outstanding manufacturing flexibility so that we can provide specials with reasonable lead times and price tags.
Therefore — if you need special capabilities and/or configurations, in prototype or production quantities — give us a call!

Note: Deflection amplifiers also available as individual components.

INFODEX
INCORPORATED
7 Cherry Avenue, Waterbury, Conn. 06702 • 203-757-9291

Below: Some special assemblies, delivered ready for installation



Used in biomedical instrumentation.

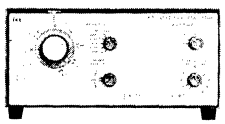
Part of radar surveillance equipment.

Component of navigation system.

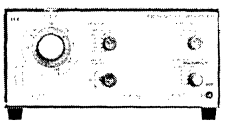
Meets MIL Specs (airborne) for altitude, shock, vibration, temperature.

Now IEC has 9 New Function Generators! One is Exactly Right for Your Needs

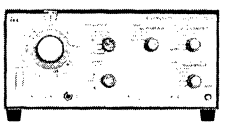
SERIES 30/0.3 Hz to 3 MHz/$295 to $495



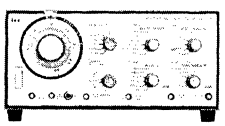
F31 includes these features which are also common to all SERIES 30 models described below: sine, square, triangle and DC waveforms; sync output; continuous, full range, calibrated fine and coarse tuning control; 10 volt peak-to-peak output and ±5 volts continuously adjustable offset range with 50 ohm load; 2-step, 40 db dynamic range output attenuator and plug-in IC's. **$295**



F32 includes 1000:1 VCG; 5-step, 60 db dynamic range output attenuator; and IEC's exclusive output limit indicator to visually warn of waveform clipping due to improper combination of offset and level controls. **$345**

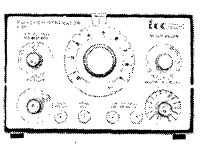


F33 includes VCG; 60 db attenuator; overscale limit indicator; PLUS trigger and gate and external sync input. The F33 is the industry's lowest cost function generator to include variable width pulse. **$395**

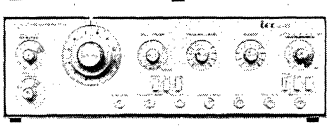


F34 includes VCG; 60 db attenuator; overscale limit indicator; trigger and gate; sync input; variable width pulse PLUS tone burst and continuous and triggered sweep. The F34 is the industry's lowest priced function generator offering true analog voltage output proportional to frequency for X-Y display. **$495**

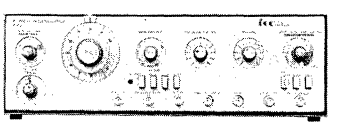
SERIES 50/0.0005 Hz to 10 MHz/$595 to $1195



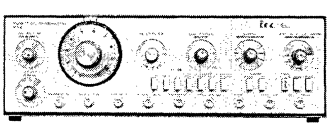
F51 includes these features which are also common to all SERIES 50 models described below: variable width pulse, sine, square, triangle, ramp and fixed duty cycle pulse waveforms; VCG; pulse width modulation; sync signal output; fixed and variable voltage offset for all waveforms; sync input; continuous, full range, calibrated fine and coarse tuning control; 15 volt peak-to-peak output and ±7.5 volt offset range with 50 ohm load. **$595**



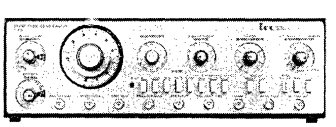
F52 includes trigger and gated output with manual or external trigger with start-stop phase angle control; 6-step, 70 db dynamic range attenuator; simultaneous sine, square and triangle monitor outputs. **$795**



F53 includes trigger and gate; 70 db output attenuator; monitor outputs PLUS phase lock for multiplication and division of frequencies and coherent generation of a variety of waveforms with continuous phase angle control. **$895**



F54 includes trigger and gate; 70 db output attenuation; monitor outputs PLUS sweep with continuous, triggered and frequency shift modes; direct reading, fool-proof, calibrated sweep width control and multiple or single cycle burst. **$1085**



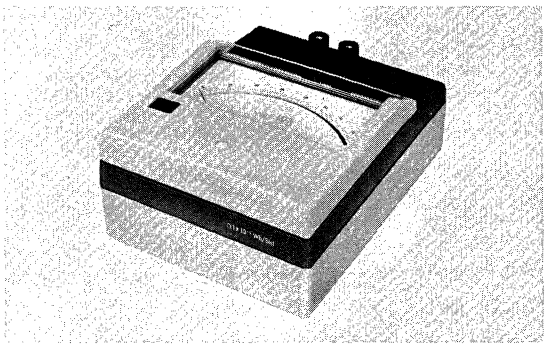
F55 includes trigger and gate, 70 db output attenuator and monitor outputs PLUS being the industry's only function generator offering both sweep and phase lock. **$1195**

Contact John Norburg at IEC, Telephone (714) 772-2811;
TWX 714-776-0280; TELEX 655443, 655419.

INTERSTATE ELECTRONICS CORPORATION

A Subsidiary Of A-T-O Inc.

Dept. 7000E, Box 3117, 707 East Vermont Avenue, Anaheim, California 92803

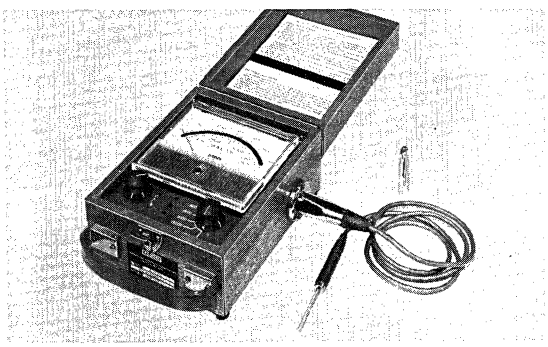


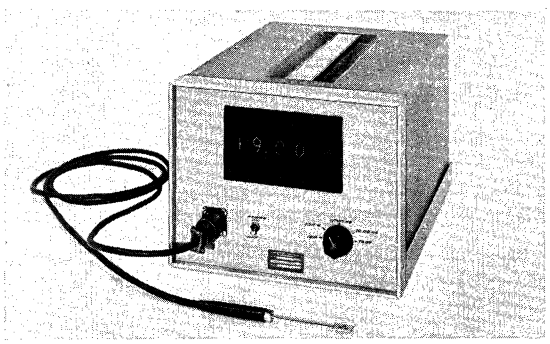
MODEL 621 F NORMA FLUXMETER

Joining the widely used Model 251F is the new, small and rugged Model 621F Fluxmeter. This accurate instrument, with a simple scale of 10^{-4} Webers (10,000 Maxwells)/Scale Division is expressly intended for the educational field. The economical price and liberal education discount makes its purchase for student use possible even with the limited budgets that exist in many science departments.

MODEL A GAUSSMETER

With prices starting at $185.00 (including probe) and a ten year history of performance and durability, the Model A Hall Effect Gaussmeter is the answer to many engineering, production and inspection requirements. The instrument includes a built-in magnet standard and can be supplied with axial probes to a diameter of 0.125 inches and transverse probes to a thickness of 0.006 inches.



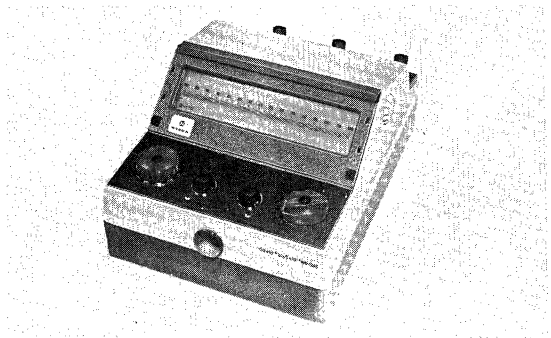


MODEL D GAUSSMETER

The Model D Gaussmeter provides a digital (3½ digit) display for exceptional readability and high resolution. As a highly stable laboratory instrument the Model D Gaussmeter is available with a wide selection of probes including special units for operation at 4.2°K or 200°C.

MODEL 251F NORMA FLUXMETER

The Model 251F is a highly sensitive, versatile fluxmeter for laboratory and production use. The instrument provides ten ranges covering 5 x 10^{-6} to 5 x 10^{-3} Webers (500 to 500,000 Maxwells)/Scale Division. Search coils, carrying/storage cases, etc. are also available.



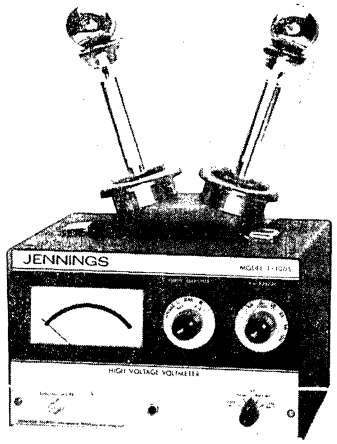
ISC ✱ MAGNETICS

Division of INSTRUMENT SYSTEMS CORPORATION

770 Park Avenue, Huntington, N. Y. 11743

Telephone: (516) 423-6200 / TWX: 510-226-6983 / Cable Address: INSSYSTHTGN

high voltage measuring equipment



Solid State AC Voltmeter Model J-1005

A compact, portable instrument for the accurate, direct reading of very high voltages at rf, audio and power frequencies . . . determination of the amplitude of pulses with oscilloscope connections for viewing wave shapes . . . removable high voltage input circuit for remote panel mounting of the meter . . . internal battery and ac line operation.

SPECIFICATIONS

Voltage Ranges:
Peak Kilovolts (single-ended)
0-2.5, 0-5, 0-10, 0-25, 0-50
Peak Kilovolts (double-ended)
0-2.5, 0-5, 0-10, 0-25, 0-50, 0-100

Frequency Response: Flat from 10 Hz to 20 MHz at full rated voltage. Internal resonances are above 100 MHz.

Accuracy: ±3% of full scale on all voltage ranges.

Oscilloscope Connection: 600 to 1 division ratio (approx.).

Meter Calibration: The meter is calibrated in peak kilovolts with linear voltage scales of 0-2.5, 0-5, 0-10, 0-25 and 0-50.

Input Impedance: Greater than 2×10^{12} ohms and approx. 4 pf single-ended to ground, 2 pf double-ended.

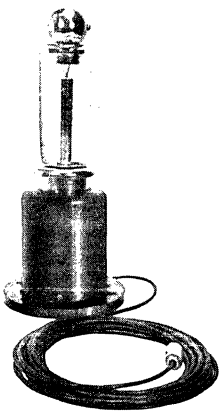
Power Supply: 117/230 volts ±10%, 50/60 Hz, 5 watts, or rechargeable battery.

Dimensions: Height, 16"; width, 10¾"; depth, 8".

Net Weight: 12 pounds (approx.).
Ranges can be increased by using JCD5 series capacitors.

High Voltage AC Vacuum Dividers Models JP-325 and JP-2000

These dividers can be used with an oscilloscope to measure and observe voltages up to 60 kv at frequencies up to 20 mhz. Their low circuit loading design and shielded construction make them particularly suitable for rf measurement applications including tank circuit and transmission line voltages, pulse parameters, modulation voltages, and transient wave characteristics.

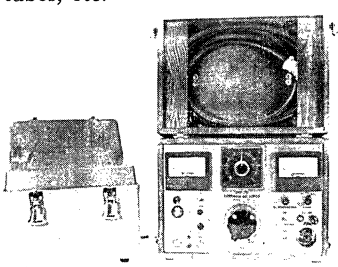


SPECIFICATIONS	JP-235	JP-2000
VOLTAGE	40, 50, 60 kv peak	
CURRENT	12.5 amperes RMS maximum through the voltage divider.	
INPUT IMPEDANCE	Above 10^{12} ohms, 4 pfd.	
HIGH FREQUENCY RESPONSE	Flat to 20 MHz at 50 kv peak; maximum frequency 50 MHz at 20 kv peak.	
DIVISION RATIO	325:1 to termination of 3 ft. of RG-58A/U cable.	2000:1 to termination of 25 ft. of RG-58A/U cable.
LOW FREQUENCY RESPONSE When operated into shunt resistance of		
1 megohm	1000 Hz	100 Hz
10 megohms	100 Hz	10 Hz
WEIGHT	2 lbs. 4 oz.	4 lbs. 4 oz.

high voltage power systems and testers

High Voltage AC Tester — Model JHP-70A

The smallest and lightest instrument available at its power level the JHP70A will generate and measure 70,000 volts peak for on-site testing of high voltage components such as capacitors, switches, transformers, bushings, vacuum tubes, etc.



Maximum Output Voltage ..... 70 KV Peak
Maximum Continuous Current ..... 30 MA RMS
Short Circuit Current (Est.) .....100 MA RMS
Power Requirements ..... 105-125 Volts RMS
Frequency ..... 50-60 Hz
Current ..... 15 Amps
Surge Current ..... 10 Amps
Weight:
Control Cabinet ..... 28 lbs.
Transformer ..... 43 lbs.

High Voltage DC Power Systems

ITT Jennings offers a broad line of custom miniature high voltage power systems (HVPS) satisfying a variety of military, industrial, and commercial needs.

Applications include power sources for night vision systems, CRT displays, laser excitation sources, and other devices that require a precision, reliable high voltage supply. These products feature advanced solid-state and magnetics designs, broad environmental performance capabilities, and corona-free operation. Voltages to 50 kv dc and currents to 2000 microamperes are available. Prime dc power inputs in the 2 to 50 vdc range may be specified. High voltage static multipliers, inverters, as well as integral dc to dc converters are available in a number of wrap-around envelopes and rectangular modules.

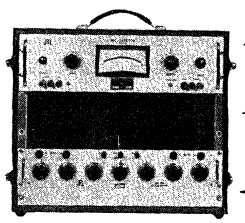
ITT JENNINGS
Post Office Box 1278 • 970 McLaughlin Ave. • San Jose, Calif. 95108
Telephone: (408) 292-4025 • TWX: 910-338-0159
DIVISION OF INTERNATIONAL TELEPHONE AND TELEGRAPH CORPORATION

JULIE RATIOMETRIC® SYSTEMS

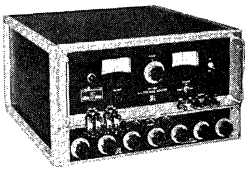
In Julie approach, use is made of very accurate resistance and voltage references. A voltage divider is used with associated circuitry, switches and a null detector, to interpolate and extrapolate the values of these references. Total measurement errors are reduced, very simply, to those produced by the voltage divider (usually 1 ppm f.s. at worst), switching and hook-up (usually 1 or 2 ppm) and reference voltage or resistance (1 ppm to typically 10 ppm for resistance).

The key to the Ratiometric™ approach is the stable Kelvin-Varley voltage divider. (See the table that follows.) Although the Kelvin-Varley divider was invented over 100 years ago, it was not used in high precision applications because of accuracy limitations. With the radical improvement in the accuracy of the Kelvin-Varley divider by Loebe Julie, founder of Julie Research Laboratories, Inc., the previously unrealized advantages of this divider were harnessed. Background information is available for the asking from the Julie Research home office in New York City.

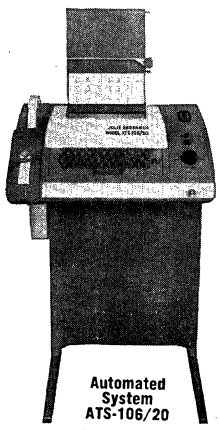
These pages list only a basic sampling of Julie products. We welcome your request for detailed information.



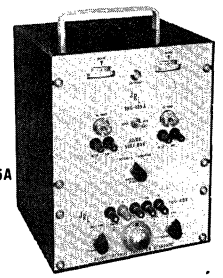
Multivider cabinet with ND-106 null detector and VDR-307 voltage divider.



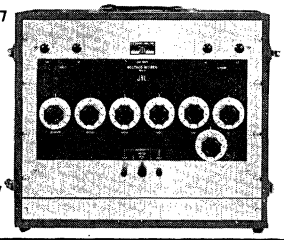
DVS-106



Automated System ATS-106/20



TRS-105A



VDR-106/7

GTX-335

VOLTAGE DIVIDERS

Model	Accu. (PPM)	Lin./ Resol. (PPM)	Stability (PPM/ yr.)	Resistance (Kohms)	Max. Volts	Dim.* (height)	Price
DVD-108J	1 (5 yr.)	.01	.2	100/110/120	1000	14″	$3850.
SVD-108	1 (5 yr.)	.01	.2	100	1000	17½″	$3630.
VDR-106/7	1 (5 yr.)	.1	.2	100	300	14″	$1995.
VDR-307	1	.1	1	100	700	3¼″	$ 990.
VDR-327J	1	.1	1	100/110/120	700	3¼″	$1250.
RVD-106	1	1	1	100	700	3¼″	$2490.

*All units are 19″ wide rack mount type in cabinet and dust cover.

NULL DETECTORS

Model	Ranges	Sensitivity	Dimensions	Price
ND-106	(9) 3 uv to 30 mv	.1 uv	19 x 5 x 8	$970.
ND-107	(3) 10 nv to 1000 nv	.3 nv	9½ x 4 x 5	$690.

OPERATIONAL AMPLIFIERS

OA-601, output ±10 ma, 0-1000 ohms load ..... $950.

SYNCHRO-RESOLVER BRIDGES

MSB-5	$570.	±.002% (4 sec. arc) Accuracy,
MRB-5	$680.	Zero Harmonic Distortion. 800 Hz.

PRECISION DC VOLTAGE AND CURRENT SOURCES

Model	Outputs	Accuracy	Stability	Price
DVS-106	0 to ±12, 120, 1200 v at 35 ma, 7 digits	2 ppm	2 ppm/day	$3995.
DCS-105	0 to ±1.2, 12, 120 ma; 0 to 1.2, 12 Amps	10 ppm	3 ppm/day	$3995.
GTX Series	1 v and 10 v with 6 digits, 25 ma	10 ppm - 50 ppm	3 ppm/day	$795-995.
NVS Series	5 uv to .5 v or 10 uv to 1 v	.04%	30 day Acc.	$ 695.

ATS-106/20 "MINI-AUTOMATOR" • AUTOMATED CONTROL, MEASUREMENT AND DATA LOGGING SYSTEM

A significant advance has been made in universal interfacing of programmable instrumentation with the development of the new Julie ATS-106/20. This system may be used with any equipment using 10-line decimal or BCD program format, and provides an immediate interface with any computer or other data-handling equipment equipped with a "Teletype" input/output channel. The ATS-106/20 includes a modified Teletype keyboard, automatic paper tape punch and reader and specially designed digital logic cards. It can easily be auto-programmed and is capable of completely controlling measuring and data logging by itself, or it can be controlled etc. by computer.
The ATS-106/20 makes it feasible for all manufacturers to compete in today's market place by deviating from the previous tendency toward expensive dedicated designs.

Prices start at $14,000. Detailed specifications and engineering assistance are awaiting the inquirer. Also ask about our scanners and other remotely-controlled instrumentation.

AC-DC THERMAL VOLTAGE TRANSFER STANDARDS

TRS-105A	Frequency	To 64 V	128-512 V	1024 V
$1750.	5 Hz - 10 KHz	.001%	.002%	.003%
	10 KHz - 20 KHz	.002%	.003%	.005%
400 ohms/volt	20 KHz - 50 KHz	.003%	.004%	.01%
	50 KHz - 100 KHz	.02%	.1%	.2%
	100 KHz - 1 MHz	.1% to 10 V		

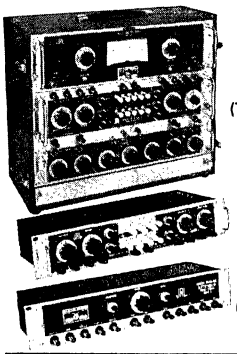
Thermocouple Reversal Error: Zero ±2 ppm adjustable from front panel.

TNB-102 Series — Coaxial Type (Complete Set) .....$1350.

This set of two Thermoelement Modules (2.5 ma and 5 ma) and six Resistor Modules provide highest available transfer accuracy from 0.5 v to 1000 v up to 50 KHz.

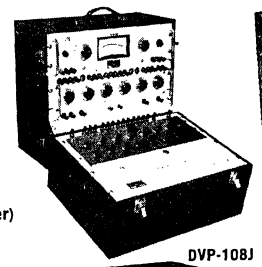
JULIE RESEARCH LABORATORIES, INC.
211 WEST 61st STREET, NEW YORK, NEW YORK 10023 • (212) 245-2727

JULIE PRECISION MEASURING SYSTEMS

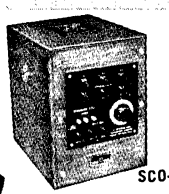

PRB-205S (Typical Layout)

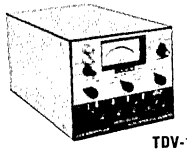
PRB-205L (Plug-in Extender)

PRB-205H (Plug-in Extender)


DVP-108J

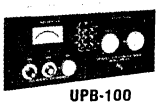
PVP-1001J (Plug-in)


SCO-106


TDV-1000

ZRO-106

ZVR-506


UPB-100

HV-85

PRECISION RESISTANCE BRIDGES

Through the use of various Plug-ins and Extenders the Multivider (see previous page) is made into various precision resistance measuring systems.

PRB-205C PLUG-IN, $2490.

0-1000	±1 ppm Setting ±1 ppm f.s.
0-10K	±1 ppm Setting ±1 ppm f.s.
0-100K	±1 ppm Setting ±1 ppm f.s.
0-1 Meg	±2 ppm Setting ±1 ppm f.s.
0-10 Meg	±3 ppm Setting ±1 ppm f.s.

DRRS-108 DIRECT READING RATIO SET, PLUG-IN, $1650.

Used for resistance comparison to accuracy of 0.1 ppm when ratio is 1:1 or 1:9 or 1:10.

PRB-205H EXTENDER, $1190.

0-100 Meg	±.004% ±1 ppm f.s.
0-1 K Meg	±.009% ±1 ppm f.s.
0-10 K Meg	±.019% ±1 ppm f.s.
0-100 K Meg	±.04% ±1 ppm f.s.

PRB-205L EXTENDER, $1190.

0-.1	±3 ppm Setting ±1 ppm f.s.
0-1	±2 ppm Setting ±1 ppm f.s.
0-10	±2 ppm Setting ±1 ppm f.s.
0-100	±1 ppm Setting ±1 ppm f.s.

Note: For System Accuracy add values shown to accuracy of reference resistor used.

VOLTAGE REFERENCES

SATURATED STANDARD CELL OVENS

Stability Specs*		Temperature	Time
SCO-106 $1390.	cells oven	.64 ppm/.01°C .01°C/day max	1 ppm/yr. max. .05°C/yr. max.
SCO-107 $1390.	cells oven	.064 ppm/.001°C .001°C/day max.	1 ppm/yr. max. .005°C/yr. max.

* Guaranteed

SOLID STATE REFERENCES — ZENERS

Output: +1.018, +1.0 and −5.0 volts all models except ZVR-500 Series.

Room Temp. Effect: 5 ppm Total (0°C to 50°C) for ZRO-106 Series, 0.3 ppm/°C (20°C to 30°C) for ZVR-106 Series and 0.2 ppm/°C (20°C to 30°C) for ZVR-500 Series.

Line Regulation: 1 ppm for 10% line charge for all models.

Model	Size	Price
ZRO-106	6″ x 6″ x 4″	**$550.** (ovenized)
ZRO-106A	3½″ h half rack	**$550.** (ovenized)
ZVR-106A/B	3½″ h half rack	**$525.** (Batery oper.)
ZVR-106B	6″ x 6″ x 4″	**$525.** (Batery oper.)
ZVR-506 (6.3 v	—	**$135.** (1-9 units.
ZVR-512 (12.6 v)	.84″ x .84″ x .75″	**$165.** Quan. discounts
ZVR-518 (18.9 v)	—	**$195.** available)

MODEL UPB-100 • UPB — UNIVERSAL POTENTIOMETER/BRIDGE "STUDENT KIT"

The Student Kit is a full-performance DC laboratory, designed specifically for the needs of the school, although it is equally at home in the laboratory or in a production environment.

Heart of the Kit is the Model UPB-100 Universal Potentiometer/Bridge which houses the 6-dial Kelvin-Varley divider and electronic null detector. Adaptors for direct reading bridge and potentiometer measurements, as well as resistance and ratio standards, are included. Also available is a Student Kit Teaching Manual, which provides a non-nonsense series of practical engineering-level experiments which demonstrate the capability, simplicity and flexibility of modern precision measurement techniques.

The basic Kit includes the UPB-100, a Linear Direct-Reading Julie (patented) Resistance Bridge adaptor, a Linear Direct-Reading Potentiometer Adaptor, Precision Resistance Standards and a set of k/n Ratio Standards. **Price: $732.**

(A 10% educational discount is available.)

Other items purchased separately as required are as follows:

Lead Kit: .....$20.
Binary Series, Resistor Set Comprised of 16 Binary Bits: .....$15.
Binary Coded Decimal Resistor Set Comprised of 5 decades: .....$66.
Student Operator's Manual: .....$ 1.
Instruction Book for Theory, Experiments and Answers: .....$15.

PRECISION VOLTAGE POTENTIOMETERS

Through the use of POTENTIOMETER Plug-ins, the Multivider system is made into various precision voltage measuring systems. (Systems listed in the table below include null detector).

PVP-110C Single Range Potentiometer Plug-in with 0.0002% ± digit accuracy, 0-1.1 VDC: **$1475.**

PVP-1000C Potentiometer/Voltbox Plug-in with ranges to 1000 volts and with accuracy as shown below for PVP-1000S: **$2320.**

PVP-1001J Universal Potentiometer Plug-in is used in the **PVP-1001JS** and **DVP-108JS** systems listed below: **$2475.**

Range volts	PVP-1000S Accuracy (w/self cal.)	PVP-1001JS Ac'racy (w/self cal.)	DVP-108JS System Accuracy
1000	8 ppm ±1 ppm f.s.	—	—
300	8 ppm ±1 ppm f.s.	—	—
100	8 ppm ±1 ppm f.s.	—	—
30	8 ppm ±1 ppm f.s.	—	—
12	—	1 ppm ±1 uv	.5 ppm +.05 uv
10	5 ppm ±1 ppm f.s.	—	—
3	5 ppm ±1 ppm f.s.	—	—
1.2	—	1 ppm ±.1 uv	.5 ppm +.05 uv
1.1	±1 uv (cell compar.)	—	—
1.0	2 ppm ±1 ppm f.s	—	—
.12	—	2 ppm ±.02 uv	.75 ppm +.01 uv
.012	—	3 ppm ±.3 nv	1 ppm +.005 uv
.0012	—	4 ppm ±1 nv	2 ppm +.001 uv
Price	$4280.	$4795	$7395.

DIFFERENTIAL VOLTMETERS

Model	DC %	AC %	Line	Bat.	AC input imped. *(DC see below)	Price
TDV-1000/0	.0025	—	Yes	No	DC only	**$1050.**
TDV-1000B	.0025	—	Yes	Yes	DC only	**$1150.**
TDV-1000A	.0025	.05	Yes	No	1 Meg, 40 Pf.	**$1485.**
TDV-1000	.0025	.05	Yes	Yes	1 Meg, 40 Pf.	**$1585.**
TDV-1000/1	.005	—	Yes	No	DC only	**$ 885.**
TDV-1000/1B	.005	—	Yes	Yes	DC only	**$ 985.**
TDV-1000/1A	.005	.1	Yes	No	1 Meg, 40 Pf.	**$1285.**
TDV-1000/1AB	.005	.1	Yes	Yes	1 Meg, 40 Pf.	**$1385.**
TDV-1000/2	.02	—	Yes	No	DC only	**$ 685.**
TDV-1000/2B	.02	—	Yes	Yes	DC only	**$ 785.**
TDV-1000/2A	.02	.2	Yes	No	1 Meg, 40 Pf.	**$ 985.**
TDV-1115/0	.0025	—	Yes	No	DC only	**$1160.**
TDV-1115/2	.01	—	Yes	No	DC only	**$ 735.**
TDV-1115/2B	.01	—	Yes	Yes	DC only	**$ 835.**
TDV-1115/2A	.01	.05	Yes	No	1 Meg, 20 Pf.	**$1035.**
TDV-1115/2AB	.01	.05	Yes	Yes	1 Meg, 20 Pf.	**$1135.**

* DC Input Imped: Infin. at null, to ±11 v on TDV-1000 Series and to ±1100 v on TDV-1115 Series.

HIGH VOLTAGE DIVIDERS/VOLT BOXES

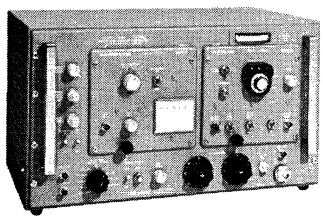
(Typical units are listed. Inquire about others)

Model	No.	Input Ranges Lowest	Input Ranges Highest	Input Imped.	Output Taps	Acc. (%)	1 Year Stab. (%)	Price
DV-1500	11	1 v	1500 v	1 Kohm/v	1/1.5 v	.001	.001	**$1280.**
DV-1000	7	1 v	1000 v	1 Kohm/v	1/1.5 v	.001	.001	**$ 990.**
DV-1000B	7	1 v	1000 v	1 Kohm/v	1 v	.001	.001	**$ 660.**
HV-100/w	1	100 Kv	100 Kv	1 Kohm/v	1 v	.05	.0015	**$2280.**
HV-100	1	100 Kv	100 Kv	4 Kohm/v	1 v	.05	.1	**$1730.**
KV-50/.01	1	50 Kv	50 Kv	1 Kohm/v	1/10 v	.01	.0015	**$1390.**
KV-25/.01	1	25 Kv	25 Kv	1 Kohm/v	1/10 v	.01	.0015	**$ 785.**
KV-10/.01	1	10 Kv	10 Kv	1 Kohm/v	1/10 v	.01	.0015	**$ 480.**
KV-10R	1	10 Kv	10 Kv	1 Kohm/v	1/10 v	.01	.0015	**$ 425.**

RESISTANCE REFERENCES, DECADE BOXES AND SHUNTS

(See Resistor Section in EEM)

KAY Sweep and Marker Generators



1500C
20 Hz-4 GHz

1500C: The model 1500C is a high performance solid-state sweep and marker system which accepts a variety of sweep and marker plug-ins to cover the frequency spectrum from 20 Hz to 4 GHz. The basic rack unit contains a variable sawtooth sweep generator, a fast-acting AGC, birdie and pulse marker controls, and RF output circuits including precision attenuators and built-in detector.

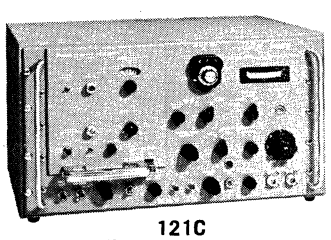
860H: The model 860H includes all of the features of the model 1500C with the exception of the frequency marking facility. It is intended for use where the frequency marking is obtained from an external source or counter.

SWEEP PLUG-INS for the 1500C and 860H systems feature: A group of highly stable, low residual audio band modules; extremely flat wide band video, VHF and UHF plug-ins; and a new series of low cost, high output, solid-state microwave devices which extend the range of these systems to 4 GHz.

MARKER PLUG-INS for the 1500C include PCM7631, PCM7632, PCM7633, and PCM932 pulse marker plug-ins, PCM861 birdie marker plug-in and the new PCM7670 variable marker plug-in—all described on the following page.

Frequency Range	Model	Sweep Width	RF Output	FEATURES
20 Hz—200 KHz	PC-141A	0*—20 KHz	1.0V RMS Into 50 ohms	Ultra-stable, Narrow band plug-ins. Crystal-controlled beat-frequency oscillators provide 1.0 V rms output with excellent waveshape. Extremely low residual FM: <0.2 Hz. Drift: <3 Hz/min. Log or linear sweeps.
35 Hz—600 KHz	PC-142A	0*—40 KHz		
100 Hz—2 MHz	PC-130F	0*—2 MHz		Ultra-stable, narrow sweep plug-ins; wide sweeps to 2 MHz. Residual FM: <4Gliz. Drift: <30 Hz/min. Log or linear sweeps.
1 KHz—20 MHz	PC-152B	0*—20 MHz		Wide video sweep plug-in; sweeps from 20 MHz down to less than 1 KHz. Log or Lin sweeps. Spurious beats down more than 30 DB. Residual FM: <75Hz.
50 KHz—115 MHz	PC-154A	0*—100 MHz		Solid-state wide sweep plug-in; very flat output: ±.25 DB; harmonic and spurious distortions >30 DB down. Residual FM: <50Hz. Log and Linear sweeps.
1—175 MHz	PC-857A	0*—30%		Ultra stable, narrow band plug-in, very low residual FM.
2—220 MHz	PC-860F	0*—30%		Solid-state, fundamental frequency sweeps to 220 MHz; Twelve band direct reading dial; high output with excellent waveshape. Extremely low residual FM.
220—470 MHz	PC-867A	20 KHz—70 MHz	0.5V rms into 50Ω	Solid-state, VHF-UHF, fundamental frequency sweeps. Excellent waveshape.
Following Models Available for 1500-C, 860-H and 121-C Rack Systems				
100 MHz—1 GHz (Any octave)	PC-123A P-123A	0.2%—octave	0.5V rms into 50Ω	Solid-state octave sweeps to customer specifications. Excellent linearity over full octaves. Stable outputs.
.75—1.5 GHz	PC-120A P-120A	Nom. 0—Full octave	10 MW levelled 13 MW unlevelled	Completely solid-state octave-wide sweep plug-ins; high-level outputs. Quality not luxury prices; spurious distortion: >60 DB down, Harmonic distortion: >20 DB down.
1—2 GHz	PC-125A P-125A	Nom. 0—Full octave		
1.2—2.4 GHz	PC-126A P-126A	Nom. 0—Full octave	50 MW levelled 70 MW unlevelled	
1.5—3 GHz	PC-128A P-128A	Nom. 0—Full octave	15 MW levelled 18 MW unlevelled	
2—4 GHz	PC-127A P-127A	Nom. 0—Full octave	10 MW levelled 13 MW unlevelled	

* Residual



121C
500 KHz-4 GHz

121C: This solid-state instrument is an electronically swept wide sweep and marker generator which accepts a choice of UHF and microwave sweep plug-ins to provide extended frequency ranges and sweep widths. With its plug-ins, the 121C covers a range of 500 KHz—4 GHz, offers a new series of solid-state microwave sweeps featuring high output at low cost, and accepts a variety of narrow and wide-sweep plug-ins for special applications such as UHF TV.

The basic 121C system includes variable sweep rates, external modulation, CW and manual operation, built-in attenuator and detector plus a fine digital frequency control for smooth center frequency settings and remarkable adjustment during narrow operation.

Frequency Range	Model	Sweep Width	RF Output	FEATURES
500 KHz—1050 MHz	P-121A	5 KHz—350 MHz	0.5V rms	Electronic, wide-sweep, stable narrow sweeps.
900—1300 MHz	P-122	200 KHz—400 MHz	0.5V rms	Electronic, wide-sweep, stable narrow sweeps.
1.3—1.7 GHz	P-124A	500 KHz—400 MHz	0.5V rms	Electronic, solid-state, wide sweep.
.75—4 GHz	Microwave Plug-in Models P120 thru P128 see table above			

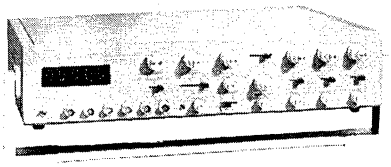
KAY ELEMETRICS CORP
FORMERLY KAY ELECTRIC

Maple Avenue
Pine Brook, N. J. 07058
(201) 227-2000
TWX: 710-734-4347

Midwest Office
U.S. Route 31 North
South Bend, Ind. 46637
(219) 272-2848

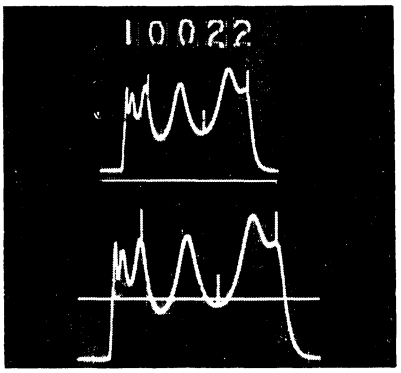
West Coast Office
P.O. Box 206
Goleta, Calif. 93017
(805) 967-9316

Marker Generators KAY

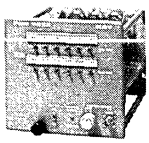


NEW MODEL 8323A FREQUENCY MARKER COUNTER PROVIDES VARIABLE PULSE MARKERS TO 7 SIGNIFICANT DIGITS

8323A: This all new ultra-state-of-the-art instrument teaches your "Old Dog" sweeper a "New Trick" — How to count! The 8323A works with any old dog or new VCO sweep to provide both a counter (DC-115MHz) and three independent, continuously variable pulse markers that can be read out individually to counter accuracy. Designed to facilitate precision passband marking and sweep and point setting, each frequency marker can be read out as desired with the flick of a switch. Marker height, width, and direction (horizontal for sharp slopes) are controlled on the front panel. A variable, horizontal line provides easy reference for amplitude calibration. Works with Kay sweeps or others.

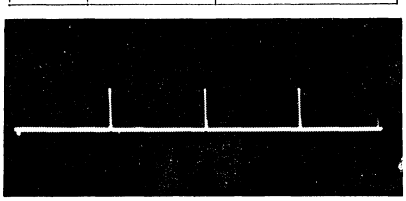


■ Pulse Marker Plug-Ins

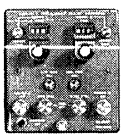


PCM7631, PCM7632, PCM7633, PCM932 (1500C system), PM7650 (154C, 159D systems): These plug-ins are precision pulse marking systems which accept multiple, crystal-controlled, markers at customer specified frequencies. Each marker or marker group is controlled by a simple front panel switch. The individual pulse marker is sharp enough to remain narrow and well defined even on extremely narrow sweeps.

Model	Freq. Range	No. of Markers
PCM7632	1KHz—1MHz	6 + External Variable
PCM7631	10KHz—2MHz	6 + External Variable
PCM7633	1KHz—110MHz	12 + External Variable
PCM932	2MHz—220MHz	31 + External Variable
PM7650	1MHz—110MHz	8 + External Variable

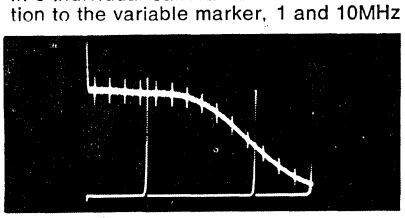


■ Variable Marker Plug-Ins

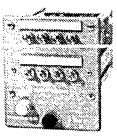


PM100, PM300: These new plug-ins provide two, accurate, variable pulse markers for use with 154C and 159D sweep generators. Both models also include individually controlled 1 and 10MHz crystal marker arrays. The variable pulse markers thus may be used as calibrated end point markers and passband markers. Individual amplitude controls adust marker size up from the base line for accurate gain marking. New PM600 for 160A

PM7670: The model PM7670 is a new fundamental frequency marker module which develops a direct-reading variable birdie marker for use with the Kay model 154C, 159D and 1500C sweep systems. It covers its 300KHz—300MHz spectrum in 8 individual calibrated bands. In addition to the variable marker, 1 and 10MHz

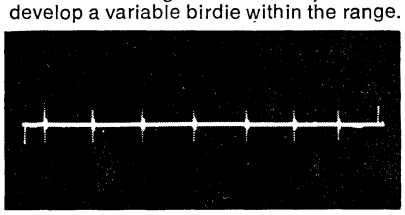


■ Birdie Marker Plug-Ins



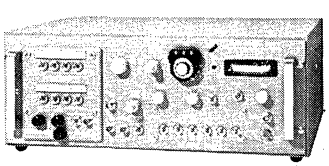
harmonic markers and a CW output are provided. An optional 4.5MHz crystal sideband marker may also be specified. For the model 1500C system, specify PCM7670.

PCM861, PM7660: Designed for use with the 1500C and 154C and 159D respectively these plug-ins offer either individually switched single frequency and/or harmonic birdie-pip markers as specified. The PCM861 produces up to six markers in the 200KHz—1GHz region. The PM-7660 allows up to eight indicators in the 500KHz—300MHz range. All markers are held to .005% crystal accuracy. Variable level controls are included and an external CW signal can be injected to develop a variable birdie within the range.



154C - 159D: These up-to-the-minute versions of Kay's 154 and 159 are completely solid-state, electronically swept, wide-sweep and marker generators which cover their ranges in a single wide sweep. The additional features of continuously variable sweep width and multiturn digital frequency dial provide exceptional fine touch settings over the video, IF and VHF range. The use of a broad output amplifier in these beat frequency units permits light coupling of the mixed oscillators, thus providing high RF levels with superior waveshape; distortion and spurious are minimal.

Performance characteristics include line lock, CW, manual, wide variable sweep rates, and external modulation input. Frequency range may be swept from HI to LO or from LO to HI as required. Automatic leveling may be controlled either externally or internally. A built-in detector and precision sweep attenuator are standard features. Both models are available in 50 or 75Ω impedance. In addition, a full compliment



159D

of pulse, birdie, and variable marker plug-ins are available for use with these instruments. These modules are described above.

Freq. Range	Model No.	Sweep Width	RF Output	Flatness	Markers	Features
50 KHz-110 MHz	154C	5 KHz-100 MHz	1.0 V., 50Ω metered	±0.25 db	PM7650 pulse markers PM7660 birdie markers PM7670 variable birdie markers PM100 dual variable pulse markers	Solid-state, wide sweep: plug-in marker system. Sweeps full 110MHz to low end 50KHz. Pulse and harmonic markers. Sweep rates .01—1000Hz.
300 KHz-300 MHz	159D	20 KHz-300 MHz	1.0V., 50Ω metered		PM7650, PM7670 PM7660, as above PM300 dual variable pulse markers See descriptions above.	Similar to 154C solid-state sweep and marker system. Very flat, very low harmonics and spurious. Now with full 1 volt RMS output. Summation sweep option.

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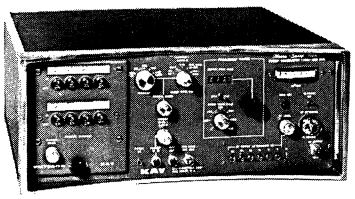
KAY WIDEBAND SWEEP AND MARKER GENERATORS

Kay Elemetrics Corp. has introduced a new sweep generator, the 160A, which provides a full one volt RMS output into 50 ohms over a 1 MHz to 600 MHz frequency range.

The sweep generator itself features continuously variable sweep widths and center frequency over the 600 MHz range. A multi-turn center frequency control includes a direct-reading, digital frequency dial for fine setting of narrow sweeps and superior readability and settability.

Performance characteristics include line lock, variable repetition rates, CW, manual, external modulation and switchable, blanked retrace. A triangular sweep output, synchronized with the RF output, is available for triggering the horizontal axis of an oscilloscope. A built-in precision RF step attenuator provides up to 79 db of attenuation plus a 6 db variable.

The RF output is AGC'd flat for amplitude linearity of better than ±.25 db over the widest range. Careful shaping of the electronic modulating circuits provide for controlled, meaningful frequency linearity. Distortion and spurious are minimal. The use of a broad output amplifier in these beat frequency units permits light coupling of the mixed oscillators, gives high output with superior waveshape. The price of the sweep is a low $1,195.00; markers are optional at additional cost.



160A

FREQUENCY BANDS: .05 to 10 mHz
1 to 300 mHz
255 to 510
340 to 680
450 to 900
600 to 1200

RF OUTPUT: 0.5 v rms into 50 ohms — 50 kHz to 300 mHz; 1.0 v rms into 50 ohms — 255 mHz to 1200 mHz.

RF ATTENUATOR: 0 to 70 db, 10 db steps.

Leakage: less than 5 uV.

Spurious: more than 30 db down on video (bfo) bands. None above (300 to 1200 operation is fundamental).

Harmonic Distortion: more than 30 db down.

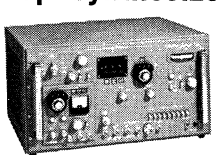
Sweep Modes: 0.5 to 6, variable
6 to 60, variable
line-lock
CW

Frequency Markers: Harmonic birdie crystal combs at 1, 10, 100 mHz. Variable, "triangular", pulse marker from 50 kHz to 100 mHz.

Blanking: zero reference blanking on retrace.

Kay has developed a new sweeper, Model 1520A, that covers the frequency range from a low 50 kHz to 1200 mHz without plug-ins. At video and IF frequencies from 50 kHz to 100 mHz, a variable frequency pulse marker offers frequency counter readout and accuracy. A low-frequency video band provides cw or full sweep from below 50 kHz to 10 mHz using circuits designed for frequency stability and low residual FM at video frequencies. A second, scaled-up, video range provides 1 to 300 mHz, full sweep or cw. Four additional, overlapping bands at fundamental frequency cover 255 to 1200 mHz, cw or sweeps to at least 40% of center frequency. A six-band, slide-rule frequency dial is provided and crystal harmonic markers at multiples of 1, 10, and 100 mHz cover the entire range of the unit. A special circuit is provided for an especially effective narrow sweep mode, provision is made for inserting external oscillator marker signals, and a detachable RF detector is included.

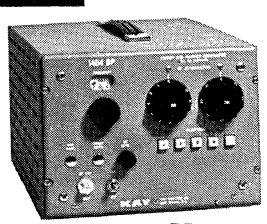
Sweep Synthesizers



101A

101A: The model 101A is a sweep synthesizer which provides not only the solid-state 100 MHz wide sweep capability of Kay's proven 154C (see above) but also superb, low residual, narrow sweep features essential for steep-skirted, narrow band filter applications and for the design and production of pin-point frequency discriminating circuits. In addition it provides a new order of swept and cw stability, of narrow-band frequency marking, of calibrated (0.01%) cw output frequencies, and of digital/analog programmability through the use of newly developed IC synthesizer circuitry. The price at around $3000 for a unit that includes a "locked" range of 100 KHz to 100 MHz is a fraction of the cost of the usual synthesizers.

KAY PRODUCTION SWEEPS FOR RADIO, TV, ETC.



1484 BP

1483B: The new 1483B is a solid-state sweep and marker generator used to design, test, and align UHF-TV receivers, it develops a full 0.5 volt rms output into load over the entire channel 14 to 83 frequency range. A front panel control permits switching of the sweep width from a wide 520 MHz (entire UHF-TV band) to continuously variable widths from 60 down to 5 MHz.

1484BP: New, compact units for production type applications feature push-button band switching of both sweeper and marker outputs. Markers are pulse of birdie pip, sweeps are ALC'd flat and linear, standard models at FM IF, FM RF, VHF TV frequencies. Frequencies to 1GHz to order. Excellent narrow sweep units feature level controls free from frequency pulling. Wide sweeps to an octave at all frequencies and wider at many (e.g. 40 — 230MHz single sweep TV), low cost, repeatable, stable.

- **Push-Button Sweep and Marker Selection.**
- **Application Oriented, Sweep and Marker Units.**
- **Easy to Use, Lower Cost Excellent for Production.**

Model No.	Frequency Range	Markers	Features
1483B	440-960MHz	Up to 8 single frequency or 7 harmonic birdie	UHF channels 14-83
1484BP	10.7MHz	Band selected pulse markers or single freq and harmonic birdies	Push-button sweep and marker selection for fast production line testing
1484BP	88-108MHz		
1484BP 1484BP	40-230MHz Selectable to 1GHz	Single frequency or harmonic birdies	Customer specified bands

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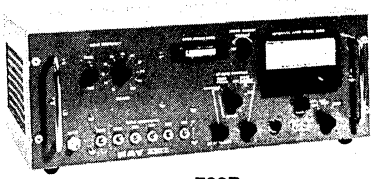
KAY AUTOMATIC NOISE FIGURE METER



792B

- TUNED IF INPUT AMPLIFIER (NO SPURIOUS READINGS
- BROAD 10-1000 MHz SOURCE (NO CHANGING SOURCE IN MID-BAND)
- OPTIMIZED IN PRICE AND PERFORMANCE FOR 10-1000 MHz RANGE
- NOISE MEASUREMENTS TO 26.5 GHz
- 75Ω MEASUREMENTS FOR CATV COVERAGE

The 792B is a sensitive, solid-state, noise figure meter. Primarily focused on the frequency range below 1000 MHz, this instrument provides better accuracy and greater flexibility at considerably less cost than conventional noise generators. The 7921A hot wire noise source is a unique broad band generator and operates over the full 10-1000 MHz range.

Provision is made for later addition of noise sources covering the range to 26.5 GHz. In this way, an expanded applications requirement can be met without the full expense or added space demands of an additional unit.

Additional noise sources provide variable impedance and balanced VHF outputs from temperature-limited diodes, waveguide output from argon gas tubes

Either 6 db or 15.2 db excess noise outputs can be selected for increased accuracy at low or high noise figures, respectively.

This wide coverage eliminates the inconvenience (and the inaccuracies) of changing noise generator source in mid-band, as is usually required.

INPUT FREQUENCY: 10-120 MHz Continuous Coverage

BANDWIDTH: Approx. 4% of Center Frequency

INPUT SENSITIVITY: 0 to 75 dbm (noise source on). Approx. 35 db gain required between lowest noise source & input.

INPUT IMPEDANCE: 50 ohms nominal

INPUT ATTENUATOR: Steps of 20, 10, 5, 3, 2, and 1 db.

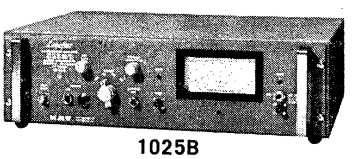
A NEW CATV CHANNEL SELECTED INPUT AMPLIFIER IS NOW AVAILABLE FOR THE KAY 792. IT OFFERS 15 PRESET CHANNELS AT THE FOLLOWING FREQUENCIES: 10, 20, 30, 55, 67, 83, 121, 133, 157, 175, 195, 211, 239, 257 AND 275 MHZ. SPECIFY MODEL 793A.

KAY RANDOM NOISE GENERATORS

240, 403, 780: These models are calibrated random noise sources providing output over a wide frequency and power range. They employ noise diodes with tungsten filaments as temperature-limited noise generators. The plate voltage of the noise diode is regulated and the diode plate current, (proportional to noise power output), is variable by a front panel control. A calibrated meter provides direct reading in noise figure. The ability to vary the noise output in an accurately known way, greatly simplifies the measurement process since it permits precise matching of circuit noise rather than a more complicated referencing back to some fixed output.

Model	Frequency	Features
240	5-220MHz	0-23.8DB Noise Figure
403	3-500MHz	0-19DB Noise Figure
780	1-3GHz	0-20DB Noise Figure

AMPLIFIERS KAY



1025B

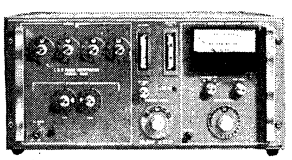
1022A, 1022A PF, 1023A, 1024A, 1026A: These amplifiers include new wide-band models with excellent gain-bandwidth characteristics, (40 db - 150 MHz, 30 db - 300 MHz), and a high output 8 MHz unit delivering 15 volts rms into 50 ohms. Each of these amplifiers has unusually flat response over its full frequency range. Each is designed for accurate input and output impedances of 50 ohms, but can operate an accessory probe to provide amplification from high-impedance outputs without loading down the test signals.

For high impedance application, the 965A broad-band probe is designed for operation with these 50 ohm input amplifiers.

1025B: The 1025B gives overall response, and at the same time gives detailed, easily seen measurements of points on the curves as far down as 80 db. The unit permits highly accurate viewing of the skirts and sharp slopes of bandpass filters, single side-band filters, traps, etc. A control gives expansion of the top critical points simultaneously with the log display. 80 db log range, also available as undetected RF signal.

Model No.	Frequency Range	Output Voltage	Gain	Response	Features
1022A	50KHz—8MHz	15VRMS	34DB	±.25DB	High, Flat Output
1022APF	10KHz—110MHz	5VRMS	30DB	±.5DB	Wideband, High Output for distribution systems
1023A	1KHz—150MHz	.5VRMS	40DB	±.5DB to 100MHz ±1DB to 150MHz	40DB Gain, Compact Built-in Attenuator
1024A	200Hz—300MHz	.5VRMS	30DB	±.5DB: 1KHz—300MHz ±3DB: 200Hz—300MHz	Wideband Low Noise 75Ω for CATV
1026A	100KHz—300MHz	3VRMS	20DB	±.5DB	Wideband, High Flat Output

KAY TELEMETRY L & S BAND GENERATOR



1522A

- **Programmable Carrier Frequency, IRIG Channel and RF Attenuation.**

A new FM signal Generator for the telemetry L and S bands uses phase-lock techniques to provide superior stability and accuracy; and digital control of RF frequency, set up for remote operation or BCD programmability. Remote operation (or programmability) is also provided for RF output and IRIG channel selection.

The new generator, model 1522, is a solid state unit with peak FM deviations of up to ±3 MHz modulated on a self-contained, calibrated deviation meter. Internal modulation for each of the 21 standard IRIG subcarrier frequencies is provided. Calibrated RF output is adjustable from 0 dbm to —120 dbm.

Settability: 100 KHz, digital control

Accuracy: ±.002%, calibrated after one half hour warm-up.

Stability: Drift plus incidental FM less than ±2 KHz pk for 1 minute, less than ±5.0 KHz pk for 10 minutes, less than ±15 KHz for one hour.

(Residual FM: <1.5 KHz on L Band; <2.0 KHz on S Band)

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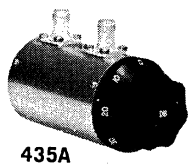
KAY

PRECISION ATTENUATORS



435A

Kay in-line and rotary attenuators are designed to provide a means of inserting an accurate and fixed amount of loss in circuits operating in the DC-12.4 GHz range. Attenuation is controlled by field-proven high-frequency toggle switches. Solid silver contacts set in Teflon for low loss and superior match are employed throughout. The precision resistors used are 1% tolerance, carbon film resistors. The maximum total error is very low and incidental insertion loss is negligible. These units have met rigid environmental tests and are traceable to N.B.S.

The individually-switched steps are isolated in broad-tuned, shielded compartments, providing high accuracy and a flat frequency response over the specified range. All models are symmetrical, (bi-directional), attenuators. Most models are available in either 50, 75, or 90 ohms.

To afford maximum utility, Kay in-line attenuators are available for your special built-in applications. These attenuators are ideally suited for inclusion in a wide variety of equipment, such as test equipment, IF amplifiers, receivers, etc. In general, the electrical specifications are the same as for the in-line model. They differ, however, in mechanical configuration.

MODEL		431-C	432-D	1/432-D	439-A	460-A	437-A	1/439A	433-A	434-A
ATTENUATION RANGE		0-41 DB In 1 DB steps	0-101 DB In 1 DB steps	0-22.1 DB In 0.1 DB steps	0-101 DB In 1 DB steps	0-132 DB In 1 DB steps	0-102.5 DB In 0.5 DB steps	0-22.1 DB In 0.1 DB steps	0-119 DB in 1 DB steps	0-99 DB In 1 DB steps
FREQUENCY		DC-1 GHz	DC-1 GHz	DC-.5 GHz	DC-1 GHz	DC-1 GHz	DC-1 GHz	DC-1 GHz	DC-500 MHz	DC-1 GHz
CONTROLS		In-line toggle switches	In-line toggle switches	In-line toggle switches	Miniature In-line toggle switches	Miniature In-line toggle switches	Miniature In-line toggle switches	Miniature In-line toggle switches	Rotary-Digital	Rotary-Digital
TYPICAL OVERALL ACCURACY (± DB) OR % OF INDICATED DB	DC-250 MHz	0.5	0.6	0-.5 DB steps: ±.5 DB/step 1-10 DB steps: ±.2 DB/step	0.5	0.5	0.5	0-.5 DB steps: ±.05 DB/step 1-10 DB steps: ±.3 DB/step	0.6	0.6
	250-500 MHz	0.9	1.2		1.0	1.0	1.0		1.2	1.0
	500-1000 MHz	1.2	2.0		1.5	1.5	1.5			1.5
	1-2 GHz									
	2-4 GHz									
	4-6 GHz									
	6-12.4 GHz									
MAXIMUM VSWR	DC-250 MHz	1.2:1	1.2:1	1.2:1	1.2:1	1.2:1	1.2:1	1.2:1	1.2:1	1.2:1
	250-500 MHz	1.4:1	1.4:1	1.4:1	1.2:1	1.2:1	1.2:1	1.2:1	1.4:1	1.2:1
	500-1000 MHz	1.4:1	1.4:1		1.4:1	1.4:1	1.4:1	1.4:1		1.4:1
	1-2 GHz									
	2-4 GHz									
	4-6 GHz									
	6-12.4 GHz									
INSERTION LOSS TYPICAL (db)	DC-250 MHz	.1	.1	.2	.1	.1	.25	.1	1	.1
	250-500 MHz	.2	.3	.2	.2	.2	.35	.2	2	.25
	500-1000 MHz	.5	.6		.5	.5	.7	.5		.5
	1-2 GHz									
	2-4 GHz									
	4-6 GHz									
	6-12.4 GHz									
POWER (watts)		1	1	1	1	1	1	1	½	1
DIMENSIONS (inches)		2 x 7 x 2	2 x 9¾ x 2		1¼ x 6¼ x ⅞				5 x 2¼	2¼ x 2 x 5¾

For automatic testing, new programmable, precision attenuators controlled by logic level inputs and powered by the 50/60 Hz AC line (or optional 400 Hz), are offered in cool-running, compact, low-cost units. One nine line model offers 0 - 135 db in one db steps over a DC to 1300 MHz range; a second offers 0 - 132 db in one db steps for the DC to 4 GHz range. A smaller four line unit provides 0 - 90 db in ten db steps from DC to 6 GHz.

These are designed for rapid switching time (20ms/line), frequent cycling, extremely low insertion loss, and high-accurate, repeatable, wideband attenuation. All the superior RF characteristics of the Kay manually operated in-line attenuators have been incorporated (plus double RF shielding) and the same specifications have been maintained.

Each line controls an individual, electromechanically switched attenuation pad. These can be combined to form a single, high-attenuation line and can be supplied for special values, BCD sequencing, etc. The electro-mechanical switching draws power *only* during the switching period. Line control current drain is very low. For logic level operation, the input impedance is 1000 ohms and 2 to 5 V dc sets ATTENUATION ON, 0 to 1 V dc sets ATTENUATION OFF. For contact closure control, a shorted line sets ATTENUATION IN and draws approximately 4 ma.

The RF attenuation is furnished as a complete, self-contained unit and can be replaced for system changes and long term maintenance. As on the manually operated attenuators, individual, switched attenuation pads can be replaced.

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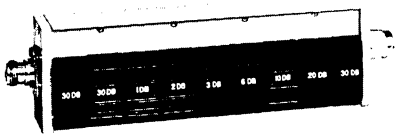
DC — 12.4GHz

KAY

A new group of switched, coaxial attenuators is now available to span the DC - 12.4 GHz range. Developed from Kay's precision VHF - UHF attenuators, these devices eliminate the cumbersome technique of inserting and reinserting individual pads or the need to go thru a time-consuming rotary step-cycle.

Individual attenuation steps are controlled by finger operated, spring-loaded slide switches. These models consist of a complete coaxial system. Each segment is constructed with air dielectrics, and fine silver contacts insuring precision surfaces. Individual steps are isolated in broad-tuned, shielded compartments.

A variety of models is available to provide customer specified attenuation and frequency ranges covering the 0 - 132 db — DC-12.4 GHz range. Standard models are listed on the attenuator chart; many attenuators in this series are available in single coaxial pads, two or three step versions or special versions to suit customer specifications.

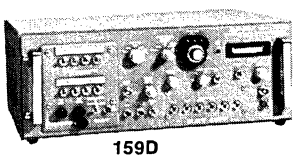


461A

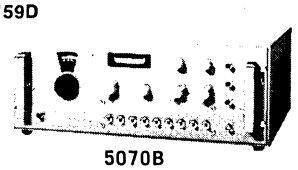
464-A	467-A	435-A	436-A	1/435-A	400-A	461-A	424-A	414-A	495-A	411-A
0-120 DB In 10 DB steps	0-12 DB In 1 DB steps	0-10 DB In 1 DB steps	0-70 DB In 10 DB steps	0-1 DB In 0.1 DB steps	0-70 DB In 10 DB steps	0-132 DB In 1 DB steps	0-90 DB In 10 DB steps	0-130 DB In 1 DB steps	Single Step switched coax pads	Single Step switched coax pads
DC-1.3 GHz	DC-1.5 GHz	DC-2 GHz	DC-2 GHz	DC-1 GHz	DC-2 GHz	DC-4 GHz	DC-6 GHz	DC-12.4 GHz	DC-4 GHz	DC-12.4 GHz
Rotary-Step	Rotary-Step	Rotary-Step	Rotary-Step	Rotary-Step	Miniature Rotary-Step	Slide Switches	Slide Switches	Slide Switches	Slide Switches	Slide switches
1% ± .1	.2	0.1	1% ± .1	.025	± 1%	1% ± .1	1% ± .2	1 DB or 5% whichever is greater	1% ± .1	1 DB or 5% whichever is greater
1% ± .2	.2	0.1	1% ± .1	.025	± 1%	1% ± .1	1% ± .2		1% ± .1	
2% ± .2	0.3	0.3	1% ± 0.2	.025	± 2%	1% ± 0.3	1% ± .2		1% ± .2	
	0.5 to 1.5 GHz				± 4%	2% ± .3	1.5% ± .2		2% ± .2	
						2% ± .3	2% ± .2			
							2% ± .5			
1.2:1	1.2:1	1.1:1	1.1:1	1.1:1	1.1:1	1.05:1	1.05:1	1.1:1	1.05:1	1.1:1
1.2:1	1.2:1	1.2:1	1.2:1	1.2:1	1.1:1	1.05:1	1.05:1	1.1:1	1.05:1	1.1:1
1.4:1	1.25:1	1.3:1	1.3:1	1.4:1	1.15:1	1.1:1	1.1:1	1.1:1	1.1:1	1.1:1
					1.25.1	1.25:1	1.2:1	1.2:1	1.2:1	1.2:1
						1.5:1	1.3:1	1.3:1	1.5:1	1.3:1
							1.5:1	1.5:1		1.5:1
								1.5:1		1.5:1
.1	.15	.1	.1	.1	.1	.1	.1	.1	.1	.1
.15	.25	.1	.1	.1	.1	.1	.1	.1	.1	.1
.3	.5	.2	.2	.2	.2	.2	.2	.2	.1	.1
					.5	.3	.2	.3	.1	.1
						.5	.3	.5	.2	.2
							.5	.6	.3	.3
								1.0		.5
1	1	1	1	½	¼	1	1	2	1	2
1¾ x 3⁷⁄₁₆ x 2¹¹⁄₁₆		2 dia. x 2⅛	2 dia. x 2⅞	2 dia. x 2⅛	1¼ dia.x2¾₁₆	8⅜x2⅜x1⅝	2⅜x4¼x1⅝	2⅜x5⅛x1⅝	2⅜ x 1½ x 1⅝	

CATV TEST INSTRUMENTS

Kay offers a complete line of CATV test instruments. We have often supplied the model 159D sweeper with PM7670 vari-marker plug-in, 1024A amplifier, 792A automatic noise figure meter, attenuators, and 255B coaxial electronic switch at 75Ω for CATV testing.



159D



5070B

PULSED RF GENERATOR

The 5070-B is a solid-state instrument whose pulsed output features sharp rise and decay and flat tops. The unit will serve as a CW generator, as well as a video pulse generator. It provides a stable CW signal from 10 MHz to 120MHz, continuously variable, in five overlapping bands. Carrier off level — 85DB.

OTHER MODELS AVAILABLE
The Model 5071-A offers a wider frequency range of 10-250 MHz. The Model 5072-A expands the standard 5070-B to provide carrier-off levels of up to 95 db.

KAY ELEMETRICS CORP
FORMERLY KAY ELECTRIC

Maple Avenue
Pine Brook, N. J. 07058
(201) 227-2000
TWX: 710-734-4347

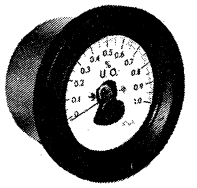
Midwest Office
U.S. Route 31 North
South Bend, Ind. 46637
(219) 272-2848

West Coast Office
P.O. Box 206
Goleta, Calif. 93017
(805) 967-9316

KRATOS INSTRUMENT DIVISION
GLASSCO AND VOLTRON PRODUCTS

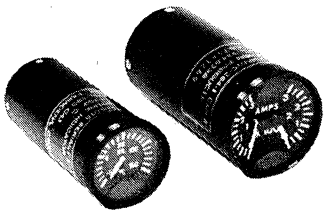
PANEL METERS
(90° and 250° Arcs) Taut Band Suspension, 1% Accuracy

INDUSTRIAL AND MILITARY METERS



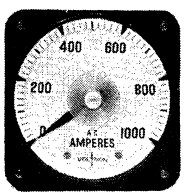
MIL-M 10304
2½", 3½", 4½" Round
and Square Configurations
Bulletin E-4010A

AIRCRAFT INSTRUMENTS



MS 33639 and AT1
1½", 2", and 3" Configurations
Bulletin E-4180A

SWITCHBOARD METERS

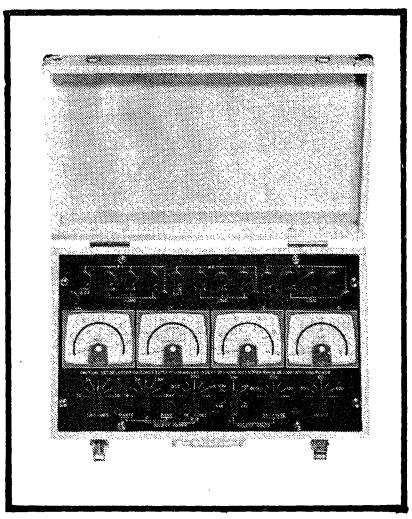


4½", 250°, C39.1
Bulletin E-SB71

FUNCTIONS AVAILABLE

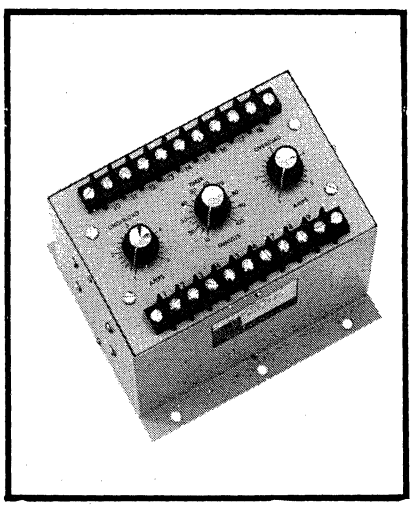
DC and AC Volts, Full Scale and Expanded Scale
DC and AC Amps, Full Scale and Expanded Scale
DC and AC Load, Full Scale and Expanded Scale
Vars and Watts, 1 ϕ and 3 ϕ
Frequency, Temperature and Differential Temperature, Exhaust Gas Temperature
Speed, Transistorized Voltmeter, Phase Sensitive Voltmeter
Synchroscopes (Available in Switchboard Only)

INSTRUMENTS



Differential Wattmeters (Bulletin E-3021)
Synchro Bridges (Bulletin E-6070)
Power Analyzers (Bulletin E-613-621)
Phase Sensitive Voltmeters (Bulletin E-3020)
Digital Wattmeters
Test Sets
Modulation Meters (AM and FM)

MOTOR/PUMP PROTECTORS AND CONTROL CENTERS (Bulletin E-8000)



Solid-state Motor/Pump Protectors are available which provide underload, over-load and single-phasing protection. Pump Protectors measure input electrical parameters to drive motor and shut down motor/pump when measured parameters are less than or greater than preset operating limits. Nuisance trips are essentially eliminated.

SPECIFICATIONS
(Pump Protectors)

Voltage Input: 230/√3 Vac, 60 Hz; or 460 Vac, 60 Hz.
Current Input: 0-5 amps.
Sensing: Power (EI cos θ).
Limit Adjustments: Under: 10-80% of rated load.
Over: 60-130% of rated load.
Operating Temperature: —65° to +160°F.
Adjustable Power Range: 1.2 to 3 KW.

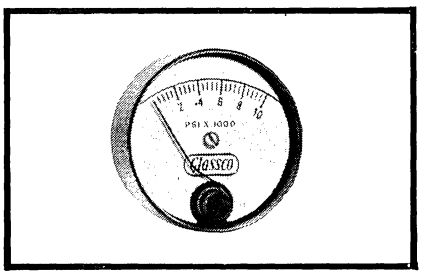
Compact Motor/Pump Control Centers are available for starter panel applications, and replace control relays, over and under-current relays, automatic restart and backspin timers and all time delay devices. Provides same protection as Pump Protectors.

SPECIFICATIONS
(Motor/Pump Control Centers)

Voltage Input: 120 Vac ±10%, 60 Hz.
Current Input: 0-5 amps, 3 phase, 60 Hz.
Trip Point Adjustment: 1-5 amps.
Automatic Restart Timer: Adjustable 10 to 100 minutes.
Operating Temperature: —65°F to +160°F.

KRATOS INSTRUMENT DIVISION
403 South Raymond Avenue, Pasadena, California 91105,
(213) 449-3090, TWX 910-588-3288

PRESSURE GAUGES

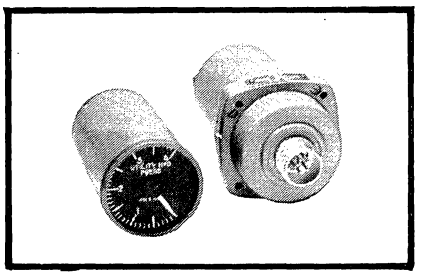


Gauges have only one moving part —a helically wound Bourdon tube which indicates pressure without any mechanical linkage. Differential, absolute or gauge pressures can be measured from 30 psi to 10,000 psi full scale ranges. Special units from 1 psi to 50,000 psi available. Inherent accuracy of gauges do not require recalibration under normal use. Gauges are lightweight, extremely sensitive, rugged and long lasting (Catalog E-8).

SPECIFICATIONS

Size: ½" to 6" Dial Face.
Accuracy: To 0.25%.
Shock: 100 G's or more without loss of calibration.
Vibration: 10 G's to 2000 Hz without damage.
Temperature: —65° to +200°F.

PRESSURE TRANSDUCERS AND INDICATORS

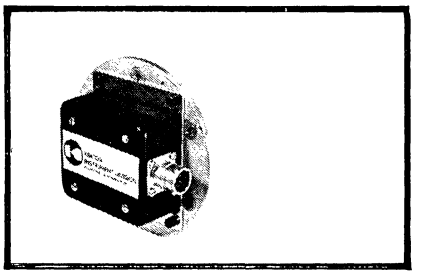


Pressure sensed by Bourdon-Helix tube, driving a variable capacitor or synchro. Electrical output signal is transmitted to associated indicator to display pressure. Used on all major aircraft to monitor hydraulic, oil, air and water pressure (Bulletin E-T-500/368).

FEATURES

Excellent Reliability
Long Service Life
Resistance to Shock and Vibration
Lightweight
Operating Pressure Range of 50-10,000 psi
System Accuracy ±2%

LIQUID LEVEL MEASURING SYSTEMS

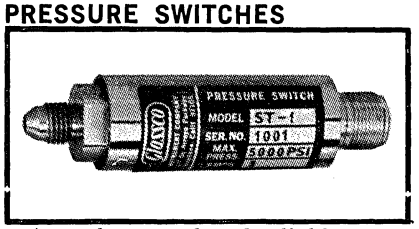


Designed for measuring fluid level in tanks. High resolution with no moving parts. Liquid level sensed by a capacitance transducer which produces a signal in response to level changes to drive an indicator. Available with glass coated probe or with sensor imbedded in wall of the tank (Bulletin E-1312/968).

FEATURES

Low Maintenance
High Accuracy and Repeatability
Applicable with Corrosive Liquids
Not Affected by Freezing Temperature
No Cleaning Required
Lightweight for Aircraft Applications

PRESSURE SWITCHES



Extremely rugged and reliable pressure switches employs KRATOS developed Bourdon-Helix in combination with an MS type snap-action switch. Actuation ranges available from 50-6000 psi (Bulletin E-S-0/368).

SPECIFICATIONS

Vibration: Meets MIL-E-5272 Procedure XII extended to 2,000 Hz.

Shock: 100 G's.

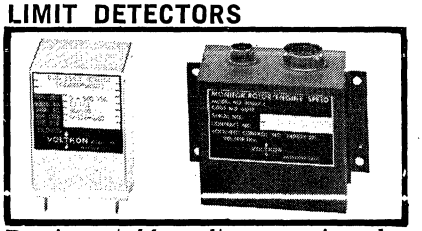
Ambient Temperature Range: —100° to +250°F.

Endurance Life: 50,000 cycles minimum.

Current Rating: 5 amps resistive at 30 Vdc.

Repeatability: ±1% of set point.

VOLTRIP ELECTRICAL LIMIT DETECTORS



Precise, stable voltage-sensing device that signals, by means of a contact closure (solid-state or electro-mechanical), when parameter being monitored reaches a predetermined value. Parameter may be AC or DC voltage, AC or DC current, and Frequency or Power.

Completely solid-state. Trip point determined by component programming. Dual and multi-limit models available. MIL versions available for —55°C to +71°C operation (Bulletin E-6030).

SPECIFICATIONS

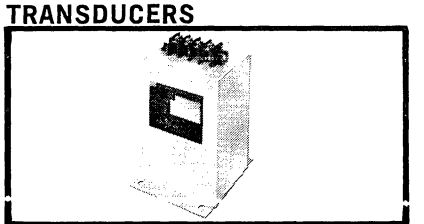
Voltage Ranges: From millivolt to hundreds of volts.

Accuracy Range: From 0.25% to 5%.

Auxiliary Power Requirements: 3 Watts at 115V ±10%, 50-1000 Hz.

Response Time: 50 ms typical.

SIGNAL CONDITIONING TRANSDUCERS



AC Voltage, AC Current, Watt, and Frequency Transducers available with 0.5% accuracy.

SPECIFICATIONS

AC VOLTAGE TRANSDUCERS (Bulletin E-5010)
Frequency Range: 50-3000 Hz, —25° to +70°C.
Response Time: 0.25 Sec. to 99%.
Hipot: 1200 Vac.
Adjustable: ±5%.

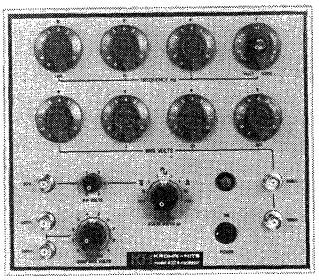
AC CURRENT TRANSDUCERS (Bulletin E-5020)
Frequency Range: 50-3000 Hz.
Temperature Coefficient: 0.01%/°C.
Input Current: 0-1, 2.5, 5 and 10A.

WATT TRANSDUCERS (Bulletin E-5030)
Frequency Range: 50-3000 Hz.
Response Time: 0.25 Sec. to 99%.
Input Elements: One (500W), two (1000W) and three (1500W).
Adjustable: 60-120%.

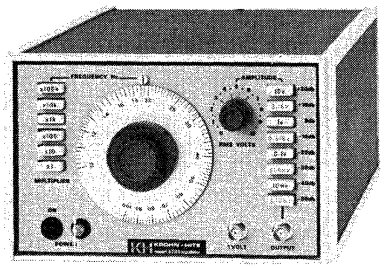
FREQUENCY TRANSDUCERS (Bulletin E-5050)
Input Frequency: 55-65, 58-62, 350-450 and 380-420 Hz.
Voltage: 100-130 V.
Overload: 1.5 X rated input, continuous; 2X rated input, 1 sec.
Hipot: 1200 Vac.

KRATOS INSTRUMENT DIVISION
403 South Raymond Avenue, Pasadena, California 91105,
(213) 449-3090, TWX 910-588-3288

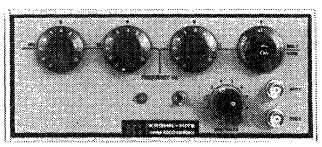
Oscillators and Function Generators



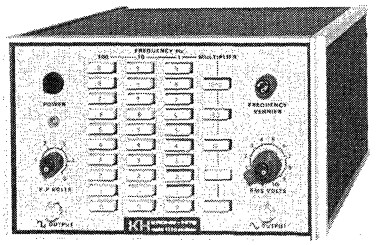
Model 4024
Standard Oscillator



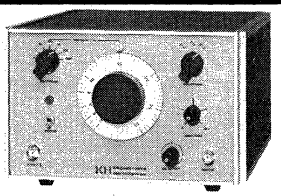
Model 4200
Test Oscillator



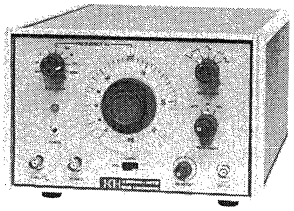
Model 4000
Standard Oscillator



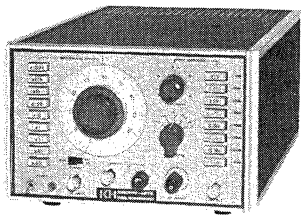
Model 4100A
Push-Button Oscillator



Model 5000 Function Generator



Model 5100 Function Generator



Model 5400 Function Generator

OSCILLATORS

Frequency Range	Osc. Model*	Freq. Acc. %	Power (mw)	Impedance (ohms)	VRMS (Open Circuit)	Quad. Output	Wave-Forms	Freq. Resp. (db)	Dist. %	Approx. Ship. Wt. lbs/kgs	Price
0.001 Hz to 100 kHz	4024	0.5	125	200/600	10	Yes	∿ ⊓ ⊥	0.01	0.01	24/11	$1200
0.001 Hz to 100 kHz	4025	0.1	125	200/600	10	Yes	∿ ⊓ ⊥	0.01	0.01	24/11	$1950
0.01 Hz to 1 MHz	4100A	0.5	500	50	10		∿ ⊓	0.05	0.02	21/10	$ 595
0.1 Hz to 100 kHz	4000	0.5	125	200/600	10	Yes	∿	0.01	0.01	18/9	$ 895
0.1 Hz to 100 kHz	4001	0.1	125	200/600	10	Yes	∿	0.01	0.01	18/9	$1450
10 Hz to 10 MHz	4200	2	500	50	10		∿	0.025	0.1	21/10	$ 395
10 Hz to 10 MHz	4300	2	500	50	10		∿ ⊓	0.025	0.1	21/10	$ 475

*Add suffix "R" for rack mounting

PROGRAMMABLE OSCILLATORS

Frequency Range	Osc. Model	Freq. Acc. %	Max. Volts	Output Impedance	Dist.	Square Wave	Prog. Amp.	Approx. Ship. Wt. lbs/kgs	Price
0.1 Hz to 100 kHz	4030R	0.5	10 RMS	200/600	0.01%	optional	optional	27/13	$1495
0.1 Hz to 100 kHz	4031R	0.1	10 RMS	200/600	0.01%	optional	optional	27/13	$2145
1 Hz to 1 MHz	4131R	0.1	10 RMS	50	0.02%	yes	no	30/15	$1495
1 Hz to 1 MHz	4141R	0.1	10 RMS	50	0.02%	yes	yes	30/15	$1695
1 Hz to 1 MHz	4130R	0.5	10 RMS	50	0.02%.	yes	no	27/13	$1195
1 Hz to 1 MHz	4140R	0.5	10 RMS	50	0.02%	yes	yes	27/13	$1395

FUNCTION GENERATORS

Frequency Range	Model*	Output Waveforms	Max. Output	Output Impedance	Aux. Outputs	D.C. Offset	V.C.O.	Sine Wave Dist.	Price
.2 Hz to 3 MHz	5000	∿⊓∿	20V p-p	50 ohms	5V	±5V	—	.5%	$ 295
.002 Hz to 3 MHz	5100	∿⊓∿⌒⌣	20V p-p	50 ohms	5V	±5V	1000:1	.5%	$ 395
.002 Hz to 5 MHz	5400	∿⊓∿⌒⌣	30V p-p	50 ohms	0-5V	±10V	1000:1	.5%	$ 575

For complete details, write: The Wavemakers:
Krohn-Hite Corporation, 580 Massachusetts Avenue,
Cambridge, Mass. 02139 U.S.A.
Tel: (617) 491-3211 TWX:710-320-6583

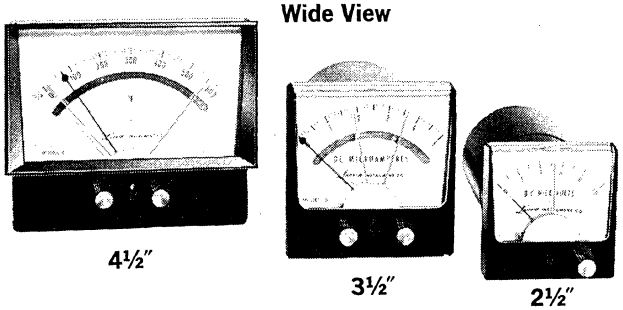
KROHN-HITE CORPORATION

OSCILLATORS / FILTERS / AC SOURCES / FUNCTION GENERATORS / AMPLIFIERS

Larson CONTACTLESS METER CONTROLLERS

Where there is INDICATION, there is a need for CONTROL

Wide View



4½" 3½" 2½"

This is exactly what the Larson Controller offers you. Our instruments are designed to indicate and control any electrical variable from:

5 μa up to 1000 μa, dc
1 ma to 1000 ma, dc or ac
5 mv to 1000 mv
1 amp to 1000 amps dc or ac
1 volt to 1000 volts dc or ac

The variety in models and ranges continues... AC Volts Rectifier, RF Amps, Watt meters, Expanded Scale and Temperature Controllers from 100°C to 3000°F plus the newest design which features a Temperature sensitivity of 60°C f.s. with Thermistor or Thermocouple output amplifier.

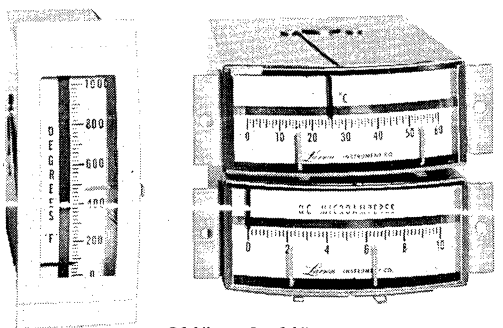
Features:

- Overall depth, ONLY 3.95"
- No moving wires — no failures
- Continuous indication beyond set point
- Fail-safe circuit
- Repeatability ¼%
- Relay contacts 10 Amps 115V
- Amplifier for 115V AC or 24V DC input

For your design, we have a selection of styling and sizes. The Wide Vue, available in 2.5", 3.5" and 4.5"; single or dual limits. Shadow box optional.

The Space Saver, in 2.5" and 3.5", for vertical or horizontal mounting; single or dual limits.

Space Saver



2½" and 3½"

The method of operation is an optical system, consisting of a miniature light source with a life expectancy of 100,000 hours. Each set pointer is equipped with a photo-electric sensing device. The indicating pointer has a segment which actuates the sensing elements precisely at the control point. They will remain actuated anywhere beyond the set point.

Control is established by means of a transistorized electronic circuit. The transistor amplifier and load relay are continuously energized up to the control point. In the event of power or light failure, the fail-safe circuit will de-energize the relays.

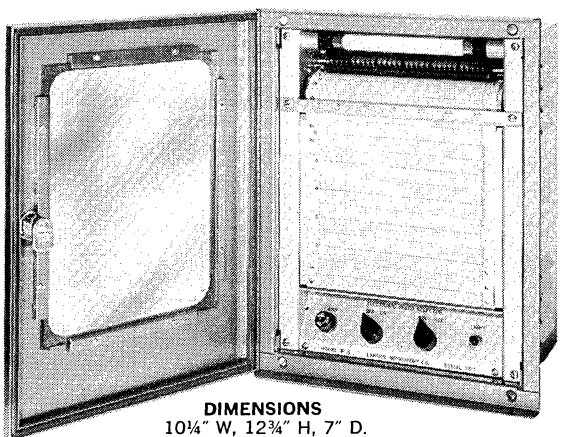
In the Larson Meter Relays, we designed for you, **our** Customer, modern styling, incorporating components obtaining top reliability...to give **your** Customer the best in Quality.

Inkless Event Recorder

The Larson Model ROS instrument will continuously record the time, sequence and duration of as many as 30 different events on one chart. The record is made on electro-sensitive paper, by a stylus which marks only when current flows through the paper. The recording is instantaneous, accurate and permanent.

RESPONSE and **RESOLUTION.** The recorder can remain on stand-by for an unlimited length of time, yet be ready to respond within 1 Millisecond when a signal is applied. The instrument will record up to 60 pulses per second for each stylus. Response time of the styli is 1 Millisecond.

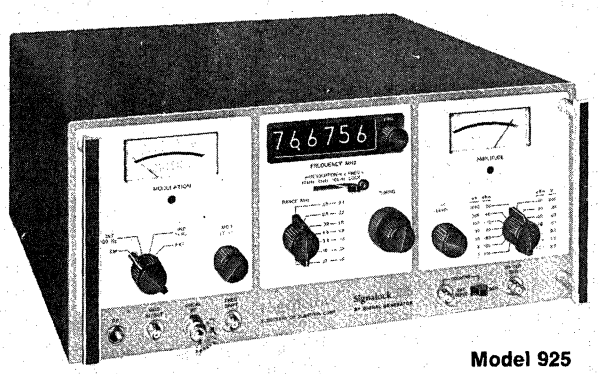
CHART SPEEDS. Are available for ½" per hour to 10" per second. Standard speeds are ½", 1", 2", 3", 4", 6", 8" and 10" per hour, minute or second.



DIMENSIONS
10¼" W, 12¾" H, 7" D.
WEIGHT 20 Lbs.

Larson INSTRUMENT COMPANY, INC.
GREENBUSH RD. • ORANGEBURG, N.Y. 10962 • 914 EL 9-3800

LogiMetrics solid-state RF signal generators with built-in frequency counter



Model 925

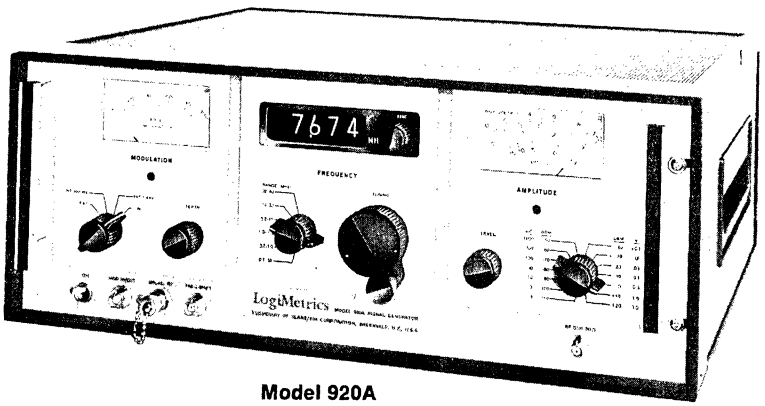
LogiMetrics patented "Signalock"™ provides synthesizer stability in a standard signal generator

- LogiMetrics generators contain a patented, direct reading, built-in electronic frequency counter that provides a higher frequency accuracy at any setting. This exclusive feature eliminates the usual frequency dial mechanism found in conventional generators where tuning backlash and oscillator dial tracking problems exist.
- LogiMetrics generators provide a high range of leveled RF output, with extremely good spectral purity and modulation characteristics.
- Functionally related controls and an easy-to-read digital display make LogiMetrics RF Signal Generators the easiest to use in industry.

The Model 925 "Signalock" RF Signal Generator covers the frequency range from 50 kHz to 80 MHz. The patented "Signalock" feature locks the generator's fundamental RF oscillator to the built-in frequency counter's crystal time base to provide a frequency stability of ±10 Hz. The 925 electronic frequency counter has a 6-digit "NIXIE" readout with an external input to enable measurement of external signal frequencies to 80 MHz with 100 Hz resolution.

In addition, the 925 contains all of the RF output and modulation characteristics of the "standard" LogiMetrics Model 920A RF Signal Generator.

LogiMetrics Standard AM generators are easier to use

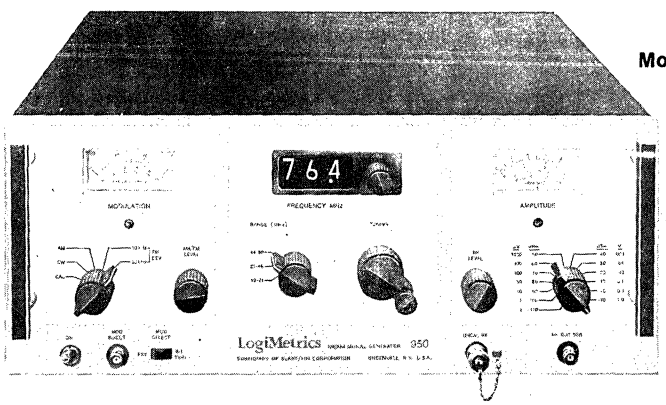


Model 920A

Model 920A. Covers the range from 100 kHz to 80 MHz with a 4-digit NIXIE frequency readout. The RF output is calibrated from 3 volts to 0.1 microvolt and leveled to within ±0.5 db. CW, internal and external AM outputs are available. In addition, the 920A contains a DC-coupled varactor tuned frequency shift feature that permits narrow band FM and fine oscillator frequency control.

Model 923. Contains all the 920A features, and includes a 5-digit frequency readout display for increased resolution.

Model 910A. Similar to the 920A, but covers the frequency range from 100 kHz to 32 MHz with a calibrated RF output from 1 volt to 0.1 millivolt leveled to within ±1.0 dB. This high performance, low-cost generator is intended for limited range production use.



Model 950

A fully calibrated FM generator

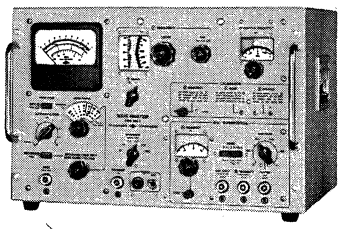
The LogiMetrics Model 950 FM-AM Signal Generator covers the frequency range from 10 to 80 MHz and provides calibrated internal and external FM, AM, and CW outputs. A front panel modulation meter directly indicates the amount of FM deviation or % AM. Internal FM deviation is adjustable from 0 to 20 kHz peak, and once set, remains constant with frequency. Incidental FM and AM, and distortion are very low, increasing the generator's usefulness. The 950 RF output is calibrated and adjustable from 1 volt to 0.1 microvolt and leveled to within ±0.5 dB. The 950 frequency counter has a 3-digit "NIXIE" readout with an X100 expander switch to provide an effective 5-digit display with a resolution of 1 kHz.

LogiMetrics, INC. 100 FOREST DRIVE, GREENVALE, N. Y. 11548 • (516) 484-2222
Representatives throughout the world • Telex 96-1371

SUBSIDIARY OF SLANT/FIN CORPORATION.

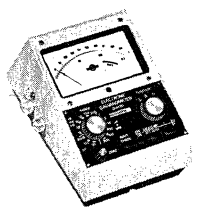
TEST EQUIPMENT by RADIOMETER COPENHAGEN

Audio Frequency

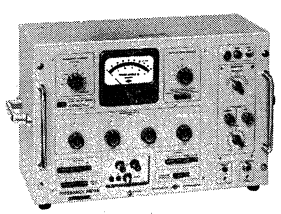


WAVE ANALYZER, FRA3 — Frequency Coverage: 10 Hz to 60 kHz. Six Band widths: ±3, 6, 12, 25, 50 and 100 Hz. Sensitivity 30 μV to 300V f.s. Distortion, noise and hum: in the order of —100 db. Recorder output. Internal BFO and Superposition Amplifier for Intermodulation Measurements.

DISTORTION METER, BKF6 — Ranges from 0.3 to 100% f.s. Sensitivity 100 mV to 300V f.s. True r.m.s. detection. High pass and low pass filters. Push button operation, low internal distortion, hum and noise.

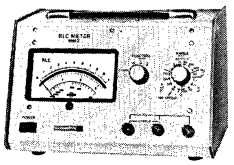


GALVONOMETER, MULTIMETER, GMV30 — High sensitivity measurements, Current: 30 pA to 300 μ A.f.s. Voltage: 1mV to 300 V.f.s. Resistance: 1 kΩ to 300 MΩ f.s. Battery operated; differential inputs.

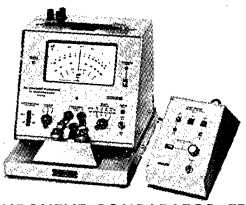


VECTOR IMPEDANCE METER, GB11 — Accurate measurements of magnitude and phase angle of capacitive or inductive impedances from 1 ohm to 1.1 megohm. Frequency range 25 Hz to 1 MHz. Option for d-c polarization. Phase angle from 0 to ±90°.

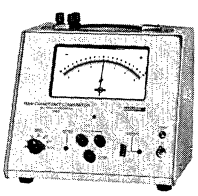
Component



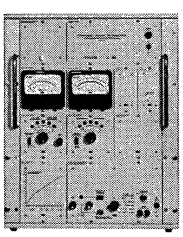
R-L-C METER, MM2 — Wide range, direct reading measurements of Resistance: 0.1Ω to 1MΩ, Inductance: 3 μH to 100 H., Capacitance: 3 pF to 5000 μF, five test frequencies from 160 Hz to 1.6 MHz., DC bias input to ±60V. Recorder output. Low voltage test signals from 160 Hz to 1.6 MHz.



R-L-C COMPONENT COMPARATOR, TRB11 — Manual or automatic comparison of magnitude and phase angle at 1 KHz. 10Ω to 10MΩ, 1 mH to 10 H., 200 pF to 20 μF. Magnitude Deviation: ±1.5 to 100% f.s. Phase angle deviation: ±.015 to 0.6 radian f.s. Shown with component jig KPH1 and Limit Sensor LMS1.

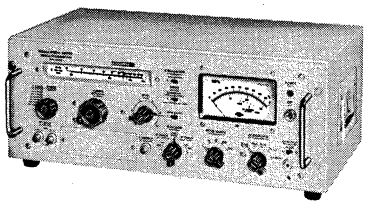


CAPACITANCE COMPARATOR, CMB12 — For manual or automatic check of capacitance directly or against a standard. 7 ranges from ±1 to ±1000 pF f.s. Test frequency 1 MHz. Ext. bias to ±60V.



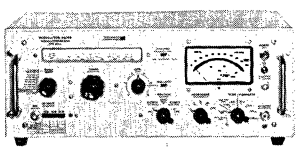
COMPONENT LINEARITY TEST EQUIPMENT, CLT1 — Fast, nondestructive RELIABILITY TEST METHOD for detecting latent defects in resistors, capacitors and other components. May be used on laboratory basis or on-line for automatic check of up to 10 components per second. High sensitivity — Interference free. Impedance range: 0.01Ω to 100MΩ, 10kHz Test Signal.

Radio Frequency

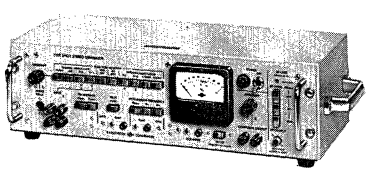


AM/FM Wide Band **MODULATION METER, AFM2** — For Mod. Freq. from 50Hz to 200kHz; Selectable 50Hz to 15kHz filter. RF Range: 5 to 1002 MHz with over-range capabilities to 2 GHz. RF Input to 50Ω: 3mV to 10V. Auto-level Control, stable within 40Db. FM Dev. Ranges: ±3, 10, 30, 100 and 300kHz f.s. AM Mod. Ranges: ±3, 10, 30, and 100% f.s. Stereo L/R Separation 46Db. Optional Xtal and Ext. Oscillator Plug-ins.

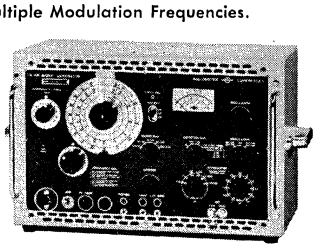
NEW



AM/FM Narrow Band **MODULATION METER, AFM-3** — For Mod. Freq. from 30Hz to 15kHz; Selectable 300Hz to 3kHz filter. RF Range: 6MHz to 1001MHz. RF Input to 50Ω: 3mV to 10V. Auto-level Control stable within 40Db. FM Dev. Ranges: ±1, 3, 10, 30, and 100kHz f.s. AM Mod. Ranges: ±1, 3, 10, 30, and 100% f.s. Optional Xtal and Ext. Oscillator Plug-ins.



STEREO GENERATOR AND MODULATOR, SMG1 — Both Composite and RF Outputs (100MHz). Exceptionally stable stereo signal in accordance with FCC standards. SCA modulation with FM sub-carriers. Multiple Modulation Frequencies.



FM/AM SIGNAL GENERATOR, MS27 — Wide Range: 0.3 to 240MHz in 5 ranges. 0.5% accuracy with crystal calibration. Int. or ext. mod: to ±75kHz FM and 80% AM. Low distortion: ±50kHz incremental frequency for narrow band applications.

Specifications subject to change without notice. Detailed literature and demonstrations available on request.

THE LONDON COMPANY 811 Sharon Drive • Cleveland, Ohio 44145
Telephone (216) 871-8900
In Canada: Bach-Simpson Ltd., Ontario

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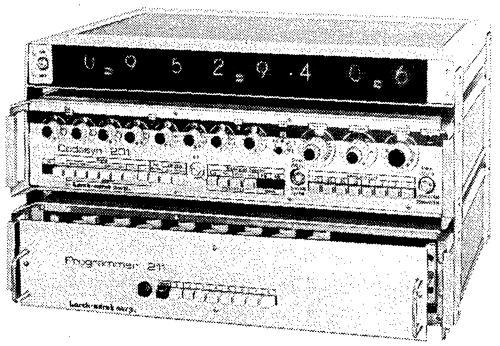
PROGRAMMABLE SYNTHESIZERS DC VOLTAGE STANDARDS

1KHz, 10KHz, 100KHz, 32MHz, & 70MHz
PROGRAMMABLE SYNTHESIZERS
with
SIGNAL GENERATOR VERSATILITY
PROGRAMMABLE PHASE
SWEEP CAPABILITY
MANY USEFUL ACCESSORIES



Model 201 with Programmer and Readout

SPECIFICATIONS

Model	302 B 1 KHz	303 10 KHz†	301 100 KHz	201 S 2 MHz	201 2 MHz	203 S 32 MHz	202 70 MHz
Frequency Stability	3 x 10^{-5}/week	3 x 10^{-5}/week	3 x 10^{-5}/week	2 x 10^{-8}/day (2 x 10^{-9}/day optional)			
Digital Decades	4	6	4	8	8	8	8
Resolution (with vernier)	0.01 Hz	0.001 Hz (0.00001 Hz)	0.1 Hz	0.1 Hz	0.1 Hz (0.001 Hz)	1.0 Hz	0.1 Hz (0.001 Hz)
Modulation AM	—	0 - 100%	—	—	0 - 100%	—	0 - 90%
Deviation FM	—	1 KHz	100 KHz (ext. only)	—	2 MHz	—	10 MHz
Sweep Range	—	1 KHz	100 KHz	—	2 MHz	—	12 MHz
Output Level	2.5 v	30 v p-p	+21 dbm	3 Vrms	+13 dbm	1.5 Vrms	+13 dbm
Attenuator	Calib. Dial	0 - 60 db	Calib. Dial	Calib. Dial	0 - 100 db	—	0 - 60 db
Spurious Output (nonharmonic)	−60 db	−80 db	−60 db	−70 db	−70 db	−70 db	−80 db
Signal to Phase Noise	60 db	—	60 db	90 db*	70 db	100 db*	100 db*
Rack Panel Height	3½″ (½ rack)	5¼″	3½″ (½ rack)	3½″	3½″	5¼″	5¼″
Price	$1450.00	$4950.00	$2150.00	$2700.00	$3800.00	$4800.00	$6300.00

*Noise level below carrier at 1 Hz bandwidth beginning 100 Hz from center frequency.

†Model 303 features DIGITALLY PROGRAMMABLE PHASE in steps (0.1° accuracy). Multiple outputs with sine, triangular, pulse and square wave forms.

PROGRAMMABLE DC VOLTAGE STANDARD
Model 102
with
HIGH ABSOLUTE ACCURACY
SIX DIGIT RESOLUTION
HIGH SPEED PROGRAMMING
SWITCHES OPERATE AT 5K OHMS
No Switch Cleaning Required

Output Voltage
10 volt range: 10 microvolts to 9.99999 volts in 10 microvolt steps
100 volt range: 100 microvolts to 99.9999 volts in 100 microvolt steps

Output Current
0 to 50 ma for any setting on 10 or 100 volt range.

Absolute Accuracy
10 volt range: ±(0.003% of setting +100 microvolts.)
100 volt range: ±(0.005% of setting +1 millivolt.)
From 20° to 30°C and for a ±10% line voltage variation.

Stability 7 days
10 volt range: ±(0.001% of setting +30 microvolts.)
100 volt range: ±(0.0013% of setting +300 microvolts.)

Noise
10 volt range: less than 25 microvolts rms
110 volt range: less than 250 microvolts rms

ACCESSORIES

Remote Digital Readout
Operates with main unit in local or remote program mode.

Remote Programmer
Voltages or Frequencies may be preset on eight rows of manual switches. Any preset program may be selected by a front panel push button or a single contact closure. Remote programmers may be cascaded.

Programmable Attenuator
0 to 99 db in 1 db steps; 0 to 60 MHz; may be controlled by front panel decade switch, remote BCD program or remote programmer accessory.

Harmonic Generator
Generates a comb of frequencies to 500 MHz precisely derived from the synthesizer.

100:1 Precision Divider
Provides a 0.1 volt range on Model 102 DC standard.

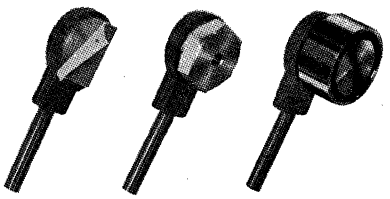
IRIG Programmers for Telemetry and FM Tape Systems
These devices generate BCD signals which program Model 201 Synthesizer to frequencies covering all telemetry channels (both constant bandwidth and proportional bandwidth). Other programmers set FM tape system center frequencies and 20 frequencies across the band in accord with IRIG standards.

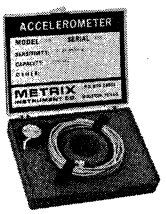
Lorch-adret corp.
105 Cedar Lane, Englewood, N. J. 07631 • 201-569-8282 • TWX: 710-991-9718

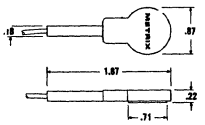
METRIX

SHOCK AND VIBRATION INSTRUMENTATION

SERIES 500 PIEZOELECTRIC ACCELEROMETERS







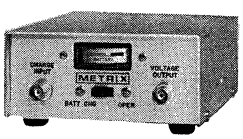
These transducers are self-generating and require no external excitation. However, as they are capacitive sources, operation into high impedance devices or charge amplifiers is required for good low frequency response. Mounting is with adhesive transfer tape or by threaded or magnetic adapter.

MODEL	502-1	512-1
Voltage Sens.	25 mv/g	6 mv/g
Charge Sens.	150 pc/g	20 pc/g
Capacitance	6000 pf	3300 pf
First Resonance	> 3000 Hz	> 10 KHz
Max. Accel.	5000 G's	5000 G's
Temp. Range	0° to 85° C	0° to 85° C
Weight	6 gms.	6 gms.
Cable	6' mini coax	6' mini coax
Connector	BNC	BNC
PRICE	$ 50.00	$ 50.00

Price includes calibration data, case and 10' roll of adhesive transfer tape.
1230-1 Magnetic Mounting Adapter.....$10.00
1230-2 Threaded Adapter (10-32 tap)..... 2.00

MINIATURE CHARGE AMPLIFIERS

MODEL 5080

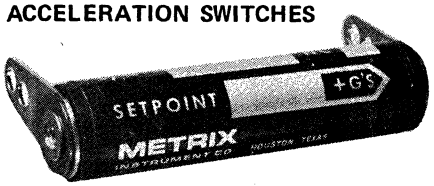


MODEL 5152

These solid state units condition signals from piezoelectric transducers to obtain good low frequency response and a high level low impedance output. Gain adjustment within the indicated ranges is by a screwdriver control. Calibration signal input is used for precise gain calibration.

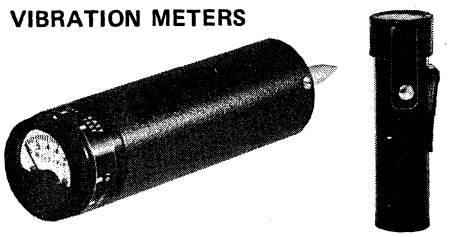
MODEL	5080-1	5080-2	5080-3	5080-4	5152-1	5152-2	5152-3
Input Charge (pc)	100-1K	1K-10K	10K-100K	100K-1M	2.5-125	25-1250	250-12,500
Output Voltage	±1 V				±2.5 V		
Output Impedance	20 ohms in series with 100 ufd.				65 ohms in series with 20 ufd.		
Low Freq. Resp. (-5%)	1 Hz	.1Hz	.05Hz	.05Hz	1 Hz	.1 Hz	.1 Hz
High Freq. Resp. (-5%)	10 KHz				10 KHz		
Noise RTI (rms)	.01 pc plus .002pc/1000pf source cap.				.009 pc plus .005pc/1000pf source cap.		
Operating Temp.	0°C to +65°C				-40°C to +85°C		
Input Power	rechargeable Ni-Cad battery (9V)				28 VDC @ 20 ma.		
Weight	25 oz (.7Kg)				2.8 oz (80 gms)		
Dimensions	5" x 2" x 5"				1.0" x 1.25" x 2.25"		
Input Connector	BNC coaxial				10-32 coaxial		
Output & Pwr. Conn.	BNC coaxial				Viking VR7/4AG15		
PRICE	$175.00 incl. battery and recharge cable				$175.00		

ACCELERATION SWITCHES



Model 5171 Acceleration Switch is factory set to close a set of electrical contacts when the unit is subjected to an acceleration greater than the setpoint. The unit is sensitive along the cylindrical axis in one direction only. The acceleration setpoint can be factory adjusted to any value from 2 G's to 100 G's, ±10%. Higher acceleration setpoints can be supplied but with less accuracy. Maximum acceleration is 1,000 G's. The switch contact rating is 28 VDC @ .5A. Both contacts are insulated from the plastic case, which is temperature rated from -40°C to +150°C. The case is hermetically sealed and measures .38" diam. x 1.7".

VIBRATION METERS

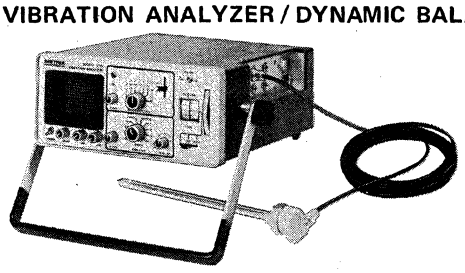


Model 5160 Vibration Meter is a self-contained probe, pickup and meter readout for on-the-spot measurements of vibration amplitudes. Vibration measurements are made simply by holding the probe end against the vibrating surface and observing the meter reading. Three full scale ranges of vibration displacement, velocity or acceleration are provided. The frequency range is 10 Hz to 1,000 Hz. When switched to the BATT position, the meter indicates the voltage of the 9 V transistor battery.

Model	Meter Ranges
5160 D	1, 10, 100 MILS, pk-pk
5160 V	.1, 1, 10 IN/SEC, pk
5160 A	.1, 1, 10 G's, pk

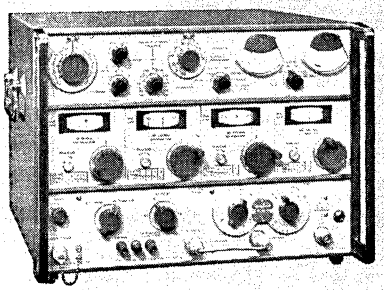
PRICE $245 including battery and case.

VIBRATION ANALYZER / DYNAMIC BALANCER

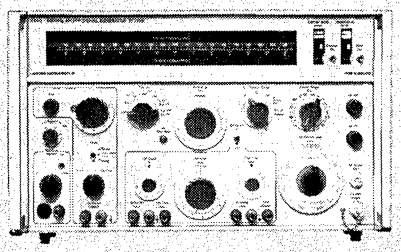


Consisting of a rugged vibration pickup and lightweight portable indicator, complete with integral oscilloscope, Model 5115 Vibration Analyzer measures amplitude and frequency of vibration displacement, velocity or acceleration in the frequency band 5 Hz to 1,600 Hz. Spectral analysis is accomplished with a continuously variable narrow band filter (Q = 10). The actual vibration waveform is displayed in the oscilloscope, filtered or unfiltered. Features include a measurand selector, 5 position range switch, sweep speed selector, calibrated filter, external X and Y inputs, signal output jack and external trigger input. Optional accessories include an oscilloscope camera and a stroboscope for dynamic balancing. The unit is powered by rechargeable batteries or 115/230 VAC. Standard unit is $1,950.00, including pickup, probes, cables, batteries.

P. O. BOX 36501—HOUSTON, TEXAS 77036
TEL.: (713) 668-2386
METRIX INSTRUMENT CO.



MODEL 2006 SOLID STATE PRECISION SIG. GEN. — All solid state unit in which each frequency range is covered by separate fundamental RF oscillator unit. Generators will accept any 4 of 5 available units. Features very low microphony 12KHz deviation under ½ G acceleration. Low noise pure spectrum typically 12Hz telephone weighted, 40Hz flat over entire range.



MODEL 2008 SWEEP/SIGNAL GENERATOR (DYNAMIC TRANSMISSION SIMULATOR) Exceptionally wide frequency range starting in the VLF Band (10KHz) and going up to UHF (510MHz) in eleven ranges each with a 1 to 1.5 cover . . . internal or external sweep adjustable to entirely span any tuning range . . . full FM and AM capabilities which can be retained in the swept mode.

FM/AM SIGNAL GENERATORS

DESCRIPTION	FREQUENCY	FEATURES
AM SIG. GEN. (6625-900-1016) Model 144H/4	10KHz to 72 MHz	0.2μv to 2v ±0.5 dB, 50Ω. Also max. direct output 2.75v, xtal check, 400KHz and 2MHz. Stability 0.002%/10 min. internal AM to 80% at 400Hz and 1KHz. Also external AM.
FM/AM SIG. GEN. Model 2002AS	10KHz to 72 MHz	0.1μv to 1v ±1 dB, fully solid state, AM variable to 100%, FM deviation ±1KHz to ±50KHz max. dependent upon range. Incremental frequency controls with discrimination of 0.025% of carrier frequency and direct readout in KHz. Xtal calibrator 1MHz, 100KHz, 10KHz. Drift less than 30 ppm/15 minutes after warm-up. External frequency shift permits phase mod. or phase locking. For specifications of TF2116 Synchronizer, see below.
FREQ. CONTROL UNIT Model 2166		For use with Signal Generator 2002AS. Unit locks up the frequency to a crystal, internal or external, or another signal generator. Variable offset up to ±50KHz enables units to simulate SSB signal.
FM/AM SIG. GEN. (6625-913-7223) Model 995B/Series	200 KHz to 220 MHz	0.1μv to 100mv. Calibrated, △F. Step attenuator, Crystal standardized; extremely stable. Deviation ±600KHz on top bands. Has simultaneous FM & AM. Special high sensitivity external FM mod. position with frequency/phase response suitable for stereo modulation. Also available for narrow band working FM spurious less than 25Hz. Model 995B/5.
MOBILE RADIO TEST SET Model 2905	Low and High Band	Test set comprises an FM/AM Signal Generator covering low and high bands, FM/AM modulation meter with demodulated output, RF power meter terminated and through line with forward and reflected power, 1KHz audio oscillator and AF voltmeter.
FM SIG. GEN. (6625-929-4277) Model 1066B/1	10MHz to 470 MHz	0.1μv to 100mv. 50Ω, FM at 1KHz and 5KHz internal, deviation to ±100KHz, △F to ±100KHz, both meter monitored. Stability .0025% 10 min. Rack mounted available.
FM SIG. GEN. (6625-937-2801) Model 1066B/6	10MHz to 470 MHz	0.1μv to 100mv into 50Ω. FM modulation at 1KHz and 5KHz internal or 30Hz to 100KHz external. Deviations to 100KHz, 10MHz to 50 MHz, ±400KHz, 50MHz to 270MHz and ±300KHz. 270MHz to 470MHz. Modulation distortion 5% over telemetering band 215MHz to 265MHz, AM or FM less than 5% at max. deviation. Crystal calibrator gives check points at 1MHz and 10MHz.
LOW NOISE FM SIGNAL GENERATOR Model 2012	400MHz to 520MHz	Highly stable low noise unit for testing UHF narrow band mobile receivers. Rejection ratios exceeding 90 dB at 20KHz from mid band can be measured. Output level 0.01μv to 100mv into 50 ohm. FM deviation variable to ±30KHz f_m 300Hz to 3KHz.
SOLID STATE PRECISION FM SIGNAL GENERATOR Model 2006	4MHz to 1000MHz	Solid state precision FM unit accepts any 4 of 5 oscillators with bands 4 to 10MHz; 10 to 90MHz; 88 to 220MHz, 215 to 500MHz and 440 to 1000MHz. Stability 15ppm +1.5KHz per 15 minutes. Xtal calibrator, 10MHz, 1MHz, 100KHz. Output 0.1μv to 100mv into 50Ω. FM ±100KHz to ±300KHz max. dependent on frequency. Mod. frequencies 20Hz to 125KHz from internal tunable oscillator or external source.
SOLID STATE SIG. SOURCE Model 6055	850MHz to 2150MHz	Digital readout continuously tunable solid state microwave source. Scale accuracy 1%, residual FM 1ppm, harmonics 25 dB down, output 30mW into 50Ω max. AM (square wave) 900Hz to 1.1KHz. FM model to special order.

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SWEEP GENERATORS & OSCILLATORS

DESCRIPTION	FREQUENCY	FEATURES
VIDEO AND UHF SWEEPER Model 2361		Main sweep unit has internal rep. rate 0.01Hz to 100Hz with linear, semi log, CW, single shot and manual modes. TV field lock, blanking and phase shift controls and alternate trace separation.
VIDEO PLUG-IN Model 9692	25KHz to 30MHz	Sweep width variable 0 to 30MHz, detected system flatness +0.05 dB harmonic and spurious 40 dB down. 1MHz and 5MHz markers.
UHF PLUG-IN Model TM9693	1MHz to 300MHz	Sweep width variable 0 to 300MHz, flatness ±0.25 dB, harmonic and spurious 40 dB down, 1, 10 and 100MHz markers.
AF OSCILLATOR Model 2102M	3Hz to 30KHz	A solid state oscillator capable of delivering up to 10 volts into 600 ohms (20 volts open circuit). Has complete freedom from "amplitude bounce" when rapid frequency changes are made. Drift 0.02% per 15 minutes. Distortion 1%.
WIDE RANGE OSCILLATOR Model 2103	10Hz to 1MHz	Sine wave or square wave output 0 to 2.5 volts RMS continuously variable with 4 step attenuator. Sine wave distortion less than 0.5% 50Hz to 10KHz.
MICROWAVE OSCILLATOR Model 6058	7.0 to 12.5GHz	Direct digital readout of frequency, accuracy ±1% resettability ±0.1%. Output power 5mw. Internal square wave mod, external PIN diode.
GUNN DIODE OSCILLATOR Model 6061	8.0 to 10.5 GHz	Micrometer head tuning, 5mv output other types for system use available on request.

FM DEVIATION METERS

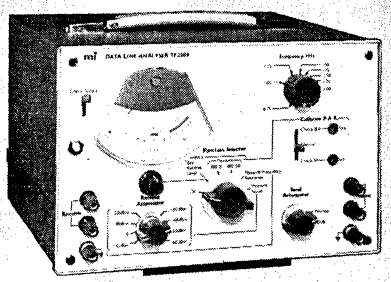
FM DEVIATION METER (6625-060-3320) Model 791D	4MHz to 1024MHz	Deviation ranges, ±5, ±25, ±75 and ±125KHz full scale. Accuracy 3%. Crystal standardized. Local oscillator can be xtal controlled for measuring deviations down to 10Hz.
FM DEVIATION/ AM MODULATION METER Model 2300A	4MHz to 1000MHz to 2500MHz using ext. oscillator	Wide range, mod. freq. up to 200KHz; deviation ranges ±1.5, ±5, ±15, ±50, ±150, ±500KHz. Local oscillator can be xtal locked, external oscillator can be used. De-emphasis 50μsec. 75μsec. switch selected. FM accuracy ±3% for deviation up to ±500KHz f_m 30Hz to 150KHz. AM modulation two ranges 30% and 100% mod. freqs. 30Hz to 50KHz (carrier 4 to 350MHz).
WIDE BAND FM DEVIATION METER Model 2300/6	20MHz to 1000MHz to 2500MHz using ext. oscillator	Deviation Ranges: ±10, ±30, ±100, ±300, ±1000KHz. Accuracy better than 5%, crystal standardized, f_m 30Hz to 150KHz.

BRIDGES AND Q METERS

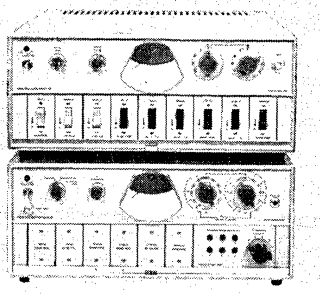
UNIVERSAL BRIDGE Model 1313A	1KHz and 10KHz 20Hz to 20KHz External	0.1μh to 110h, 0.1pf to 100μf, 0.003Ω to 110MΩ. Accuracy 0.1%. Built-in osc. and det. Direct reading; simplest possible operation. Uses adapter TM6113 for biasing inductors to 200ma.
PORTABLE UNIVERSAL BRIDGE Model 2700	1KHz internal 20Hz to 20KHz External	0.2μh to 110h, 0.5pf to 1100μf, 0.01Ω to 11MΩ. Accuracy 1%. Transistorized, simple. Measures incremental L, electrolytics & non-linear resistance using external bias supplies.
Q METER Model 1245A	1KHz to 300MHz	Q ranges 5 to 1000, △Q 25-0-25. Accuracy 5% to 100MHz, 20% to 300MHz. Calibrated capacitor 7.5 to 500pf, △C ranges ±1 and ±5pf. Extremely stable and easy to operate. Uses separate oscillators—see below. Dielectric and Series Loss Test Jigs available. Also HF & LF inductors.
POWER OSCILLATOR Model 1246	40KHz to 50MHz	For driving 1245A Q Meter, or 4v across 50Ω for general lab use.
POWER OSCILLATOR Model 1247	20MHz to 300MHz	For driving 1245A Q Meter, or 4v across 50Ω for general lab use.

TELEVISION TEST EQUIPMENT

SINE² PULSE AND BAR GENERATOR Model 2905/5		Sine² pulse and bar generator for 525 line systems includes monochrome pulse and bar T/2, T and 2T. Also 10T and 20T with color burst, color sine² pulse and bar and sub-carrier added to staircase or sawtooth. External sub-carrier may be used.
SINE² PULSE AND BAR GENERATOR Model 2905/9		For accurate K factor measurement provides T, 2T, 5T, 10T, and 20T sine² pulse, 25μsec bar, adjustable luminance/chrominance amplitude and delay, color burst, pedestal, asynchronous square wave, 0.05 volt 52μsec set up. Includes inverted sine² pulse for checking quadrature distortion.
LUMINANCE/CHROMINANCE GAIN & DELAY TEST SET Model TF2904/1		Measures gain and delay inequality with gain discrimination 0.5 dB, delay discrimination 2 nanoseconds, visible display of misalignment with scope.
TV SIDEBAND ANALYZER Model TF2360	100KHz to 20MHz 30MHz to 90MHz 170MHz to 230MHz 470MHz to 960MHz	Provides a symmetrical or asymmetrical swept video signal for testing video amplifiers or transmitters using 625, 525 or 405 line systems, positive or negative modulation.
BLANKING AND SYNC MIXER Model TF2908		Reshapes blanking and sync pulses and mixes with video waveform (sine² pulse and bar, sweep, sawtooth, etc.). Permits sweep measurement with clamps or dc restoring circuits in normal operation. Output flat 0.2 dB to 10MHz, 0.3 dB to 20MHz.
GRAY SCALE GENERATOR Model 2909/1		For linearity measurements on color and monochrome systems. 5, 7 or 10 stair step or sawtooth with line sync. selectable every first, fourth or fifth line. Color sub carrier can be added to steps. Features automatic switching between black and white levels. Contains line frequency xtal or may be triggered from external VIT unit.



MODEL 2809 DATA LINE ANALYZER — A self contained test set for assessment of overall distortion produced by communication links, it is useful for testing the suitability of voice band transmission systems and microwave links — for data transmission. Three types of measurement can be made, peak-to-average rating (PAR), frequency response and system noise level (a special circuit is incorporated to correct for the effects of phase intercept distortion.)



MODEL 2090B NOISE LOADING TEST SET — This new unit measures Noise Power Ratio directly in db and picowatts. A standardizing noise generator is built into the receiver to facilitate out of — band measurements. Band limiting and slot filters for all CCIR/CCITT and D.C.A. recommendations. Special frequencies to order.

INTERMODULATION AND BASEBAND TEST GEAR

DESCRIPTION	FREQUENCY	FEATURES
NOISE LOADING TEST SET TRANSISTORIZED (6625-670-0146) (AN/GSM 161) Model 2090A	12KHz to 12.388MHz (i.e. up to 2700 channels)	Solid state unit has built-in standardizing noise source in receiver for gain setting, out-of-band testing, etc. Includes noise generator, receiver and a choice of many different filters. NPR measurements can be made up to 75 dB.
NOISE LOADING TEST SET Model 2090B	12KHz to 12.360MHz	Designed to meet latest CCIR and CCITT requirements (Recommendation 399-1 Oslo 1966). Operation similar to model 2090A.
TWELVE CHANNEL NOISE GENERATOR (6625-948-4724) Model TM7816	300Hz to 3400Hz	Generates twelve non-related channels of Gaussian noise from twelve separate solid state sources. Output: each channel 1mW in 600Ω balanced, 300Hz to 3400Hz. Attenuation to −32 dbm in 2 db steps. Spurious noise in OFF channel (all other channels ON) is less than 10 dba (−75 dbm FIA weighted).
DATA LINE ANALYZER Model 2809		Used for testing data transmission lines and links; measures peak-to-average rating (PAR) frequency response and system noise level. Has correction for phase-intercept distortion.
TWO-TONE SIGNAL SOURCE Model 2005	20Hz to 20KHz	Two continuously variable solid state oscillators 0.1% harmonic distortion, intermodulation −80 dB, hum −80 dB, monitored 111 dB attenuator with balanced and unbalanced outputs. Recommended for SMPTE and CCIF two-tone testing.
SELECTIVE VOLTMETER Model 2330A (6625-168-0955)	20Hz to 76KHz	3 dB bandwidth 6Hz; rejection ratio 65 dB at 40Hz off tune. Sensitivity 30μv to 300 volts full scale. BFO output tracked in frequency and flat to 0.1 dB. Includes RF detector for AM demodulation.
SOLID STATE DISTORTION FACTOR METER Model 2331	20Hz to 20KHz Fundamental 20Hz to 100KHz Max. Bandwidth	All transistorized unit measures distortion factor 0.05% to 100% in seven ranges from 0.1% to 100% f.s.d. Noise measurement to 100% in similar ranges. Switch bandwidth 100KHz or 20KHz with filters to give HF cut above 20KHz, LF cut below 400Hz and CCIF weighting characteristics. Voltage measurement 20Hz to 100KHz in ten ranges between 1mv and 30v f.s.d.

RECEIVERS FM/AM/CW/SSB

EDDYSTONE Model 850/4	10KHz to 600KHz	11 tube superheterodyne with top performance throughout VLF and LF bands. Three selectivities, 100Hz to 6KHz; 75 dB image rejection. Has facility for eight xtal controlled spot frequencies.
EDDYSTONE Model 958	10KHz to 30MHz	High stability AM/SSB receiver with FET front end. Drift cancelling loop above 1.6MHz gives stability better than 20Hz. Blocking and adjacent signal interference exceptionally low; front end protected against high voltage at antenna input.
EDDYSTONE Model 990R	27MHz to 240MHz	All solid state four range single conversion receiver for AM/FM. Two bandwidths of 30KHz and 125KHz. Local oscillator may be xtal locked to any of 8 internal customer selected crystals.
EDDYSTONE Model 990S	230MHz to 870MHz	Transistorized two range single conversion receiver for AM/FM. Bandwidth variable 6MHz an.1MHz. FM discriminator deviation to 250KHz.
PANORAMIC DISPLAY UNIT Model 961	50KHz to 60MHz	3 models (/A — 50KHz to 800KHz; /B — 500KHz to 36.5MHz; /C — 36MHz to 60MHz) can be used separately or in conjunction with Eddystone Receivers. Sensitivity: /A 10μv/cm; /B and /C 20μv/cm. Calibration markers and pen recorder output; log/lin display, variable sweep speed or manual.

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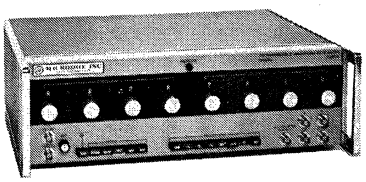
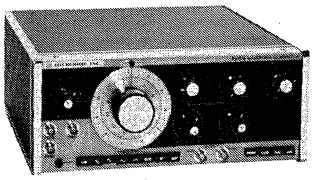
MICRODOT INC.

0.0005 Hz SIGNAL ← SIGNAL SOURCES → SOURCES 2500 MHz

F200 Series Waveform Generators



Programmable Waveform Generators

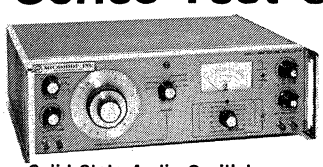


Triggered/Sweep Waveform Generators

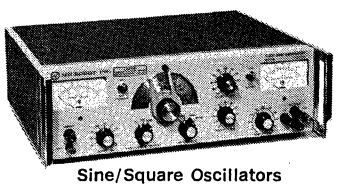
WAVEFORMS: sine, square, triangle, ramp, $\sin^2$. Selected front panel outputs; simultaneous rear panel outputs.
FREQUENCY: .005 Hz-3MHz; 16 ranges of 1 and 3 combinations, 20:1 ratio (F210A-01 .0005 Hz-3 MHz).
OUTPUT VOLTAGE: 32.5 V p-p (16.25 V p-p, 50 ohm), >60 dB attenuator range.
VCF: >100:1, DC to 100 kHz Bandwidth.
DC OFFSET: Fixed or variable up to ±16.25 v.

F210B Trigger/gate.
F220A Tone Burst, selectable 1-99 cycles front panel.
F230B Trigger/gate Sweep. .001 Hz-100 kHz bandwidth.
F231A AM/FM sweep.
F240A Phase-Lock, variable 0°-360°, 10 Hz-3 MHz.
F280A BCD Programmable, .01 Hz-1.1 MHz, .01 V-11 V p-p into 50Ω. TTL/DTL 3 digit resolution plus 10% overrange.

F300 Series Test Oscillators



Solid State Audio Oscillators



Sine/Square Oscillators

SQUARE WAVE AND SINE WAVE

FREQUENCY: 10 Hz-10 MHz, 6 decade ranges.
OUTPUT POWER: 200 mW (3.16 V across 50 Ω) or 16 mW (3.16 V across 600 Ω); +23 dBm into 50 Ω (other impedances optional).
ATTENUATION: 0-90 dB in −10 dB steps, including amplitude control of >20 dB range and −9 dB step for rms/p-p conversion. Accuracy: ±0.075 dB, −60 dBm to +20 dBm, ±0.2 dB, −70 dBm to −60 dBm.
OUTPUT VOLTMETER: Scales: 0-1.0 V rms, 0-3.2 V rms, −15 dBm to +3 dBm.
EXPAND SCALE: Expands reference of normal scale from <0.9-1.0 or <2.8-3.2.
F321 Sine.
F322 Sine with expand scale.
F323 Sine/square.
F324 Sine/square with expand scale.

AUDIO SINE GENERATORS
Professional Sound and Broadcast

F370 OUTPUT POWER: >5 watts into 50, 200, 600 and 5000 Ω.
DISTORTION: <1%.
METERING: Input and output AC Voltmeter.
OUTPUT ATTENUATOR: 110 dB in 1 dB steps.

F380 OUTPUT POWER: 4.5 V (+15 dBm) into 50, 150 and 600 ohms.
DISTORTION: <0.1%.
OUTPUT ATTENUATOR: 110 dB in 0.1 dB steps.
HUM AND NOISE: >100 dB below zero level.

RF Products

RF POWER AMPLIFIERS — HIGH POWER VHF & UHF TRANSMITTERS
POWER OSCILLATORS — AM-FM-PM SIGNAL GENERATORS

Power Oscillators 50 Watts CW

PLUG-IN VHF-UHF POWER OSCILLATOR Model 445

Choice of plug-in heads for six frequency ranges*:

Model 183	2-10 MHz
Model 184	10-50 MHz
Model 185	50-200 MHz
Model 186	200-500 MHz
Model 187	500-1000 MHz
Model 188A	1000-2000 MHz
Model 189A	2000-2500 MHz

*Approximately 3% to 10% frequency overlap provided.

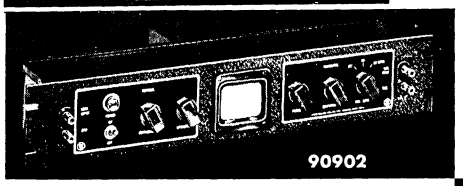
FEATURES:
- Flexibility through use of selected plug-in heads
- Same outstanding performance specifications as 400 Series Power Oscillators
- Power outputs to 50 watts
- Positive no-load protection
- Readout for forward and reflected power
- High-Q tuned cavity, temperature compensated
- Regulated power and heater supplies

TYPICAL APPLICATIONS:
Power meter calibration
Antenna pattern measurements
Power amplifier drive
Susceptibility measurements
High attenuation measurements
Laser modulator drive
High power transistor testing
Laboratory transmitter

Model 183
2-10 MHz

Contact your local representative listed in the EEM Yellow Pages for more information or a demonstration.

MICRODOT INC. / INSTRUMENTATION DIVISION
19535 East Walnut Drive, City of Industry, Calif. 91744 / (213) 965-4911 • (714) 595-7541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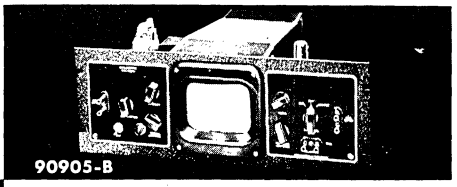
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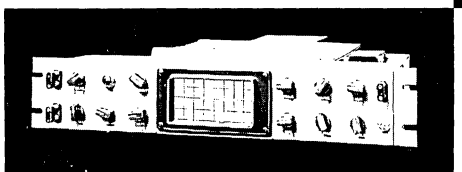
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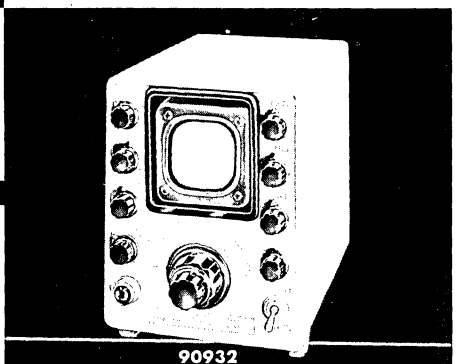
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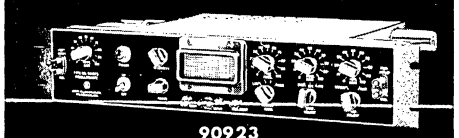
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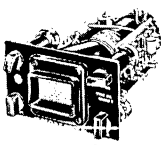
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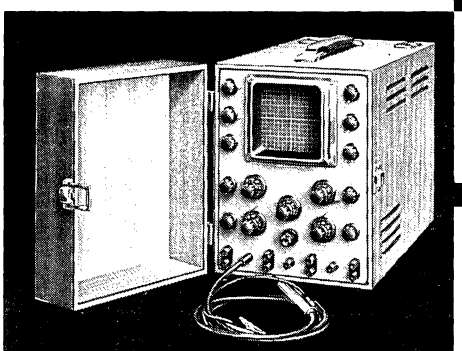
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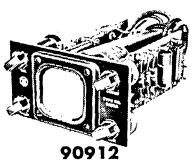
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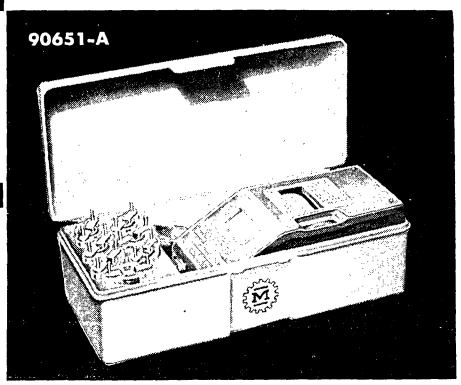
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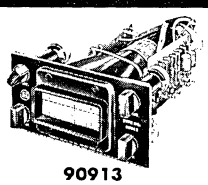
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"Designed for Application"® OSCILLOSCOPES AND ACCESSORIES

MODULE OSCILLOSCOPES

Miniature, packaged panel mounting cathode ray module oscilloscope indicators for monitoring. Designed to be built into equipment. Require minimum panel space. Use separate module power supply.

No. 90901 uses 1CP1 fixed focus cathode ray tube. Smallest and most economical of the module oscilloscopes. Panel 2⅜" square.
No. 90911 uses type 1EP1 flat face 1¼" cathode ray tube. Balanced deflection. Blanking input. Sharp focus. Panel 2⅜" square.
No. 90912 uses type 2BP1 two inch cathode ray tube. 3" x 5" panel.
No. 90912-R uses type 3UP1 2⅛" x 1-9/16" cathode ray tube.
No. 90913 uses type 3XP1 3" x 1½" rectangular cathode ray tube.
No. 90914 uses type 4KP1 3½" square cathode ray tube.
No. 90943 uses type 3KP1 Three inch C-R-T. Contains power supply.
No. 90945 uses type 5BP1 Five inch C-R-T. Contains power supply.

BASIC OSCILLOSCOPES

Rack mounted inexpensive basic oscilloscopes including cathode ray tube circuit, power supply; intensity, focus, and centering controls, magnetic shielding, safety features, switches, etc.

No. 90902 uses type 2BP1 two inch cathode ray tube. 3½" x 19" panel.
No. 90902-M designed to meet military specification MIL-T-945.
No. 90903 uses type 3KP1 three inch cathode ray tube. 5¼" x 19" panel. Power requirement — 105-125 volts 60 cycles — 19 watts.
No. 90903-R uses type 3XP1 3" x 1½" rectangular cathode ray tube.
No. 90905 uses type 5UP1 five inch cathode ray tube. 7" x 19" panel.
No. 90905-B uses type 5ADP1 five inch flat face precision tolerance cathode ray tube. Balanced deflection. Blanking input. 35 W at 117 V.
No. 90905-D for balanced direct coupled deflection. Uses 5ADP1.
No. 90905-R uses type 5BXP1 4⅝" x 2⅝" rectangular C-R tube.

COMPACT COMPLETE OSCILLOSCOPES

Extremely compact oscilloscopes complete with amplifiers, linear low frequency sweep, and power supplies. Balanced deflection for minimum distortion. High accelerating potential for good resolution.

No. 90923 uses type 3XP1 3" x 1½" rectangular cathode ray tube. 3½" x 19" panel. 0.4 V. p to p per cm. defl. d.c. to 275 kc.
No. 90923-C uses 3RP1. 5¼" x 10½" panel. 50 mv p to p per cm.
No. 90925 uses type 5BXP1 4⅝" x 2⅝" rectangular C-R tube. 3½" x 19" panel. 0.16 V. p to p per cm. defl. DC to 550 kc.
No. 90925-A Vertical amplifier is 50 mv. p to p per cm. to 2.5 mc.
No. 90925-B Low frequency linear sweep 3 seconds per sweep to 22 kc.

PORTABLE FIELD OSCILLOSCOPES

Especially suitable for use in factory, laboratory, and the field for design, installation, maintenance, and service. Well shielded against magnetic fields. Excellent linearity. Sharp focus. Compact.

No. 90915 uses 5AQP1. Frequency response either amplifier DC to 200 kc. Completely insulated front panel and case. Double shielded.
No. 90952 Synchroscope or Oscilloscope. 7½" x 5⅝" x 13"
No. 90954 uses 4KP1 3½" square CRT. 7½" x 9½" x 13½" insulated case. 23 pounds. Response DC to 1.2 mc. 0.1V. per cm.

MONITOR OSCILLOSCOPE

No. 90932 Amateur Band Monitor Oscilloscope is a complete oscilloscope for monitoring the modulated r-f output of a transmitter. Built-in link-coupled tuned circuits cover all amateur bands 3.5 to 54 mc. All circuits and accessories are built in. The monitor will display the r-f envelope and/or the trapezoidal monitoring pattern.

GRID DIP METER

The No. 90651-A Grid Dip Meter has a transistor d.c. amplifier to increase sensitivity. It provides full scale meter reading at all frequencies from 1.7 to 300 mhz. It has a modern taut band meter to eliminate any possibility of the meter ever becoming sticky.

POWER SUPPLIES

Compact high voltage and low voltage power supplies for oscilloscopes etc. 1⅞" x 2⅛" x 4⅝". Input 117 volts 50/60 cycles. Supply accelerating and centering potential for oscilloscopes.

No. 90202 is a plug-in supply for high voltage and heater power for any of the MILLEN Module Oscilloscopes. Output 750 volts dc at 3 ma.
No. 90202-M designed to meet military specification MIL-E-16400.
No. 90203 supplies B+ and heater to three amplifiers and a sweep.
No. 90203-A has external filter capacitors for military applications.

MODULE ACCESSORIES

The MILLEN Module Oscilloscope Amplifiers and Sweep are compact plug-in units designed to provide the required deflection voltages for the MILLEN series of Module and Basic Oscilloscopes.

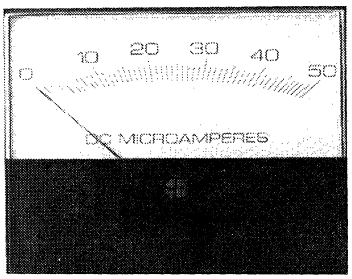
No. 90924 A-C coupled unit. Use as pre-amplifier or deflection amp.
No. 90926 Plug-in linear sawtooth sweep generator. Controls on top.
No. 90927 Several versions of direct coupled deflection amplifier.

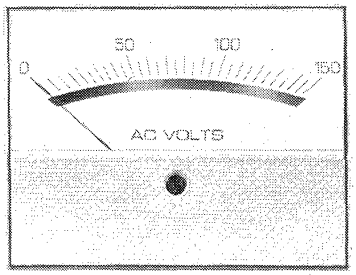
JAMES MILLEN MFG. CO., INC.
MAIN OFFICE AND FACTORY
150 EXCHANGE ST., MALDEN, MASSACHUSETTS, U. S. A.

MODUTEC
TAUT BAND PANEL METERS

The Modutec family of precision, self-shielded, permanent-magnet / moving coil panel meters combines state-of-art movements with advanced, functional styling.

Each of the five Modutec series is available in a full range of five sizes.





FEATURES AND SPECIFICATIONS

Movement — High torque, frictionless taut-band suspension assures long life and dependable high accuracy.

Scale — 100° long, linear, low-profile scales provide easy, accurate reading.

Accuracy: ±2% for DC meters; ±3% for AC meters (60 Hz sine wave).

Tracking: ±1.5% for DC meters; ±2% for AC meters.

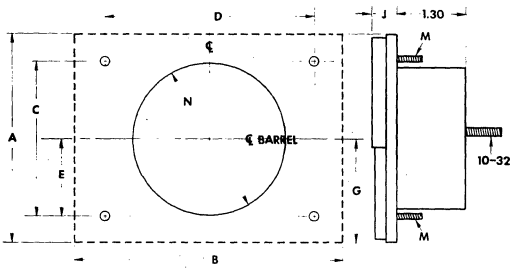
Modutec meters meet or exceed the performance requirements of USA Standard C-39-1.

S SERIES
SURFACE MOUNT BLACK COVER

The handsome aspect ratio and clean cut detailing of these meters will add distinction to any instrument or control panel. Available in five sizes and a wide variety of ranges, this series provides new latitude for the equipment designer.

C SERIES
SURFACE MOUNT CLEAR COVER

This series features a case front of clear acrylic, polished on the outside and closely ribbed on the inside surface. The visual effect of this is to greatly reduce contrast between the meter and the adjacent panel, resulting in a very pleasing overall appearance.

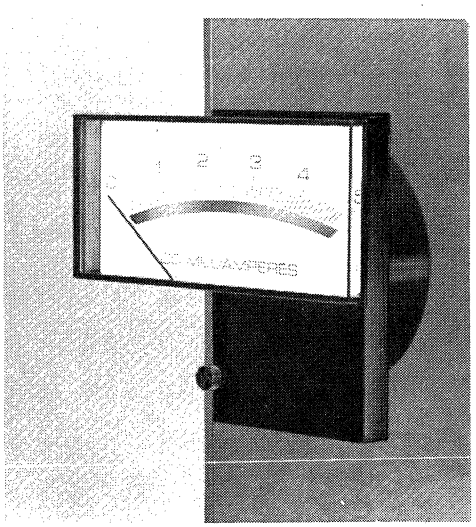


DIMENSIONS, AND PANEL CUTOUT FOR BARREL

METER SIZE	A	B	C	D	E	G	J	M	N
1½"	1.75	2.24	1.31	1.31	.66	.83	.34	4-40	1.55
2½"	2.27	2.99	1.88	1.88	.94	1.13	.37	4-40	2.22
3½"	2.87	3.70	2.25	2.25	1.12	1.44	.41	4-40	2.82
4½"	3.96	5.10	3.56	4.00	1.54	1.74	.48	6-32	2.82
5½"	4.48	5.85	3.00	5.25	.85	1.59	.55	6-32	2.82

WINDO-MOUNT® METERS

W SERIES



If you want your panel to be the last word in sophisticated styling, specify Windo-Mount® meters! You see only the meter dial, through what appears to be a flush window in the instrument panel. Available in all standard Modutec sizes — concessions need be made to neither function nor appearance.

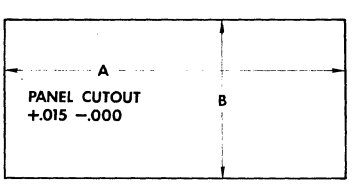
For illumination, see "Options" on next page. Mounting to panel can be done in several ways; for information request applications bulletin AB6-1 from your Modutec rep or from factory. Price: Same as "S" series, except see "Edge Options", below.

Edge Options

1. Clear. Concealed outside edge of dial cover is polished acrylic. This is the standard meter, and will be supplied unless specified otherwise.

2. White. Concealed outside edge of dial cover is painted opaque white.
To order: Add numeral "2" to the letter "W" in the catalog number, e.g., 4W2-AVU-190-AB, and add $0.75 to the list price.

3. Black. Concealed outside edge of dial cover is painted black.
To order: Add numeral "3" to the letter "W" in the catalog number, e.g., 4W3-AVU-190-AB, and add $0.75 to the list price.



METER SIZE	A	B
1½"	2.145	.930
2½"	2.895	1.265
3½"	3.593	1.590
4½"	5.005	2.330
5½"	5.775	2.588

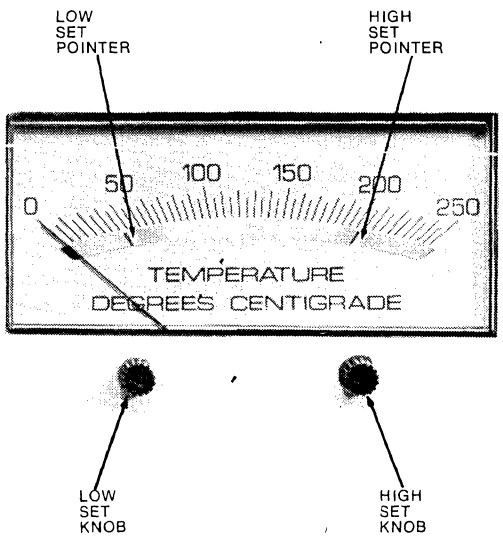
CONTROL METERS

A new approach to actuating and monitoring IC control circuits

The MODUTEC Control Meter combines a taut-band panel meter with precision potentiometers that are coupled to set point indicators. Both the panel meter and the potentiometer — set point indicator assemblies are accurately calibrated to the same meter dial (without mechanical interaction). The set point indicators move behind, rather than in front of the dial, and are visible through the mirror slot. This provides a desirable visual differentiation between indication and control, in addition to improving overall appearance.

Easily interfaced with readily available integrated circuit elements, the Modutec Control Meter offers the designer maximum flexibility in achieving accurate and reliable indication and control of almost any variable that must be continuously monitored, and at significant cost savings over alternate methods.

CATALOG — Phone or write for the special Control Meter Catalog, which gives full description, specifications, and applications data.



MODELS AND PRICES

Models — Modutec Control Meters are available in all four of the Modutec panel meter series described on these pages, in 3½", 4½", and 5½" sizes, and in all the ranges listed on the following pages, with the exception of Expanded Scale Meters, Null Meters, Elapsed Time Meters, and VU Meters.

All models are available in either single or dual set point versions.

Prices — To determine price of a Modutec Control Meter, first look up the price of the equivalent style, size and range panel meter, given on these and the following pages. The **additional** cost of a Control Meter is as follows:

Single set point version — $28.00
Dual set point version — $43.00

Discounts — Same as for regular panel meters, but applies only to the total number of control meters ordered.

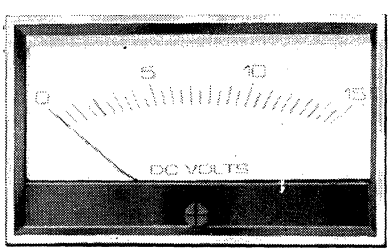
BEZEL MOUNT METERS

BA SERIES

Cast metal bezels are available for behind-panel mounting of S series or C series meters in all sizes. The cleanly designed bezel features minimum depth and cross-sectional area consistent with function, and is supplied in solid black finish or with brushed metal inline, as shown below.

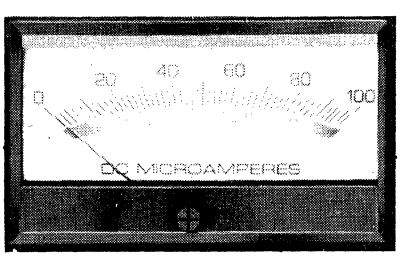
When you order a bezel mount meter you are, in effect, ordering a complete package, comprising meter, bezel, hardware, template, and mounting instructions. To order, substitute "BA" for the letter in the model designation, and add suffix "BA1", "BA2", "BA3", or "BA4". For example, 3BA-DVV-025-BA2 specifies a 3½" DC voltmeter, range 0-25 VDC, bezel mount with brushed metal inline over a clear cover meter.

Prices: Prices of bezel mount packages are obtained by adding to the basic meter prices (on the following page) as follows:
1½"—$2.20 2½"—$2.20 3½"—$2.20 4½"—$2.35 5½"—$2.50



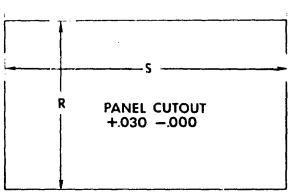
BA1 brushed metal inline bezel, black cover meter.

BA2 brushed metal inline bezel, clear cover meter.



BA3 solid black bezel, black cover meter.

BA4 solid black bezel, clear cover meter.



METER SIZE	R	S
1½"	1.37	2.25
2½"	1.59	3.00
3½"	2.16	3.72
4½"	2.75	4.81
5½"	3.14	5.86

Range	1½" Catalog No.	1½" Price	2½" Catalog No.	2½" Price	3½" Catalog No.	3½" Price	4½" Catalog No.	4½" Price	5½" Catalog No.	5½" Price
DC MICROAMMETERS										
ZERO LEFT										
0-20	1S-DUA-020	$21.85	2S-DUA-020	$20.90	3S-DUA-020	$21.85	4S-DUA-020	$23.35	5S-DUA-020	$23.80
0-50	1S-DUA-050	16.00	2S-DUA-050	15.25	3S-DUA-050	16.00	4S-DUA-050	17.10	5S-DUA-050	21.00
0-100	1S-DUA-100	15.20	2S-DUA-100	14.45	3S-DUA-100	16.00	4S-DUA-100	16.20	5S-DUA-100	19.55
0-200	1S-DUA-200	14.40	2S-DUA-200	13.90	3S-DUA-200	14.40	4S-DUA-200	15.25	5S-DUA-200	18.40
0-500	1S-DUA-500	13.60	2S-DUA-500	12.95	3S-DUA-500	13.60	4S-DUA-500	14.30	5S-DUA-500	17.45
ZERO CENTER										
10-0-10	1S-DUA-10U10	22.55	2S-DUA-10U10	21.60	3S-DUA-10U10	22.55	4S-DUA-10U10	24.05	5S-DUA-10U10	29.00
25-0-25	1S-DUA-25U25	16.65	2S-DUA-25U25	15.85	3S-DUA-25U25	16.65	4S-DUA-25U25	17.70	5S-DUA-25U25	21.40
50-0-50	1S-DUA-50U50	15.85	2S-DUA-50U50	15.05	3S-DUA-50U50	15.85	4S-DUA-50U50	16.90	5S-DUA-50U50	20.30
100-0-100	1S-DUA-1H1	15.00	2S-DUA-1H1	14.20	3S-DUA-1H1	15.00	4S-DUA-1H1	15.95	5S-DUA-1H1	19.25
500-0-500	1S-DUA-5H5	13.70	2S-DUA-5H5	13.10	3S-DUA-5H5	13.70	4S-DUA-5H5	14.75	5S-DUA-5H5	17.65
DC MILLIAMMETERS										
ZERO LEFT										
0-1, 3, 5, 10	1S-DMA-001, etc.	12.60	2S-DMA-001, etc.	12.05	3S-DMA-001, etc.	12.60	4S-DMA-001, etc.	13.50	5S-DMA-001, etc.	16.25
0-15, 20, 25, 30, 50, 100, 150, 200, 300, 500, 750	1S-DMA-015, etc.	14.10	2S-DMA-015, etc.	13.35	3S-DMA-015, etc.	14.10	4S-DMA-015, etc.	14.95	5S-DMA-015, etc.	18.00
ZERO CENTER										
1-0-1, 5-0-5	1S-DMA-1U1, -5U5	13.00	2S-DMA-1U1, -5U5	12.40	3S-DMA-1U1, -5U5	13.00	4S-DMA-1U1, 5U5	13.85	5S-DMA-1U1, -5U5	16.65
10-0-10, 25, 50, 100, 500	1S-DMA-10U10, etc.	14.45	2S-DMA-10U10, etc.	13.75	3S-DMA-10U10, etc.	14.45	4S-DMA-10U10, etc.	15.30	5S-DMA-10U10, etc.	18.45
DC AMMETERS										
ZERO LEFT (0-100 through 0-1000 amps require external shunts)										
0-1, 1.5, 2, 3, 5, 10	1S-DAA-001, etc.	14.10	2S-DAA-001, etc.	13.35	3S-DMA-001, etc.	14.10	4S-DAA-001, etc.	14.95	5S-DAA-001, etc.	18.00
0-15, 20, 25	1S-DAA-015, etc.	13.45	2S-DAA-015, etc.	13.35	3S-DMA-015, etc.	14.10	4S-DAA-015, etc.	14.95	5S-DAA-015, etc.	18.00
0-30, 50	1S-DAA-030, etc.	13.45	2S-DAA-030, etc.	13.85	3S-DMA-030, etc.	14.50	4S-DAA-030, etc.	15.50	5S-DAA-030, etc.	18.70
0-100, 150, 200, 300, 500, 750, 1000	1S-DAA-100, etc.	13.45	2S-DAA-100, etc.	12.85	3S-DMA-100, etc.	13.45	4S-DAA-100, etc.	14.35	5S-DAA-100, etc.	17.30
ZERO CENTER										
1-0-1, 3, 5	1S-DAA-1U1, etc.	14.45	2S-DAA-1U1, etc.	13.75	3S-DAA-1U1, etc.	14.45	4S-DAA-1U1, etc.	15.30	5S-DAA-1U1, etc.	18.40
10-0-10	1S-DAA-10U10	13.80	2S-DAA-10U10	13.75	3S-DAA-10U10	14.45	4S-DAA-10U10	15.30	5S-DAA-10U10	18.40
15-0-15, 25	1S-DAA-15U15, etc.	13.80	2S-DAA-15U15, etc.	14.20	3S-DAA-15U15, etc.	14.90	4S-DAA-15U15, etc.	15.85	5S-DAA-15U15, etc.	19.05
DC MILLIVOLTMETERS										
ZERO LEFT										
0-50, 100	1S-DMV-050, etc.	13.45	2S-DMV-050, etc.	12.85	3S-DMV-050, etc.	13.45	4S-DMV-050, etc.	14.35	5S-DMV-050, etc.	17.30
ZERO CENTER										
50-0-50	1S-DMV-50U50	13.80	2S-DMV-50U50	13.20	3S-DMV-50U50	13.80	4S-DMV-50U50	14.75	5S-DMV-50U50	17.80
DC VOLTMETERS										
ZERO LEFT										
0-1, 1.5, 2, 3, 5, 10, 15, 20, 25, 50, 100, 150, 200, 250, 300	1S-DVV-001, etc.	13.45	2S-DVV-001, etc.	12.85	3S-DVV-001, etc.	13.45	4S-DVV-001, etc.	14.35	5S-DVV-001, etc.	17.30
0-500, 750	1S-DVV-500, etc.	14.30	2S-DVV-500, etc.	13.50	3S-DVV-500, etc.	14.30	4S-DVV-500, etc.	15.15	5S-DVV-500, etc.	18.20
0-1000	1S-DVV-1000	20.35	2S-DVV-1000	19.55	3S-DVV-1000	20.35	4S-DVV-1000	21.20	5S-DVV-1000	24.20
ZERO CENTER										
5-0-5, 10, 15, 25, 50, 100, 150	1S-DVV-5U5, etc.	13.80	2S-DVV-5U5, etc.	13.20	3S-DVV-5U5, etc.	13.80	4S-DVV-5U5, etc.	14.75	5S-DVV-5U5, etc.	17.80
300-0-300, 500	1S-DVV-3H3, etc.	14.30	2S-DVV-3H3, etc.	13.50	3S-DVV-3H3, etc.	14 30	4S-DVV-3H3, etc.	15.15	5S-DVV-3H3, etc.	18.20
EXPANDED SCALE — DC VOLTS (Other input ranges available on special order)										
Nominal Range	**Accuracy**									
5	± 5%	±0.25%	2S-DVX-005-05	48.40	3S-DVX-005-05	50.80	4S-DVX-005-05	53.25	5S-DVX-005-05	55.65
12, 15, 28, 48, 120, 150, 300	± 5%	±0.25%	2S-DVX-012-05, etc.	48.40	3S-DVX-012-05, etc.	50.80	4S-DVX-012-05, etc.	53.25	5S-DVX-012-05, etc.	55.65
5	±10%	±0.5%	2S-DVX-005-10	48.40	3S-DVX-005-10	50.80	4S-DVX-005-10	53.25	5S-DVX-005-10	55.65
12, 15, 28, 48, 120, 150, 300	±10%	±0.5%	2S-DVX-012-10, etc.	48.40	3S-DVX-012-10, etc.	50.80	4S-DVX-012-10, etc.	53.25	5S-DVX-012-10, etc.	55.65
5	±20%	±1.0%	2S-DVX-005-20	48.40	3S-DVX-005-20	50.80	4S-DVX-005-20	53.25	5S-DVX-005-20	55.65
12, 15, 28, 48, 120, 150, 300	±20%	±1.0%	2S-DVX-012-20, etc.	48.40	3S-DVX-012-20, etc.	50.80	4S-DVX-012-20, etc.	53.25	5S-DVX-012-20, etc.	55.65
EXPANDED SCALE — PERCENT DEVIATION										
12	± 5%	±0.25%	2S-DPX-012-05	48.40	3S-DPX-012-05	50.80	4S-DPX-012-05	53.25	5S-DPX-012-05	55.65
28, 120	± 5%	±0.25%	2S-DPX-028-05, etc.	48.40	3S-DPX-028-05, etc.	50.80	4S-DPX-028-05, etc.	53.25	5S-DPX-028-05, etc.	55.65
12	±10%	±0.5%	2S-DPX-012-10	48.40	3S-DPX-012-10	50.80	4S-DPX-012-10	53.25	5S-DPX-012-10	55.65
28, 120	±10%	±0.5%	2S-DPX-028-10, etc.	48.40	3S-DPX-028-10, etc.	50.80	4S-DPX-028-10, etc.	53.25	5S-DPX-028-10, etc.	55.65
12	±20%	±1.0%	2S-DPX-012-20	48.40	3S-DPX-012-20	50.80	4S-DPX-012-20	53.25	5S-DPX-012-20	55.65
28, 120	±20%	±1.0%	2S-DPX-028-20, etc.	48.40	3S-DPX-028-20, etc.	50.80	4S-DPX-028-20, etc.	53.25	5S-DPX-028-20, etc.	55.65

Listings above are for S series. To designate C series, substitute "C" for "S" in catalog number. Prices are identical.

Range	1½" Catalog No.	1½" Price	2½" Catalog No.	2½" Price	3½" Catalog No.	3½" Price	4½" Catalog No.	4½" Price	5½" Catalog No.	5½" Price
AC MILLIAMMETERS — Rectifier Type										
0-25, 50, 100, 200, 500	1S-AMA-025, etc.	$19.00	2S-AMA-025, etc.	$17.80	3S-AMA-025, etc.	$19.00	4S-AMA-025, etc.	$21.00	5S-AMA-025, etc.	$24.15
AC AMMETERS — Rectifier Type										
0-1, 1.5, 2, 3, 5, 10, 15	1S-AAA-001, etc.	19.00	2S-AAA-001, etc.	17.80	3S-AAA-001, etc.	19.00	4S-AAA-001, etc.	21.00	5S-AAA-001, etc.	24.15
0-20, 25, 30, 50	1S-AAA-020, etc.	19.85	2S-AAA-020, etc.	18.65	3S-AAA-020, etc.	19.85	4S-AAA-020, etc.	21.95	5S-AAA-020, etc.	25.00
0-100, 150, 200, 500	1S-AAA-100, etc.	19.00	2S-AAA-100, etc.	17.80	3S-AAA-100, etc.	19.00	4S-AAA-100, etc.	21.00	5S-AAA-100, etc.	24.15
(0-100 through 0-500 amps require external current transformers)										
AC VOLTMETERS										
ZERO LEFT										
0-3, 5, 10, 15, 25, 50, 100, 150, 300	1S-AVV-003, etc.	17.65	2S-AVV-003, etc.	16.80	3S-AVV-003, etc.	17.65	4S-AVV-003, etc.	18.75	5S-AVV-003, etc.	22.80
0-500	1S-AVV-500	18.70	2S-AVV-500	17.55	3S-AVV-500	18.70	4S-AVV-500	19.80	5S-AVV-500	23.80
EXPANDED SCALE (1½" models, other ranges available on special order)										
Range	**Accuracy**									
105-125	±0.5%		2S-AVX-115-10	50.80	3S-AVX-115-10	53.25	4S-AVX-115-10	55.65	5S-AVX-115-10	58.10
210-250	±0.5%		2S-AVX-230-10	50.80	3S-AVX-230-10	53.25	4S-AVX-230-10	55.65	5S-AVX-230-10	58.10
95-135	±1.0%		2S-AVX-115-20	50.80	3S-AVX-115-20	53.25	4S-AVX-115-20	55.65	5S-AVX-115-20	58.10
190-270	±1.0%		2S-AVX-230-20	50.80	3S-AVX-230-20	53.25	4S-AVX-230-20	55.65	5S-AVX-230-20	58.10
NULL METERS										
Range	**End Scale Current**									
NULL	50μA ±20%	1S-NUL-050	22.10	2S-NUL-050	21.20	3S-NUL-050	22.10			
NULL	100μA ±20%	1S-NUL-100	19.25	2S-NUL-100	18.70	3S-NUL-100	19.25			
NULL	500μA ±20%	1S-NUL-500	16.10	2S-NUL-500	15.55	3S-NUL-500	16.10			
ELAPSED TIME METERS										
Time Range	**Input**	(Other ranges and inputs available)								
0-99999.9 hrs.	115VAC (60Hz)		2S-ETM-115/60H	20.35						
0-99999.9 min.	115VAC (60Hz)		2S-ETM-115/60M	20.35						
VU METERS — Per USA Standard C-16.5 1954										
Type A scale (record) or Type B scale (broadcast)	1S-AVU-000-	19.25	2S-AVU-000-	18.50	3S-AVU-000-	19.25	4S-AVU-000-	19.95		
VU TYPE DC MICROAMMETERS										
Scales as above	1S-DVU-000-	14.20	2S-DVU-000-	13.85	3S-DVU-000-	14.20	4S-DVU-000-	15.15		

DISCOUNT SCHEDULE:
0-9 meters NET;
10-24 meters 15%;
25-49 meters 25%;
50-99 meters 35%,
applicable to total number of meters ordered.

MODIFICATIONS

Certain modifications of catalog meters, the specifications of which are normally detailed by the customer, can be accomplished quickly at Modutec factory modification centers, at costs proportionate to work required. Typical modifications:

Custom Dials or Scales — These can be produced from artwork supplied by Modutec or by customer.

Custom Colors — Meter covers can be finished with paint supplied by the customer.

Suppressed Zero — Up to 60% of the normal range may be suppressed.

Zero Right — Meters with zero-right movements and custom scale can be supplied.

Single-Point Calibration — Can be furnished to an accuracy of 1%.

Special Marking — Case or cover can be hot stamped with customer's name, trade-mark, etc.

SPECIALS

If your application demands special requirements beyond the listed options and modifications, communicate with us. Some of the areas of capability are:

- Damping factor variation
- Response time variation
- Special cases, covers
- High sensitivity movements
- VU meters
- Multiple range meters
- Externally adjustable (dead set) pointer

OPTIONS

The optional features listed below can be promptly incorporated in any standard meter. To order, add the appropriate suffix to the catalog number of the meter, and add the indicated charge to the list price before applying the quantity discount (see above).

Improved Accuracy Calibration	Add'l Charge	Suffix
±1% tracking, ±1% accuracy	$4.50	A1
±0.5% tracking, ±2% accuracy	8.25	A2
±0.5% tracking, ±1% accuracy	11.00	A3

Colors — 9 standard colors, C suffix, add'l. charge $1.00

Blank Dial — D suffix, add'l. charge $0.50

Lexan Case & Cover — H suffix, add'l. charge $2.25

Illumination Kit — K suffix. For bezel mount & Windo-mount meters. 1½" to 3½", $3.00; 4½" & 5½", $3.25

Mirror Scale — M suffix, add'l. charge $1.00

Single-Point Calibration — P suffix, add'l. charge $2.25

Improved Terminal Resistance—R suffix, add'l. charge $1.00

Sealed Case — S suffix, add'l. charge $2.75

Temperature Compensation — T suffix, add'l. charge $4.00

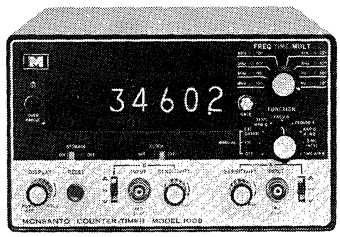
Rear Zero Adjust — Z suffix, add'l. charge $2.25

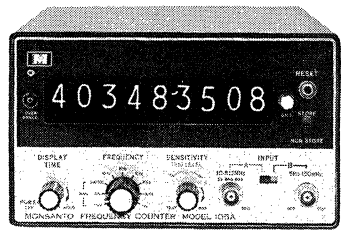
Hand Lettered Custom Dials — Add'l. charge $7.50 minimum

MODUTEC
INCORPORATED
18 Marshall St., Norwalk, Conn. 06854 Tel.: 203-853-3636 TWX: 710-468-2039

Know your exact frequency at a glance.

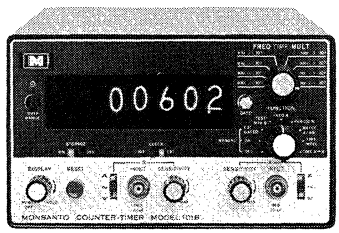
Model 100B (FCC No. 3-172)
For standard broadcast
Freq. range: 5 Hz-40 MHz
5 or 7-digit display
Price: 5-digit, $575

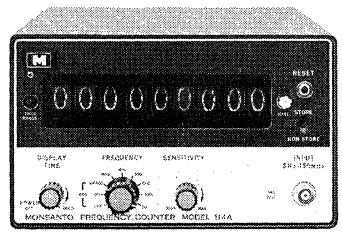




Model 105A (FCC No. 3-185)
For AM, FM, TV (all ch.), VHF
Freq. range: 5 Hz-512 MHz
7 or 9-digit display
BCD output
Price: 7-digit, $1550

Model 101B (FCC No. 3-174)
For standard broadcast
Freq. range: 5 Hz-50 MHz
5 or 7-digit display
BCD output
Price: 5-digit, $695



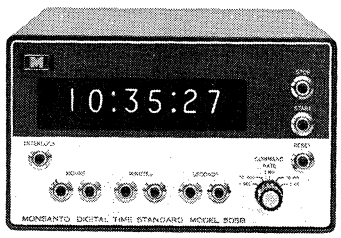


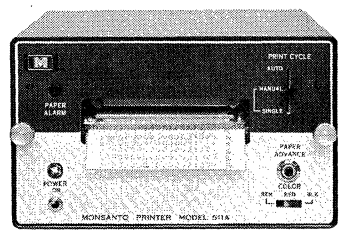
Model 114A (FCC No. 3-186)
For AM, FM, VHF, TV (Ch. 2-6)
7 or 9-digit display
BCD output
Price: 7-digit, $995

Frequency monitoring with a Monsanto digital counter is not just faster and easier than with analog instruments—it's instant and effortless. And more precise. Monsanto counters are FCC Type Approved for frequency monitoring. In addition, they can provide a full range of counter functions for other test and measurement jobs at the station.

Crystal controlled clocks and extensive use of ICs insure accuracy and long-term reliability. Automatic positioning of decimal point takes the element of human error out of measurements. Finally, Monsanto counters are modestly priced. For complete details, mail the coupon today. For a demonstration, call your local Monsanto representative.

What was your frequency at 10:35:27 last Tuesday?





Counter Models 101B, 105A and 114A provide BCD output. In combination with our 511A Printer and 505B Digital Clock, frequency and time are printed on paper tape at any desired interval, giving you a permanent record.

All prices f.o.b. West Caldwell, N. J.

Monsanto

FOR MORE INFORMATION CALL OR WRITE MONSANTO COMPANY, 620 PASSAIC AVENUE, WEST CALDWELL, N.J. 07006, (201) 228-3800

Never in the history of instrumentation has so much counter been packed into so little space for so few dollars.

Let's take those factors one at a time. Our new Model 150A is a 5Hz-32 MHz counter with solid-state 5-digit display. Automatic ranging and decimal point positioning are other features.

But the real news is that you can carry all this (and more) counter performance in the palm of your hand and activate it with either 12-32 VDC or 115/230 VAC. A battery pack will soon be available as an option if your work takes you beyond a convenient source of AC or DC.

Newsworthy, too, is the price of the Model 150A: Only $475. With our standard 2-year warranty too. Who but Monsanto could pack so much value into a space 2"H X 4½"W X 7½"D and weighing less than 3 lbs.?

Write or call for a data sheet on the Model 150A. The Monsanto representative has a Model 150A in his hand and would like to demonstrate it to you.

Monsanto Company, 620 Passaic Avenue, West Caldwell, N. J. 07006, (201) 228-3800.

Monsanto

NORTH ATLANTIC *industries, inc.*

AC PHASE SENSITIVE

Resolver/Synchro Simulators & Bridges

Most instruments offer a dual mode capability, permitting a single model to work with both resolvers and synchros. All units feature input/output isolation, and also direct in-line readout of angle, i.e., 359.999°, thus eliminating operator confusion, reading error and fatigue.

Series 530 — Resolver/Synchro Simulators

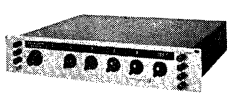
These simulators provide the ideal outputs for driving resolvers and synchros at 11.8, 26, 90 and 115V line-line voltages. These line-line voltages are all available with either 26V or 115V 400Hz excitation, and feature isolated input and output. Accuracy is 2 arc-seconds. Standard resolutions are .0001°, .001°, 1° and 5°, with standard units 3½" full-rack.

Model 530/20, 540/20 — Broadband Resolver/Synchro Simulator & Bridge

These broadband instruments operate over the frequency range from 50Hz to 10KHz, and provide accuracy to 10 arc-seconds. Their flat frequency vs. accuracy characteristic makes either unit an ideal choice for test facilities requiring maximum utility from all instruments. Both the Simulator and the Bridge provide selectable resolver and synchro modes for all standard line-line voltages in a 5¼" high full-rack unit. Angle is displayed as a non-ambiguous in-line readout from 0° to 360°.

Model 532 — Miniature Synchro Simulator

Model 532 is a miniature synchro simulator offering precision performance in a small panel-mounted unit suitable for production test, ground support and similar systems. Direct simulation of 11.8V 400Hz line-line synchro transmitters (CX) is provided, with dial reading in 30° segments plus 5° increments selectable by sealed thumb-wheel switches and accurate to 30 arc-seconds. Units are also available with 90V line-line output. A similarly packaged Resolver Simulator, Model 531, is also available.

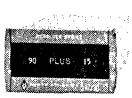


Series 530

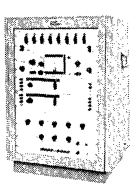
Model 545/100

Model 532

Series 540/10 & 540/11



Model 541/10 & 542/10



RTS-573

Model API-8025

Model 8525

Series 540/10 & 540/11 — Resolver/Synchro Bridges

These bridges permit direct measurement of resolver and synchro transmitters. They feature a constant null gradient output voltage, isolated input and output, input impedance over 500K, and 400Hz accuracy of 2 arc-seconds. Standard resolutions are .0001°, 1° and 5°, and are provided in a 3½" full-rack panel unit.

Model 541/10 & 542/10 — Miniature Resolver Bridge & Synchro Bridge

These miniature bridges are designed for panel-mount applications in production and field test equipment. They measure the angular position of 400Hz resolver or synchro transmitters with an accuracy of 5 arc-seconds. Manual balance is by coarse and fine sealed thumbwheel switches, with readout in 45° segments plus 5° steps.

RTS-573 — Resolver/Synchro Test Console

An integrated 400Hz Resolver/Synchro Test Console for complete resolver and synchro testing. Tests include Phase Shift, TR, Angular Accuracy, Electrical Zero, Phasing, Total and Fundamental Nulls, Input Current.

Angle Position Indicators

Model 545 — Automatic Angle Position Indicator

This instrument has .001° resolution and 10-second accuracy for all line-to-line voltages from 11.8 to 90V at 400Hz. The digital angle is both displayed and available in BCD format at the rear connectors. Remote or front-panel selection of resolver or synchro input, line-line voltage range and operating mode. Operating modes are tracking at 2000°/sec with K_v 200,000 sec^{-1}, 100ms track sequence upon command then hold, and repetitive track/hold sequences. Optional signal frequency 60Hz.

Model 545/100 — Automatic Angle Position Indicator

Similar to the Model 545 in overall function, but provided with .01° accuracy and resolution. This instrument accepts both 60 & 400Hz resolver and synchro data, and tracks data at 20,000°/sec.

Model API-8025 — Angle Position Indicator

High-speed performance 400Hz servo for field test and production test measurement of synchro and resolver transmitters. The half-rack API-8025 provides accuracy of 6 arc-minutes, repeatability of 30 arc-seconds, and slew speed of 25°/second with a digital readout display. Optional retransmit components, dual-mode, and two-speed operation.

Model 8525 — Angle Position Indicator

The Model 8525 offers 3-minute accuracy and .01° resolution, and can be supplied directly interchangeable with the Model API-8025 without any change in panel cutout or wiring. The Model 8525, with 5-decade BCD digital output and a data tracking speed of 1000°/second, is available as a two-channel instrument for any combination of synchro and/or resolver inputs at 11.8V, 26V, or 90V line-line 60Hz or 400Hz. Push-button channel selection automatically sets the line-line level, resolver or synchro input configuration, and also selects the correct rear connector terminals.

AC Ratio Boxes

These precision inductive voltage dividers feature high input impedance, low output impedance, and accuracy over a wide frequency band. All units have direct in-line non-ambiguous readout.

INSTRUMENTS, RATIO BOXES, AND ANGLE POSITION INDICATORS.

RB-503, RB-504 — AC Ratio Boxes

For production test use, the RB-503 features 10ppm accuracy from 50Hz to 5KHz, Zin 300K, Zo 3.5Ω, 0.35f volts input rating and a ratio range from 0 to 1.111110. RB-504 features 1ppm accuracy from 300Hz to 2KHz, Zin 200K, Zo 8.5Ω, 0.7f volts input rating, and a ratio range from −0.111110 to +1.111110.

RB-503T, RB-504T — Inverting AC Ratio Boxes

Both models feature isolated input with full inversion capability. Ratio range is ±1.111110 with 0.35f volts input rating. The accuracy is 10ppm and 3ppm respectively for each model.

RB-521 — Miniature AC Ratio Box

For field use, this instrument features drip- and splash-proof construction while providing 10ppm accuracy. Zin 250K, Zo 3.5Ω, 0.35f volts input rating.

Phase Angle Voltmeters

These multifunctional instruments combine phase-sensitive modes with the functions of a conventional AC voltmeter operating over the range of 10Hz to 100KHz. They provide direct-reading voltage measurement of the total, fundamental, in-phase and quadrature components of an AC signal to 2% full-scale, as well as phase angle to 1°. They feature calibrated voltage ranges of 300μV (or 1mV) to 300V rms full-scale, built-in or plug-in harmonic-rejection filters, high quadrature overload capability, and operate over a wide range of reference voltage.

Model 214A, 214B, 214C — Four-Frequency Phase Angle Voltmeter

For production test use, these solid-state instruments provide phase-sensitive operation at 1, 2, 3 or 4 frequencies 30Hz to 20KHz. Features include ±5% bandwidth without adjustment, and adjustable meter scaling for go/no-go applications. Rapid field change of frequency modules is accomplished with simple one-control recalibration procedure. Available as Model 214A (no isolation), 214B (reference isolation), and 214C (signal and reference isolation). Optional rear connectors.

Model 301A — Broadband Phase Angle Voltmeter

For production test and laboratory use, this broadband instrument is designed for continuous phase-sensitive operation from 10Hz to 100KHz with a phase angle accuracy of 0.25° from 30Hz to 30KHz. Harmonic rejection filters are available and simply plugged in behind the swinging meter door.

Model 215C — Militarized Phase Angle Voltmeter

Provides similar performance to the Model 214C Phase Angle Voltmeter in a configuration qualified to MIL-T-21200 and designed for operation to 75°C. Construction includes drip-proof front panel, booted toggle switches, panel meter per MIL-M-10304B, sealed controls and RFI gaskets.

Model 212A, 212B, 212C — Transistorized Phase Angle Voltmeter

This solid-state instrument, successor to the famous VM-202, provides phase-sensitive measurement at a single pre-specified frequency from 30Hz to 10KHz. Three basic models are available: Model 212A (no isolation), Model 212B (reference isolation), and Model 212C (signal and reference isolation).

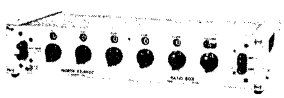
Phase Sensitive Converters

PSC-419 — Phase Sensitive AC/DC Converter

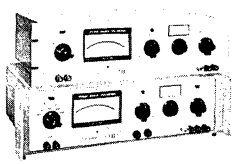
For automatic test systems, this programmable instrument converts 400Hz signal components to high-level DC with 0.1% linearity and 0.003% scale factor change from −40° to +75°C. Input sensitivity 10mV full-scale for 10V DC full-scale output with 100 ms response time.

Phase Sensitive Converter — Model 431

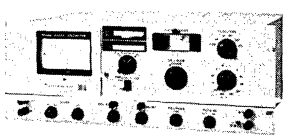
Phase Sensitive Converter measures total, fundamental, in-phase and quadrature voltages, and reads angles directly. It operates in multiple frequency bands from 60Hz to 15KHz.



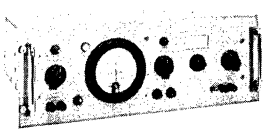
RB-503, RB-504



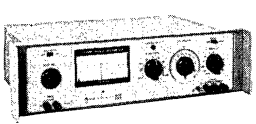
Model 214A, 214B, 214C



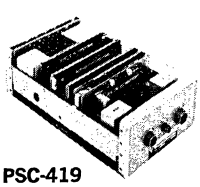
Model 301A



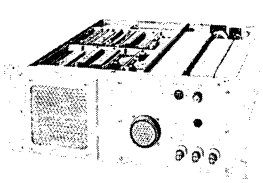
Model 215C



Model 212A, 212B, 212C



PSC-419

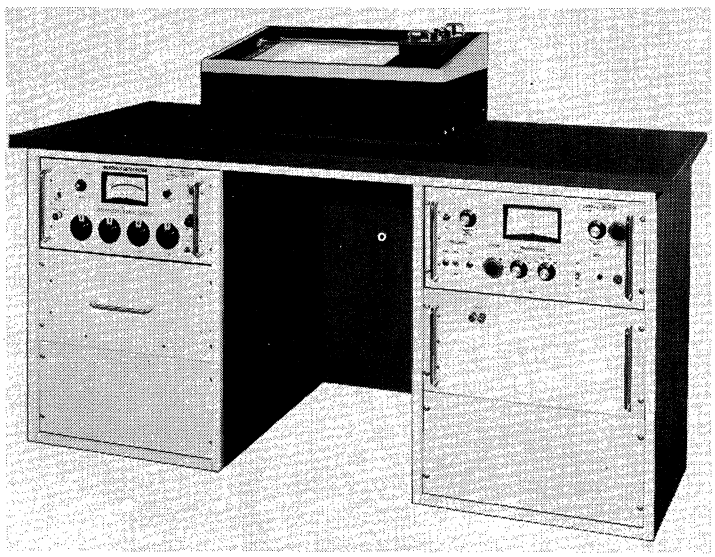


Model 431

NORTH ATLANTIC
industries, inc.
TERMINAL DRIVE, PLAINVIEW, NEW YORK • (516) 681-8600

MODEL V ALL-ELECTRONIC D.C. HYSTERESIGRAPH

by Norman Industries, Inc.



The Model V Electronic DC Hysteresigraph replaces several laboratory pieces of equipment used in the point by point method of generating hysteresis curves. Traditionally the H axis is obtained by employing batteries, ammeter, rheostat, ballistic galvanometer and a reversing switch.

The operator is faced with the compound problem of monitoring power supply drift and balancing a ballistic galvanometer while reading flux and current.

The Model V DC Hysteresigraph does all this automatically by plotting a continuous B-H curve.

Operator time is decreased to approximately 20 seconds per curve and an infinite number of points plotted. No important data is overlooked or missed. Both major and minor loops may be programmed at will.

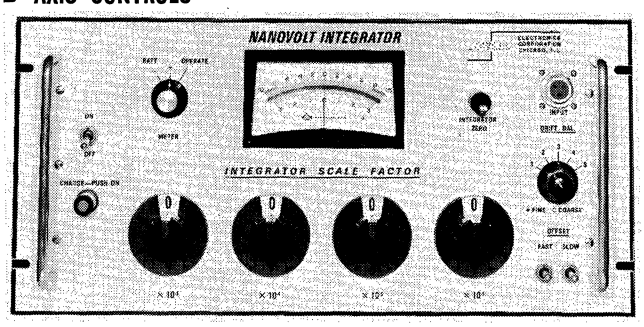
Driving samples to zero flux is insured by automatic recycle control so that initial permeability curves may be plotted.

The Hysteresigraph automatically does the following:

- Draws the positive half of the loop.
- Reverses the field when the preselected value of magnetization is reached.
- Draws the negative half of the loop and reverses direction of the field again when the desired value is reached.
- Initiates another reversal of field and completes the positive half of the loop.
- Lifts the pen from the recorder and turns off the current source.

Other programs are possible by manipulating front panel controls.

B AXIS CONTROLS



Integrating Fluxmeter—search coil employed in a Miller Integrator Circuit

Accuracy—0.05% or better

Stability—3% of display at ±100 Maxwell turns for one minute or better allows practical measurements as low as 10 Maxwell turns

Sensitivity—Scaled by operator. Displays of 10 Maxwell Turns per inch readily obtainable

The Nanovolt integrator is also sold as a separate unit

Input Impedance—essentially infinite

Output —5 to +5 volts at 5 ma

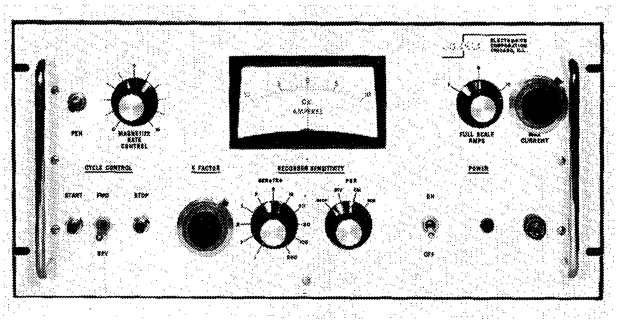
REMANENCE TEST SET

Operator positions piece part in solenoid, presses button, activating programmed power supply, and withdraws piecepart at end of program signal and reads remanence flux on digital display.

Magnetizing force up to 1000 Oersteds with flux sensitivities to 15 Maxwells.
Special as well as stock fixtures available.

Special magnetic system designed to your requirements.

H AXIS CONTROLS



Power Supply—Programmed −10 to +10 Amps, current regulated, 1 KW max, short circuit proof.

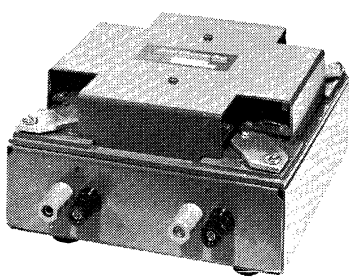
CONTROLS

Max current—Adjusts power supply output from 2 ma to 10 amps
Full scale amps—Meter scale selector
Magnetize rate control—Adjustable from 0 to 1 amp per second
Recorder Sensitivity—K factor control sets recorder to display 0 to 10^5 oersteds per division. Continuously variable with .1% calibrated multipliers
Forward-Reverse—Permits initial magnetization in positive or negative mode changes sweep direction without changing polarity

Size—Instrument is 30" high x 60" wide x 30" deep in a steel frame desk. A handy storage drawer is supplied. The top is walnut grain formica
Recorder x-y type 11" x 17" display

MAGNETICS TEST FIXTURES

Typical one shown below—ask for information.



MODIFIED EPSTEIN FRAME

Sample size—2 cm wide x 13 cm long x .03 cm
K-Factor—5.024

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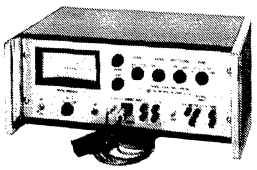
NORMAN INDUSTRIES, INC.
814 DIVERSEY PKWY.
CHICAGO, ILLINOIS 60614
(312) 348-6888

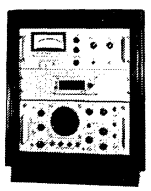
EQUIPMENT FOR CURRENT, POWER AND MAGNETIC FIELD MEASUREMENT

WIDEBAND WATTMETER



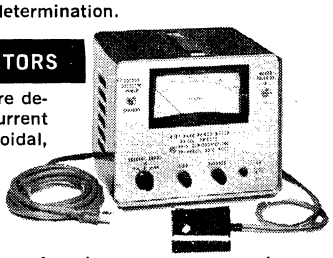
PM-4004 Wideband Pulse Power Monitors provide the unique ability to measure power in solid state switching circuits. The d.c. response and 30 nanosecond risetime insures accurate determination of instantaneous power waveform. Power input, power output, or power dissipated in solid-state devices may be readily determined. Built-in meters provide average or peak power reading. Instantaneous power, current, or voltage may be observed by connecting an oscilloscope to "monitor output" jack.

WIDEBAND POWER MONITORING EQUIPMENT



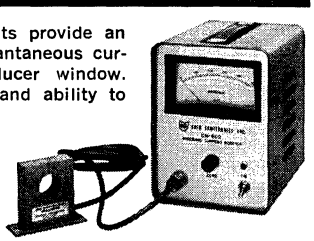
PM-6003 Power Monitoring Equipment is designed for power measurement in electrical discharge machining, resistance welding, and other applications where transient or non-sinusoidal waveforms are encountered at high current levels. D.c. to Megahertz response insures accurate measurement of power in processes where microsecond or less risetimes occur. Meter display of peak or average power is provided. Oscilloscope display of instantaneous voltage, current, or power waveforms with 100 nanosecond risetime, permits detailed analysis of system operation and efficiency determination.

WIDEBAND POWER MONITORS



PM-6010 Series Power Monitors are designed to provide power or current measurements where d.c., sinusoidal, non-sinusoidal or pulse power is delivered to a load. Currents up to 1000 Amperes can be handled with negligible circuit interaction due to the use of circuit isolated transducers. Meter display of peak or average power is provided. 0 to 1 volt output proportional to instantaneous power or current is available for oscilloscope monitoring of detailed waveforms with risetimes less than 1 microsecond in the d.c. to Megahertz frequency range.

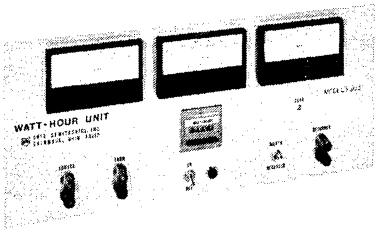
WIDEBAND d.c. to Megahertz CURRENT MEASURING EQUIPMENT



CM Series current measuring units provide an output signal proportional to instantaneous current flowing through the transducer window. The d.c. to Megahertz response and ability to faithfully reproduce 1 microsecond transients provide an ideal way to monitor critical circuits without electrical connection and with minimum interaction caused by measurement. The panel meter provides a display of direct current while the +1 to −1 volt output can be used for monitoring or control purposes with current flow in either direction.

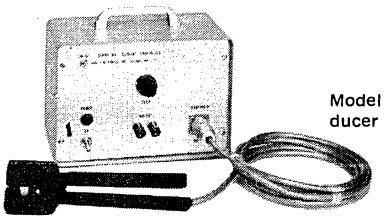
MODEL	PEAK CURRENT AMPERES	METER RANGE AMPERES	OUTPUT-VOLTS
CM-30	30	0 - 30	0 - 1
CM-100	100	0 - 100	0 - 1
CM-200	200	0 - 200	0 - 1
CM-600	600	0 - 500	0 - 1
CM-1000	1000	0 - 1000	0 - 1

WATT-HOUR METER



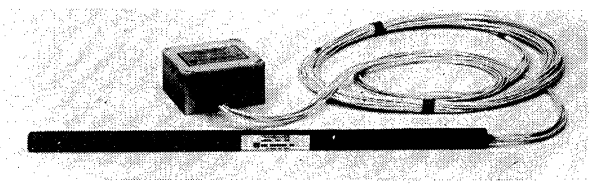
Model 2500 Watt-Hour Meters are designed to provide a registration of total energy consumption in d.c. circuits. Panel meters display instantaneous voltage, current, and power. Accumulated energy flow is registered on resettable counter up to 99,999 watt-hours.

CLAMP-ON CURRENT TRANSDUCER



Model CM-50F Current Transducer provides measurement of current without interrupting circuit. Accuracy better than 0.25%, measurements to 50 Amperes and d.c. to Kilohertz response are featured. D.c. or a.c. voltmeter may be connected to output terminals for monitoring of the 0.1 volt/Ampere output which is directly proportional to the instantaneous current flow through the window.

MAGNETIC DISPLACEMENT AND PROXIMITY MONITOR MODEL MS-1100/MA-1100



MS-1100/MA-1100 Magnetic Displacement and Proximity monitors provide non-contacting measurement of displacement over a 20 inch range. The amplifier-power supply unit (MA-1100) can be remotely located and provides a 0-5 volt output for telemetry or control applications.

BROADBAND R.F.I. AND E.M.C. MAGNETIC ANTENNAS AND MAGNETOMETERS

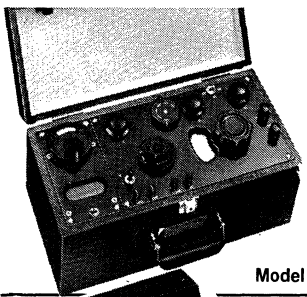
O.S.I. has designed the MS-1000 magnetic antenna for application in interference reduction, testing and measurement of magnetic fields in the d.c. to Megahertz range. Sensitivities of 100 millivolts per gauss, unamplified, from the basic antenna with output independent of frequency, illustrates performance. Vector Magnetometer units, providing an output of 10 volts in the earth's field, can be provided for particular applicational requirements.

OHIO SEMITRONICS, INC.
1205 CHESAPEAKE AVENUE • COLUMBUS, OHIO 43212 • PHONE: 614-486-9561
PIONEER IN SOLID STATE ENERGY CONVERSION MATERIALS, DEVICES and SYSTEMS

Rubicon Instruments®

Rubicon's back! A representative group of our instruments is shown below. Write or call for bulletins or spec sheets.

PORTABLE POTENTIOMETERS
with Electronic Null Detector or Galvanometer

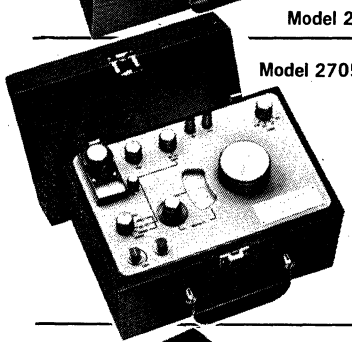


Model 2745

THERMOCOUPLE POTENTIOMETER

Self contained portable Potentiometer for all thermocouple types and ranges. Manual reference junction compensation. EMF reversing switch.

Bulletin 201

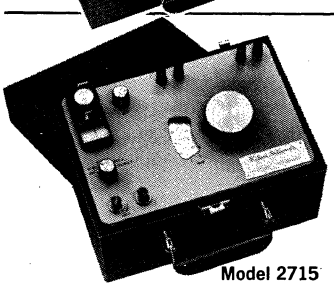


Model 2705N

COMPACT POTENTIOMETERS

Small light weight self contained portable unit. Calibrated in millivolt or volt ranges. Rugged case for use in field service, production or laboratory.

Bulletin 201

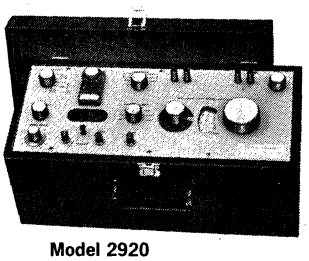


Model 2715

TEMPERATURE CALIBRATED POTENTIOMETERS

Direct temperature readout for a particular range and thermocouple. Available single or double range with automatic reference junction comp.

Bulletin 201

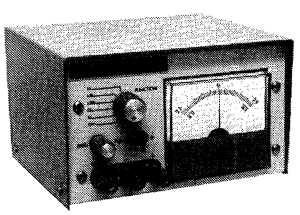


Model 2920

PORTABLE TEST SETS

Complete Potentiometric Measuring System with auxiliary run-up used to calibrate current drawing instruments and measure current, high voltage and resistance.

Bulletin 201



NULL DETECTOR

High sensitivity, three ranges from 25 to 2500 microvolts full scale. Guarded and shielded. Battery operated for bench or panel mount.

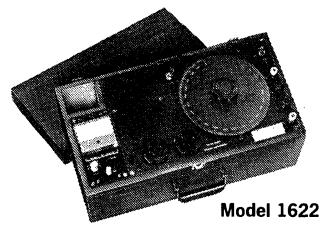
Bulletin P3900

PORTABLE BRIDGES

KELVIN BRIDGES

Portable Kelvin Bridge for low resistance from 5×10^{-7} ohm to 10.1 ohm. Electronic null meter or Pointerlite Galvanometer. High accuracy, easy to use.

Bulletin 301



Model 1622

WHEATSTONE BRIDGES

Self contained portable Wheatstone Bridges for resistance measurements from 0.1 ohm to 9.999 Megohms. Four or five decades. Galvanometer or Electronic Null Meter.

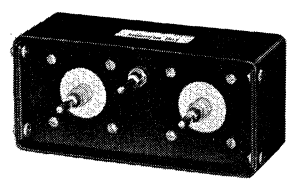
Bulletin 301

Model 1071

RESISTOR STANDARDS

High resistance standards from 10 Megohms to 10,000,000 Megohms, N. B. S. traceability. 1 and 0.2 per cent Certification Recertification Service.

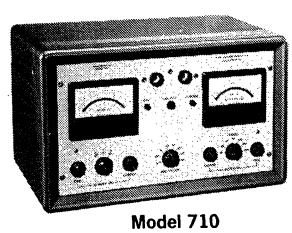
Bulletin 301



MEGATROMETER

For measuring resistors from 10000 ohms to 1000 Teraohms, completely self contained test potential variable from 0-1500 volts D.C. May be used as Voltmeter or Micro-Microammeter.

Bulletin 301

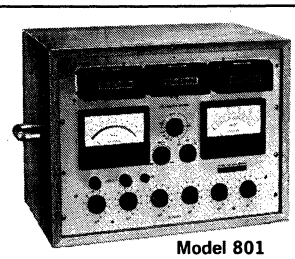


Model 710

ULTRA HIGH STANDARD BRIDGE

Measures resistance from 1000 ohms to $1.1X\ 10^{14}$ ohms with 1 PPM resolution. Nine plug-in ratio standards. 0-1000 volt test potential.

Bulletin 301



Model 801

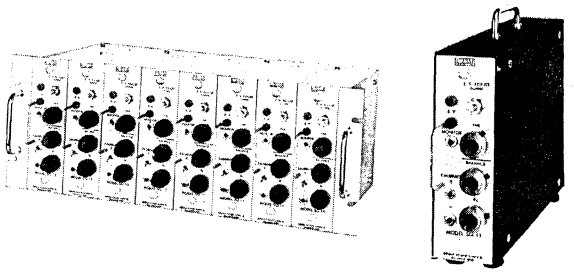
Some laboratory instruments immediately available. Other models will soon be available.

Rubicon Instruments®

PENN AIRBORNE PRODUCTS COMPANY

Industrial Highway • Southampton, Pa. 18966 • (215) 355-3400

SIGNAL CONDITIONERS



The SG-11 is a plug-in module consisting of a power supply and the balance, calibration and monitoring circuits for strain gage and similar transducers. The power supply circuit exhibits very high temperature and time stability and provides line and load regulation of 0.01%; excitation voltage is continuously adjustable from 0 to 16 volts at 0 to 150 mA. The all-silicon transistor circuitry features a self-restoring current limit circuit. These units can be wired for constant-current operation.

Extreme care has been taken to provide very high isolation to line--less than 0.03 pF coupling capacitance from power line to D.C. output--so that the instrument's performance approximates that of battery operation.

The BALANCE, CALIBRATION, and E. V. COARSE and FINE adjust controls are on the panel for easy adjustment and are all ten-turn potentiometers of very high resolution. Calibration is bipolar single shunt.

Two types of enclosures are available: a relay-rack mounting enclosure that permits the mounting of eight units side-by-side in a 19-inch rack and a portable enclosure, accepting a single plug-in unit. A plug-in power supply, only, is also available.

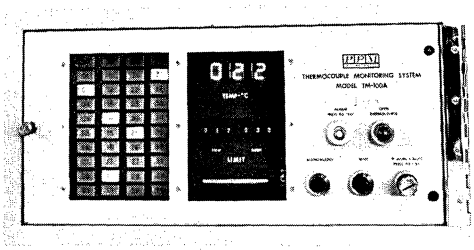
MODEL SG-11 PLUG-IN UNIT (eight shown in rack) **$187.50** each

MODEL SG-11-R RELAY-RACK MOUNTING ENCLOSURE (as shown) with solder terminals only **$ 90.00** each

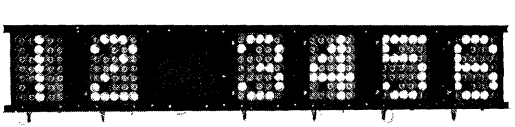
MODEL SG-11-RC RELAY-RACK MOUNTING ENCLOSURE with MS connectors (mating connectors included) **$250.00** each

MODEL SG-11-P PORTABLE ENCLOSURE (as shown) **$ 39.50** each

Write for Bulletin SG and Application Notes.
Models for conditioning other transducers are also available.



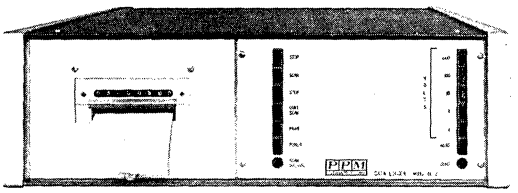
THERMOCOUPLER MONITOR The TM100A Thermocouple Monitor scans up to 50 thermocouples, displaying temperature in digital form. A high-low limit circuit compares each temperature with preset thumbheel switches; a lamp matrix displays all out-of-limit channels. Interface provides for auxiliary printout or computer entry of all data.



ALPHA-NUMERIC DISPLAYS We design and build a wide variety of data displays for commercial and industrial use. Digits up to 20 in. high -- readable 500 feet away -- with solid state control circuitry. Ask for quotation to meet your display requirements.

Prices subject to change.

DATA LOGGERS

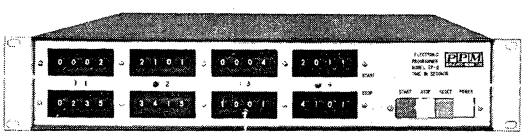


The Model DL-2 Data Logger is a complete data acquisition system in a compact, portable package. It will scan up to 100 differential signals, digitize them, and print out their values to four places, also printing range, polarity and channel number. All data is displayed in the form of 1/8 inch high characters on the printer wheels. Options include internal digital clock, conditioning for thermocouple or strain-gage transducers, and punched paper tape or magnetic tape recording. Input signals include DC voltage, resistance, and frequency. Bulletin DL.

Data Logger with 10 Channels $2,320.00
Data Logger with 100 Channels $2,995.00

PPM offers custom systems and Systems Components for data acquisition and process control. **PPM** Data Acquisition Systems will accept as many as 1000 individual signals; these signals are scanned, digitized, and recorded in printed form or on punched or magnetic tape. Alarm outputs are available for signals falling outside of preset limits. For systems applications we offer several Systems Components, such as:

PRINTERS to accept most data codes are available up to 30 columns wide (see Data Logger above). Bulletin DP.
SCANNERS 2-pole reed-relay and guarded low level available with a wide choice of options, including programming pinboards, analog channel output, and others. Bulletin SN. Price: (100 channel 2-pole reed-relay scanner) $1,295.00.
DIGITAL CLOCKS provide visual display and BCD signals of time and/or date. Options include crystal oscillator time base. Bulletin DC.

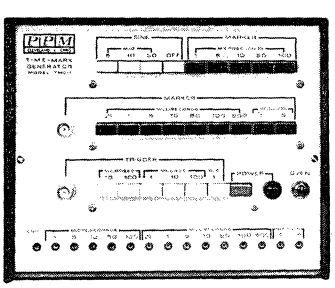


ELECTRONIC PROGRAMMER The Model EP-2 series of electronic programmers provide relay (or solid-state switch) operation at digitally-preset start and stop times, with independent operation of all channels. Bulletin EP.

Price: 4 Channel EP-2 (pictured) **$995.00**

TIME MARK GENERATOR

Model TMG-1 Time Marker Generator provides accurately-timed pulses and sine waves for calibration of oscilloscopes & chart recorders. Pushbuttons select periods from 1 microsecond to 5 seconds and sine waves from 10MHz to 50MHz, with 0.001% accuracy. Bulletin TMG. . . . Price: **$595.00**



Write for information on other models or custom modifications or call us collect with your special requirements.

PPM

32 W. Monroe Street, Bedford, Ohio 44146
Telephone 216 / 232-1880

COMPLETE AND PLUG-IN

COMPLETE SPECTRUM ANALYZERS 0.5 Hz - 6.5 GHz

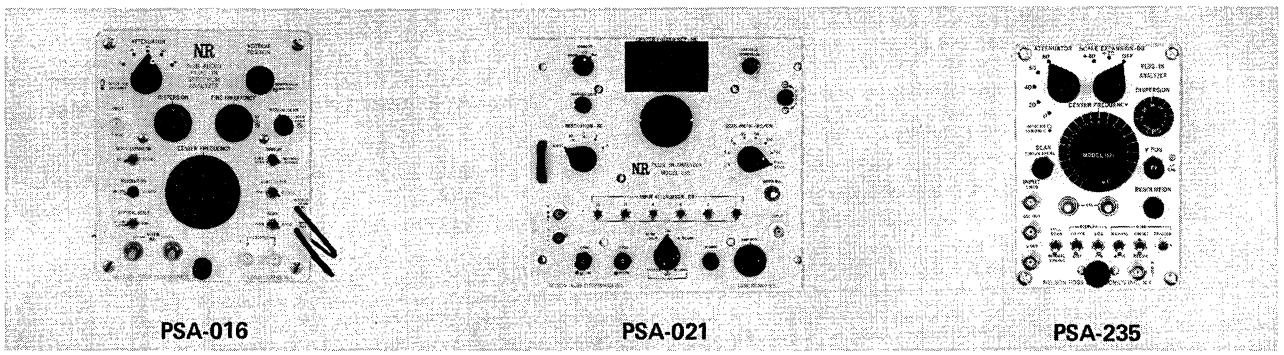
Complete NR spectrum analyzers consist of calibrated NR display main frames and plug-in spectrum analyzers. They provide unequalled versatility, ease-of-use, and reliability. Use of the value-engineered NR plug-ins greatly reduces the cost of complete NR analyzers.

For each frequency range from sub-audio through microwave, there is a complete NR Spectrum Analyzer with a calibrated high persistence CRT graticule, adjustable scale illumination, and a camera mount bezel. All carry the NR one-year warranty.

The new Model MF-9 Main Frame is specifically designed to operate with Nelson-Ross Plug-In Spectrum Analyzers. See specifications, Low Frequency Series below and High Frequency Series on next page.

The spectrum displays are bright, well-defined and calibrated on the illuminated graticule. A long persistence (P7) phosphor CRT is normally furnished. A shorter persistence (P31) phosphor is optional and is recommended for analysis of short duration microwave pulses with Models 531 or 532.

MF-9 Specifications Summary — Display: 4.5"W x 3.5"H. Graticule calibration 10 cm x 8 cm, adjustable edge lighting. CRT: Flat face, high intensity, aluminized. 5000 v post acceleration. P-7 phosphor, amber filter. (P31 phosphor, blue filter, optional). Power: 115/230v, ±10% 50-60 Hz nom. (to 400 Hz available); 150 watts max. (incl. plug-in). Dimensions: 8¾"H x 16¾"W x 21"D. Rack brackets furnished. Weight 50 lbs. Plug-In Compartment: Accepts Nelson-Ross "-3-" series plug-ins and related instruments.



PSA-016 PSA-021 PSA-235

LOW FREQUENCY SERIES

All the analyzers in this series have calibrated center frequency and dispersion (frequency scan width) dials; full band dispersion; high sensitivity and stability; low distortion; 1 megohm input impedance; calibrated input attenuator and scale expander; low noise and incidental FM levels; video (noise smoothing) filter; recorder outputs; and a wide range of scan rates (manual and single scan also provided on some models).

Typically, these analyzers are employed in the measurement of frequency, bandwidth, spectral distribution, frequency response, energy distribution, power levels, intermodulation and harmonic distortion of both simple and complex signals.

Also refer to the extremely versatile 1kHz-25 MHz spectrum analyzers, in the high frequency series.

	SUB AUDIO 0.5 Hz to 2 kHz	AUDIO 10 Hz to 20 kHz	SONIC 35 Hz to 100 kHz	ULTRASONIC 150 Hz to 500 kHz	VIDEO 1 kHz to 2 MHz
CENTER FREQUENCY	0.5 Hz to 2 kHz	10 Hz to 20 kHz	35 Hz to 100 kHz	150 Hz to 500 kHz	1 kHz to 2 MHz
DISPERSION (Scan Width)	10 Hz to 600 Hz; & 2 kHz	100 Hz to 6 kHz; & 20 kHz	500 Hz to 30 kHz; & 100 kHz	2.5 kHz to 150 kHz; & 500 kHz	10 kHz to 600 kHz; & 2 MHz
RESOLUTION	0.5 Hz and 50 Hz	10 Hz to 100 Hz	35 Hz to 250 Hz	150 Hz to 2 kHz	1 kHz to 8 kHz
SENSITIVITY	2 mv/cm deflection	85 uv/cm deflection	85 uv/cm deflection	85 uv/cm deflection	85 uv/cm deflection
VERTICAL DISPLAYS	Linear & 40 db log	Linear & 40 db log	Linear & 40 db log	Linear & 40 db log	Linear & 40 db log
DISTORTION	>40 db down	>60 db down	>60 db down	>60 db down	>55 db down
PLUG-INS FOR TEK LETTER SERIES	PSA-016 $950	PSA-011 $650	PSA-012 $650	PSA-013 $650	PSA-014 $850
TEK 560 SERIES	PSA-026 $1100	PSA-021 $800	PSA-022 $800	PSA-023 $800	PSA-024 $1000
H-P 140/141 SERIES or NELSON-ROSS MF-9	PSA-036 $1100	PSA-031 $800	PSA-032 $800	PSA-6S3 $800	PSA-034 $1000
COMPLETE NR SPECTRUM ANALYZERS	Model 36 $2100	Model 31 $1800	Model 32 $1800	Model 33 $1800	Model 34 $2000

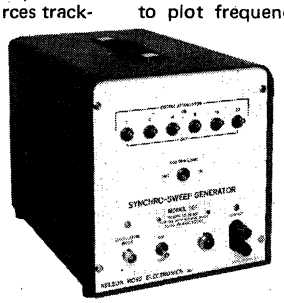
ACCESSORIES FOR LOW FREQUENCY SERIES

NR synchro sweep generators, companion instruments to the low frequency series spectrum analyzers, are signal sources tracked to the same frequency as the analyzer. The SSG is used in filter and amplifier design to plot frequency response, insertion loss, etc., in vibration analysis as an excitation source and in other similar applications. Dynamic range is virtually unlimited.

SYNCHRO-SWEEP GENERATORS

FREQUENCY RESPONSE PLOTTERS

10 Hz — 500 kHz



	SSG-101	SSG-102	SSG-103
COMPANION ANALYZER:	PSA-011, PSA-021, PSA-031	PSA-012, PSA-022, PSA-032	PSA-013, PSA-023, PSA-033
OUTPUT FREQUENCY:	10 Hz to 20 kHz	35 Hz to 100 kHz	150 Hz to 500 kHz
OUTPUT VOLTAGE:	10 volts peak to peak (open circuit);		
OUTPUT IMPEDANCE:	600 ohms;		
OUTPUT ATTENUATOR:	63 db in 1 db steps;		
AMPLITUDE FLATNESS:	±1 db or less;		
SCAN RATES:	as provided by analyzer;		
INPUT POWER:	115V, 50, 60 Hz;		
PRICE:	$450		

MODEL SA-120 SIGNAL ALTERNATOR Triggered Relay — enables two input signals to be compared on NR Low Frequency analyzers. PRICE: $100

nelson·ross electronics

A DIVISION OF POLARAD ELECTRONICS CORP.

5 DELAWARE DRIVE LAKE SUCCESS, NEW YORK, 11040 516-328-1100

SPECTRUM ANALYZERS

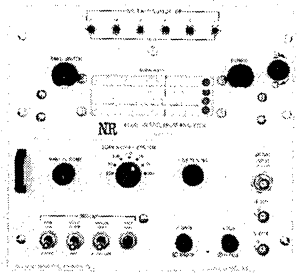
nelson • ross

PLUG-IN SPECTRUM ANALYZERS 0.5 Hz-6.5 GHz

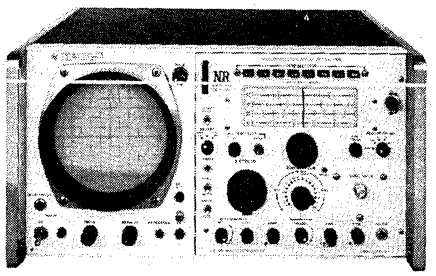
NR provides an unequalled array of plug-in spectrum analyzers for virtually every application from sub-audio through microwave frequency ranges. Each instrument is carefully designed and fully tested to provide optimum performance and versatility, at minimum cost.

NR plug-in spectrum analyzers are available for use with the Tektronix® "letter" and 560 series, and the Hewlett-Packard 140A/141A series oscilloscopes. The NR plug-ins convert these widely used scopes into easily used, calibrated spectrum analyzers. Their exceptional specifications, ease of use, self-checking, and high calibration accuracies are normally associated with spectrum analyzers costing several times as much.

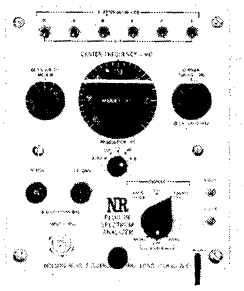
Nelson-Ross instruments are well-known for quality and reliability. Each carries a full one-year warranty. Thousands of NR instruments are in successful use throughout the world.



PSA-231



MODEL 531 SPECTRUM ANALYZER



PSA-311

HIGH FREQUENCY SERIES

The NR high-frequency spectrum analyzers provide unequalled capability for rapid broadband scanning, as well as highly resolved, narrow-band analysis; at lowest cost.

The narrow-band analyzers are well suited for signal analysis of SSB, AM, FM, and data communications. They have such essential features as 60 db dynamic range for distortion measurements, 60 db log amplitude scale, simplified operation and automatically optimized resolution. Some models include self-checking crystal controlled frequency markers.

The all solid-state wideband analyzers provide dispersions up to 1 GHz stable narrow scans, usable 60 db display range, high and uniform sensitivity, and automatically optimized resolution. In some models, highly stable phase locked narrow band scans are provided.

Typically, these analyzers are employed for pulsed and CW signal analysis, telemetry and multiplexed carrier monitoring, frequency response studies, spectrum signature and surveillance; harmonic and spurious analysis.

	VIDEO 1 kHz to 25 MHz	NARROW-BAND, RF/SSB 600 kHz to 108 MHz	BROADBAND, RF/UHF 1MHz to 300 MHz	MICROWAVE 10 MHz to 4.5 GHz	MICROWAVE 10 MHz to 6.5 GHz
FREQUENCY RANGE:	1 kHz to 25 MHz	600 kHz to 36 MHz; 108 MHz w/harmonics	1 MHz to 300 MHz	10 MHz to 4.5 GHz	10 MHz to 6.5 GHz
DISPERSION (Scan Width):	5 kHz to 5 MHz; 25 MHz	100 Hz to 100 kHz;	100 kHz to 100 MHz; 300 MHz	0 to 1 GHz Internal Phase Lock	1 to 1 GHz Internal Phase Lock
RESOLUTION:	Automatic 200 Hz to 20 kHz	Automatic 10 Hz to 2 kHz	Automatic: 5 kHz to 100 kHz	Automatic: 1 kHz to 200 kHz	Automatic: 1 kHz to 200 kHz
SENSITIVITY:	–90 dbm	–100 dbm	–90 dbm	–90 dbm to 1.5 GHz	–92 dbm to 1.5 GHz
VERTICAL DISPLAYS:	Linear, sq. law & 60 db log	Linear & 60 db log	Linear, sq. law & 60 db log	Linear, sq. law & 60 db log	Linear, sq. law & 60 db log
DYNAMIC RANGE:	60 db	60 db	60 db	60 db	60 db
DISTORTION:	>50 db down	>60 db down	>46 db down		
PLUG-INS FOR TEK LETTER SERIES	PSA-205 $1500	PSA-201 $1600	PSA-311 $1400	PSA-511 $1900	PSA-512 $2200
TEK 560 SERIES	PSA-225 $1600	PSA-221 $2060	PSA-321 $1500		
H-P 140/141 SERIES or NELSON-ROSS MF-9	PSA-235 $1600	PSA-231 $1700	PSA-331 $1500	PSA-531 $2000	PSA-532 $2300
COMPLETE NR SPECTRUM ANALYZERS	Model 235 $2600	Model 231 $2700	Model 331 $2500	Model 531 $3000	Model 532 $3300

ACCESSORIES FOR HIGH FREQUENCY SERIES

TWO-TONE GENERATORS 1Hz – 100 kHz

NR audio two-tone signal generators are distortion-free one and two-tone modulation sources for transmitter testing, frequency response and distortion measurements. Outputs are precisely adjustable and stable. Unwanted outputs are >60 db down from each tone level.

	TTG	TTG/F
FREQUENCY RANGE:	1 Hz to 100 kHz Adjustable to 1% steps	100 Hz to 10 kHz Preset at factory
FREQUENCY ACCURACY:	±2% (100 Hz – 10 kHz)	±1%
FREQUENCY STABILITY:	±0.1%/hr. after initial warmup;	
OUTPUT LEVEL:	each tone set at 0 dbm (600 ohms), on panel meter;	
OUTPUT ATTENUATOR:	63 db range in 1 db steps; ±0.1 db/db;	
INPUT POWER:	115/230V; 50-60 Hz.	
PRICE:	$900	$600

PROBES

For high input impedance for high frequency NR Spectrum Analyzers up to 36 MHz.

	P1	P2	P3 (passive)
INPUT IMPEDANCE:	1 megohm	2 megohms	0.1 megohm
INPUT CAPACITANCE:	10-15 mmf	15 mmf	7 mmf
PRICE (including Accessories):	$105	$105	$105

polarad

MICROWAVE SIGNAL GENERATORS & SOURCES 0.95-21 GHz

Polarad's 12 Microwave Signal Generating Instruments Provide High Performance Without Costly Duplication

The 12 instruments comprising the Polarad broadband line of modular signal-generating equipment offer practical combinations for producing every type of signal required in modern microwave development and testing between 0.95 and 21 GHz. They feature:

FLEXIBILITY — Use Polarad broadband instrument modules individually or in combination to obtain the desired signal characteristics. Select only the functions required by each application — add functions only when needed — avoid costly duplication. Patented reversible handles permit rack mounting or easy handling and stacking on the bench. A stacking lock fits the instruments together.

COMPACTNESS — All modules are of one standard size; measure only 5¼ inches high, 16¾ inches wide (19 inches with reversed handles for rack mounting) and 17 inches deep.

HIGH FREQUENCY ACCURACY—Frequency indication is accurate to ±0.5%.

DIGITAL FREQUENCY READOUT — Frequency setting is displayed on an easy-to-read digital indicator; turned by the UNIDIAL ® one-knob tuning contol.

HIGH POWER OUTPUT — Signal sources provide up to 50 mw; signal generators up to 15 mw. Doublers range from 0 to —100 dbm calibrated.

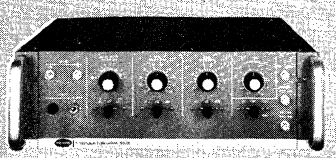
HIGH ATTENUATOR ACCURACY — Fully calibrated attenuator to —127 dbm over full frequency range.

STABILITY — Frequency and power-stability are representative of the highest state of the art.

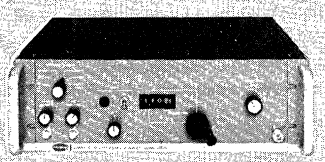
FULL MODULATION CAPABILITY — Polarad's modular line offers maximum versatility for all test applications through a wide range of internal and external pulse, square wave and FM modulation.

PHASE LOCK — A frequency stabilizer module permits locking of frequency to crystal stability. Phase lock capability is built into all Polarad modular signal instruments.

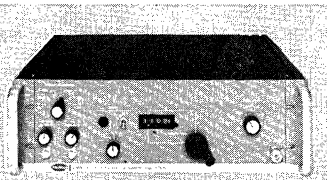
LOW PRICE — You save by paying for high quality and flexibility, without duplication of functions.



Modulator Model 1001
Full FM, squarewave and pulse modulation

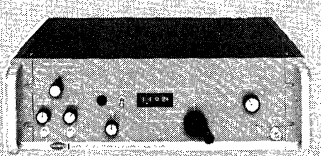


Signal Generator Model 1108
6.95 to 11.0 GHz

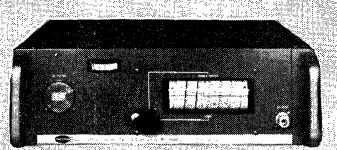


Signal Source Model 1208
6.95 to 11.0 GHz

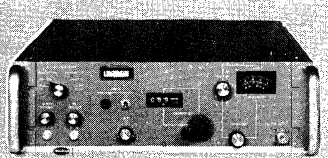
Signal Generator Model 1105
0.95 to 2.4 GHz



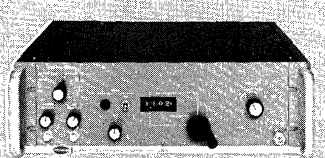
Signal Source Model 1205
0.95 to 2.4 GHz



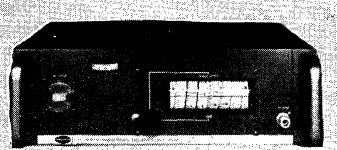
Frequency Double Model 1509
10.0 to 15.5 GHz



Signal Generator Model 1106
1.95 to 4.6 GHz

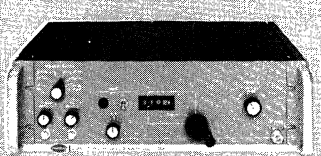


Signal Source Model 1206
1.95 to 4.2 GHz

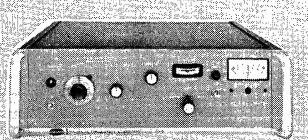


Frequency Doubler Model 1510
15.0 to 21.0 GHz

Signal Generator Model 1107
3.8 to 8.2 GHz



Signal Source Model 1207
3.8 to 8.2 GHz



Frequency Stabilizer Model 3815S
1.0 to 12.4 GHz

polarad electronic instruments
A DIVISION OF POLARAD ELECTRONICS CORP

5 DELAWARE DRIVE
LAKE SUCCESS, NEW YORK, 11040
516-328-1100
TWX 510-223-0414

Use Polarad modular instruments individually or in combination to obtain any required microwave signal

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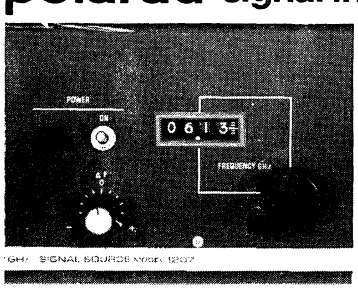
Polarad Modular Signal Instruments Condensed Specifications

MODEL	MODULE	DESCRIPTION	FREQUENCY	PRICE	CHARACTERISTICS
1001		'odulator		$ 745.00	Supplies squarewave, pulse and sawtooth FM modulation for signal generators and sources.
1105		Signal Generator, L Band	0.95 – 2.4 GHz	2090.00	0 to –130 dbm calibrated power output.
1106		Signal Generator, S Band	1.95 – 4.6 GHz	2090.00	+3 to –127 dbm calibrated, 15 mw 1.95 to 4.6 GHz, 30 mw 2.3 to 4.2 GHz.
1107		Signal Generator, C Band	3.8 – 8.2 GHz	2090.00	+3 dbm to –127 calibrated power output, 5 mw min. power output. 10 mw power output over entire frequency range optionally available. Add H suffix to model number and $100.00
1108		Signal Generator, X Band	6.95 – 11.0 GHz	2090.00	
1205		Signal Source, L Band	0.95 – 2.4 GHz	1590.00	50 mw minimum power output.
1206		Signal Source, S Band	1.95 – 4.2 GHz	1590.00	
1207		Signal Source, C Band	3.8 – 8.2 GHz	1840.00	18 mw average power output.
1208		Signal Source, X Band	6.95 – 11.0 GHz	1840.00	
1509		Frequency Doubler	10.0 – 15.5 GHz	1685.00	0 to –100 dbm calibrated power output. Doubles input frequency from signal source.
1510		Frequency Doubler	15.0 – 21.0 GHz	1685.00	
1605	1105 1001	Signal Generator, L Band with Full Modulation Capabilities	0.95 – 2.4 GHz	2330.00	0 to –130 dbm calibrated power output.
1606	1106 1001	Signal Generator, S Band with Full Modulation Capabilities	1.95 – 4.6 GHz	2330.00	+3 to –127 dbm calibrated, 15 mw 1.95 to 4.6 GHz, 30 mw 2.3 to 4.2 GHz.
1607	1107 1001	Signal Generator, C Band with Full Modulation Capabilities	3.8 – 8.2 GHz	2330.00	+3 to –127 dbm calibrated power output, 5 mw min. power output. 10 mw power output over entire frequency range optionally available. Add H suffix to model number and $100.00
1608	1108 1001	Signal Generator, X Band with Full Modulation Capabilities	6.95 – 11.0 GHz	2330.00	
1709	1509 1207	Signal Generator, Ks Band	10.0 – 15.5 GHz	3525.00	–3 to –100 dbm calibrated power output. 0 dbm (1 mw) calibrated power output optionally available. Add H suffix to model number and $100.00.
1710	1510 1208	Signal Generator, Ku Band	15.0 – 21.0 GHz	3525.00	
1809	1509 1207 1001	Signal Generator, Ks Band with Full Modulation Capabilities	10.0 – 15.5 GHz	3765.00	–3 to –100 dbm calibrated power output. Internal or external pulse, CW, FM or square wave modulation. 0 dbm (1 mw) calibrated power output optionally available. Add H suffix to model number and $100.00.
1810	1510 1208 1001	Signal Generator, Ku Band with Full Modulation Capabilities	15.0 – 21.0 GHz	3765.00	
3815 S		Frequency Stabilizer	1 – 12.4 GHz	2950.00	Continuous phase lock with crystal stability, proportional oven controlled. Can be used separately to lock any voltage tuneable device from 1 to 12.4 GHz.

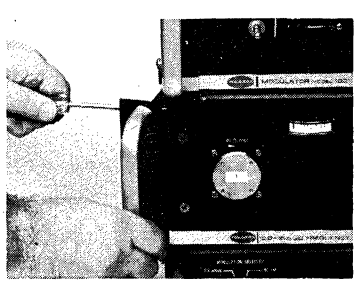
All models supplied with rack mounting capability and 115/230 V, 50-60 Hz operation at no extra cost.

For 50 to 400 Hz power line operation add F suffix to model number and $175.00 to price of unit.

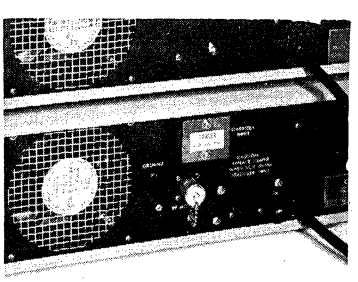
polarad signal instruments also offer...



SINGLE-KNOB UNIDIAL TUNING CONTROL provides frequency indication in easy-to-read digital form. Knob simultaneously tracks the oscillator and display to provide frequency accuracy of ±0.5%.

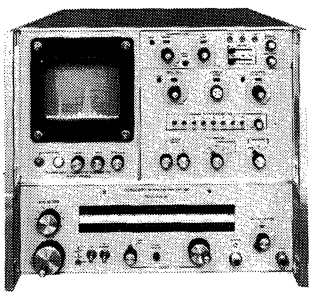


SIMPLY REMOVE AND REVERSE the handles on Polarad Modular instruments to convert them to rack mounting. For bench use the units can be easily stacked one above the other.



PROGRAMMABLE MOTOR DRIVE can be accommodated on any Polarad Generator or Source by means of a rear tuning shaft extension.

MICROWAVE SPECTRUM ANALYZERS 10 MHz-90 GHz



The Model SA 2650 Microwave Spectrum Analyzer employs new design concepts which provide increased performance and reliability. This Broadband Spectrum Analyzer utilizes both RF and IF sweep techniques to provide narrowband stability and resolution with wide image free frequency spans. A solid state swept first local oscillator is employed for wide dispersions up to 2 GHz. For frequency spans of 3 MHz or less, a stabilized cavity first LO with very low residual FM provides repeatable displays for stable high resolution measurements. The unique design enables the user to obtain spurious free displays through X-Band without the use of costly preselectors or filters. Frequency tuning, dispersion, IF Bandwidth, sweep speeds and CRT scales are all directly calibrated. RF and IF frequency markers self check the frequency and dispersion calibrations for more accurate measurements. The CRT Log presentation is calibrated over a full 70 db dynamic range. Other convenience features: automatic optimized and adjustable resolution, simplified foolproof signal identification.

SA-2650 SALIENT SPECIFICATIONS

FREQUENCY RANGE: 10 MHz to 90 GHz in 12 Bands.
SENSITIVITY: —100 dbm to —40 dbm depending upon frequency band (S+N=2N @ 10 KHz BW).
DISPERSION: 0 to 2 GHz calibrated and adjustable.
RESOLUTION: 1 KHz to 1 MHz calibrated steps, completely adjustable from 1 KHz to 100 KHz with Automatic Optimized Resolution provided.
SWEEP SPEED: 0.003 to 1 Sec/div., calibrated and variable.
VERTICAL DISPLAY: 70 DB Log, Linear, Power.
FREQUENCY MARKERS: RF Markers: Accuracy ±0.01% every 100 MHz self-checks frequency scale calibration. IF Markers: Center Frequency and internal marker modulation every 100 KHz or 1 MHz, plus external modulation.
MULTIPLE RESPONSES: No in-band multiple responses at 0-2 GHz frequency spans from 0.01 to 12.4 GHz.
MIXER SELECTION: Internal mixer covers range from 10 MHz to 12.4 GHz. External Mixers may be used on any band. Selected by front panel switch. Optional waveguide mixer and transition accessories available from 8.2 to 90 GHz.

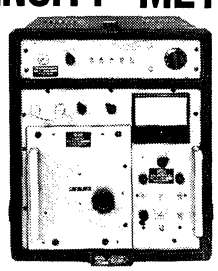
X9060 Mixer 8.2-12.4 GHz	$ 75.00
K9070 Mixer 12.4-40 GHz	$160.00
K9071 Transition 12.4-18 GHz	$ 65.00
K9072 Transition 18-26 GHz	$ 65.00
K9073 Transition 26-40 GHz	$ 65.00
Q9080 Mixer, Q9081 Transition } 40-90 GHz	$625.00

CRT DISPLAY: Calibrated 8 x 10 cm, scale illumination, Camera Mount.
DIMENSIONS: 14" H x 16¾" W x 23" D.
SA-2650 PRICE: $8500.00

MICROWAVE RECEIVERS & FIELD INTENSITY METERS 0.95-21.0 GHz

The Model TR Microwave Receiver is a triple conversion superheterodyne receiver. Six plug in tuning units cover the frequency range from 0.95 to 21 GHz and include preselectors for rejection of unwanted responses. The receiver functions equally well as an AM-FM receiver, a field intensity meter, a pulse, pulsetime or pulse position demodulator or as a sensitive microwave power meter. Operates on 115/230 Volt 50-60 Hz or 12 Volt battery.

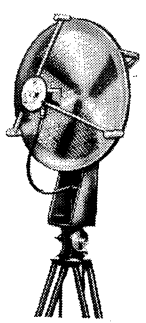
MODEL	DESCRIPTION	FREQUENCY GHz	PRICE
T-B	Basic Unit & Power Supply		$4,120
T-RL	Tuning Unit (Plug-In)	0.95 — 2.04	$2,940
T-RS	Tuning Unit (Plug-In)	1.9 — 4.34	$2,940
T-RM	Tuning Unit (Plug-In)	4.2 — 7.74	$2,940
T-RX	Tuning Unit (Plug-In)	7.3 — 11.26	$2,940
T-RKS	Tuning Unit (Plug-In)	9.85 — 15.35	$3,480
T-RKU	Tuning Unit (Plug-In)	14.75 — 21.0	$3,580
T-RW	Tuning Unit (Plug-In)	2.0 — 75.0	$2,940



The Model CFI Field Intensity Meter combines a microwave receiver, impulse calibrator and calibrated antenna system for RI/I measurements per MIL-I-11748B, MIL-E-6051C, MIL-STD-449A and category A of MIL-I-618-1D and MIL-I-26600. Provides accurate measurements of absolute power level of conducted or radiated microwave energy. Six plug in tuning units cover frequency range from 1 to 21 GHz. Choice of battery or 115/230V line power operation.

MODEL	DESCRIPTION	FREQUENCY GHz	PRICE
T-CB	Basic Unit & Calibrator		$6,000
CFI-L	Tuning Unit (Plug-In)	1.0 — 2.04	$2,940
CFI-S	Tuning Unit (Plug-In)	1.9 — 4.34	$2,940
CFI-M	Tuning Unit (Plug-In)	4.2 — 7.74	$2,940
CFI-X	Tuning Unit (Plug-In)	7.3 — 10.0	$2,940
CFI-KS	Tuning Unit (Plug-In)	9.85 — 15.35	$4,330
CFI-KU	Tuning Unit (Plug-In)	15.0 — 21.0	$4,740

CALIBRATED MICROWAVE ANTENNAS 0.95-21.0 GHz



- HIGHLY DIRECTIONAL
- LINEARLY POLARIZED
- HIGH FRONT/BACK RATIOS
- MAXIMUM VSWR 3:1
- LIGHTWEIGHT
- PORTABLE
- RUGGED CONSTRUCTION

MODEL	DESCRIPTION	FREQUENCY RANGE (GHz)	PRICE
CA-L	Horn Antenna	1.0 — 2.34	$200
CA-S	Horn Antenna	2.14 — 4.34	$200
CA-M	Horn Antenna	4.1 — 7.74	$190
CA-X	Horn Antenna	7.36 — 10.0	$200
CA-KS	Horn Antenna	9.85 — 15.35	$260
CA-KU	Horn Antenna	14.15 — 21.0	$305
CA-R2	Antenna Reflector	4.19 — 21.0	$180
CA-B	Omnidirectional Conical	1.0 — 10.0	$150
CA-KSO	Omnidirectional Conical	9.8 — 15.35	$295
CA-KUO	Omnidirectional Conical	14.75 — 21.0	$305
CA-T	Antenna Tripod		$200
CA-LPR	Log Periodic Antenna	1.0 — 11.0	$775

polarad electronic instruments
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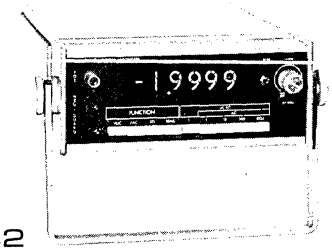
TWX 510-223-0414

PRECISION STANDARDS CORPORATION

PSC

1701 Reynolds · Santa Ana, Calif. 92705 · (714) 546-0431

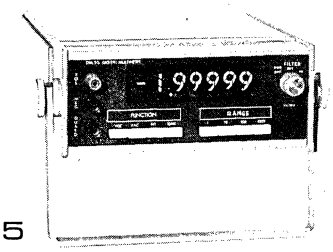
DIGITAL MULTIMETERS



Model DM 42
$690

This full 4-1/2 digit instrument has the performance and price to make it attractive to all DVM users. Some of the more important features are: 100% overranging, 10μV DC resolution, 0.01 ohms resolution and 100μV AC resolution. Variable sample rate from 5/sec to 1/2sec is a convenient operator feature.

DC volts accuracy — 0.02%; Ohms accuracy — 0.05%; AC volts accuracy — 0.2%.



Model DM 55
$995

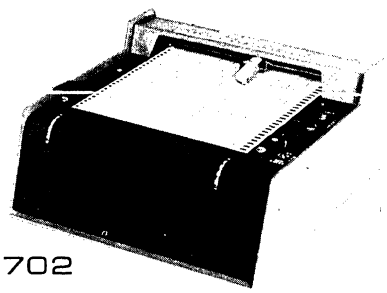
A 5-1/2 digit multimeter with no equal, the DM55 features 0.005% DC volts accuracy, 0.02% ohms accuracy and 0.1% AC volts accuracy.
The overall performance of this unit could previously only be matched by instruments costing twice as much.

DC volts resolution — 10μV; Ohms resolution — 0.01 ohms; AC volts resolution — 10μV.

GENERAL SPECIFICATIONS

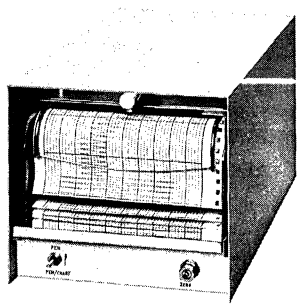
- 100% overranging
- Out of range indication
- Excellent noise rejection
- BCD output option
- 200,000 hour nixie displays
- Size: 3-1/2" high x 8-1/2" wide x 12-1/2" long
- Weight: 8-1/2 pounds

STRIP CHART RECORDERS



Model GP 702
$325

These precision potentiometric lab recorders with their large convenient writing surfaces are available in both 5" and 10" calibrated widths.
Many low cost options are available such as: event markers, dual and multiple chart speeds.
Most laboratory, medical and industrial applications can be well satisfied by this recorder.



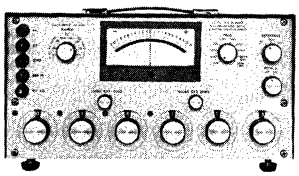
Model GP 701
$245

This 4" calibrated chart recorder has been specially designed for OEM applications and sells for as low as $170 in typical quantities. Ruggedly simple and reliable, the 701 recorders provide easy operation in any environment and application.

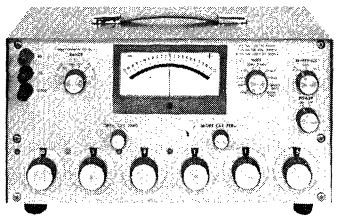
GENERAL SPECIFICATIONS

- 1 mv to 100V full scale spans
- <± 0.5% limit of error
- 20"/sec pen response
- Critical damping
- Floating inputs
- Wide selection of chart speeds
- Zero adjust — full scale
- Long life disposable fiber pen

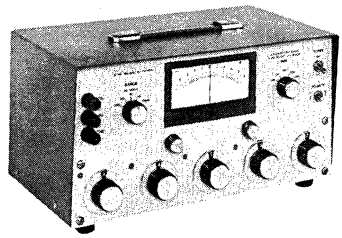
DIFFERENTIAL VOLTMETERS



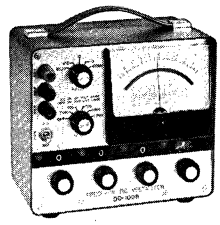
Model 1002



Model AC 200C



Model DC 110C

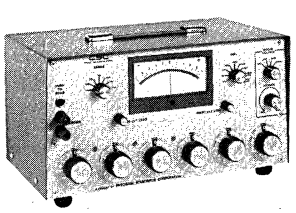


Model DC 100B

MODEL	DC ACCURACY	AC ACCURACY	RANGE	NULL RANGES	STABILITY	PRICE
1000 DC 1002 AC-DC	±(20ppm of reading ±1ppm of range)	30 Hz to 10kHz ±.05% reading ±.01% FS	1000, 100, 10, 1.0 V 10% Overranging	10μV, 100μV, 1MV, 10MV, 100MV, 1V, 10V Full Scale X10 on 100V range X100 on 1000V range	5ppm/day 15ppm/ month	$1025 $1450
DC-200C DC AC-200C AC-DC	±(30ppm of reading ±2ppm of range ± 5μV)	±.15% reading + 25μV, 20 Hz to 10KHz	1000, 100, 10, 1.0 V 10% Overranging	10μV, 100μV, 1MV, 10MV, 100MV, 1V, 10V Full Scale X10 on 100V range X100 on 1000V range	10ppm/day 25ppm/ month	$ 890 $1275
DC-110C DC AC-110C AC-DC	±0.01% of reading ± 0.005% of range	±.15% reading + 25μV, 20Hz to 10KHz	1000, 100, 10, 1.0 V 10% Overranging	100μV, 1MV, 10MV, 100MV, 1V, 10V Full Scale X10 on 100 range X100 on 1000V range	20ppm/day 40ppm/ month	$ 675 $ 975
DC-100B DC VA-100B DC Current	± 0.03% of reading ± 0.001% of range	———	DC only 1000, 100, 10, 1.0, 0.1V Current 1000, 100, 10, 1.0, 0.1, 0.01 ma	1MV, 10MV, 100MV, 1V, 10V Full Scale X10 on 100V range X100 on 1000V range	25ppm/day 50ppm/ month	$ 495 $ 675

PRECISION RESISTANCE BRIDGES

Model WB 200B

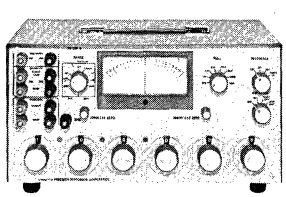


$950

HIGH ACCURACY WHEATSTONE BRIDGE

The main features of this easy to operate bridge are: high sensitivity at low power dissipation, 0.005% accuracy, adjustable bridge power, and a 10μV null detector.

Model RB 200B

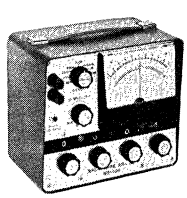


$1890

3 INSTRUMENTS IN ONE

A true 4 Terminal Resistance Bridge, Precision DC Calibrator and DC Voltmeter with no lead resistance error. The RB200B has 6 digit readout for resistance and voltage, a 10μV null detector and 0.002% accuracy.

Model WB 110B



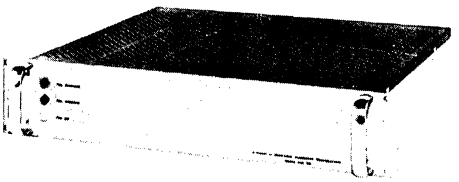
$625

ECONOMIC PRECISION

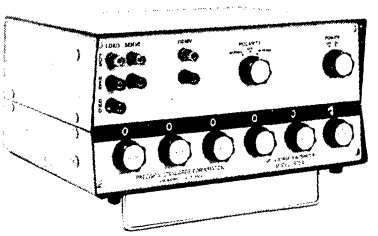
This is a low cost, all purpose compact bridge with 5 full digits and an accuracy of 0.025% of reading. Full range from 1 ohm to 110 megohms is standard.

PSC

DC VOLTAGE STANDARDS



COMPUTER CONTROLLED
Model 460 BP

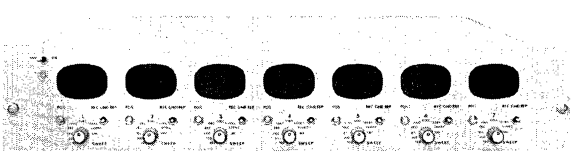


Model 472A

MODEL	RANGE	ACCURACY	RESOLUTION	STABILITY	PRICE
470BP	0 to 1.111110 volts with 1μV resolution 0 to 11.11110 volts with 10μV resolution 0 to 111.1110 volts with 100μV resolution 0 to 1111.110 volts with 1 MV resolution 30 ma output current on 10 V range & above	±(25ppm of setting + 3ppm of range + 2μV) from 0 to 111 volts. ±(35ppm of setting + 3ppm of range) on 1111 volt range	6 digits/1ppm of range	±(10ppm of setting + 1ppm of range) for 30 days	$2650
460BP		±(50ppm of setting + 5ppm of range + 2μV) from 0 to 111 volts. ±(70ppm of setting + 5ppm of range) on 1111 volt range.		±(15ppm of setting + 2ppm of range) for 30 days	$2250
472A	0 - 11 volts 0 - 110 MV 20 ma output current on 11 V range	±0.0025% of setting, ±2 ppm of range	1μV on 11 volt range .05μV on 110 MV range	10ppm + 10μV/day 11V range 10ppm + 1μV 110MV range	$ 895
462A		±0.005% of setting, ±3 ppm of range		20ppm + 15μV/day 11V range 20ppm + 1μV/day 110MV range	$ 695

MONITOR OSCILLOSCOPES

Model 275B

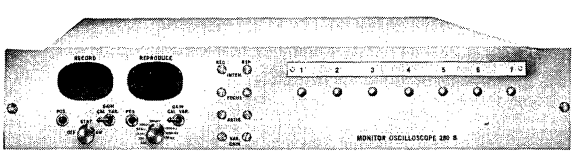


$2750

7 CHANNEL SIMULTANEOUS DISPLAY OF RECORDED ANALOG SIGNALS DC TO 5 MHz

The Model 275B was specifically designed for the purpose of providing a simultaneous display of information recorded on seven-track magnetic tape or any other form of multichannel information gathering device. Each scope is a separate and distinct instrument of its own, with all scopes operating from a common power supply.

Model 280B



$1790

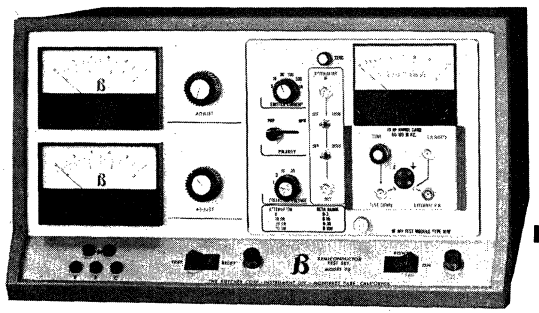
PUSH BUTTON SELECTED 7 CHANNEL DISPLAY OF BOTH RECORD & REPRODUCE SIGNALS DC TO 5 MHz

The Model 280B is a low cost monitor oscilloscope specifically designed to display information recorded on seven-track magnetic tape or any other multichannel information gathering device. The left display will monitor record information while the right display will monitor reproduce information. Any one of 7 channels may be selected by depressing one of the 7 push-buttons.

PSC

BIRTCHER TRANSISTOR & INTEGRATED CIRCUIT TESTERS

Basic Semiconductor Test Set



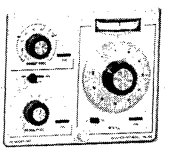
Model 70
$695

The Model 70 provides every important semiconductor test function. This allows addition of new modules as they develop.

Plug-in test modules give the low-cost Model 70 the range of a much more expensive test system. The basic unit contains power supplies and metering circuitry for setting up bias conditions. Interchangeable modules plug in at the right side of the chassis. As semiconductor technology advances, PSC continues to develop new functional plug-in modules to assure the Model 70 will never become obsolete.

Plug-In Modules

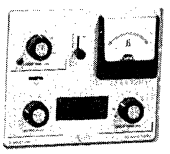
10A



Pulsed Beta
100V, 30 Amp

$795

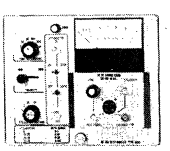
10E



Multi-Parameter
300V, 1 Amp

$595

10 RF



H_{fe} to
200 MHz

$690

OTHER PLUG-INS

10AC-1
Hybrid Parameter

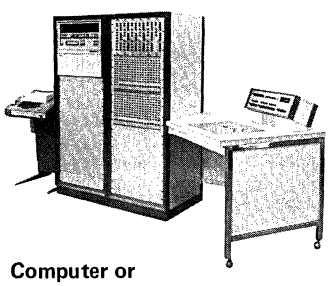
10CD
Low Leak & Breakdown

10Z
Zener Parameters

10L
Pulsed Breakdown
1000V, 1 Amp

10B
$V_{CB\ (SAT)}$
$V_{BE\ (SAT)}$
10V, 30 Amp

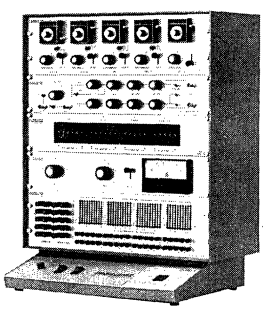
Model 8000



Computer or Tape Controlled

The Model 8000 is a system for automatic testing of multiple lead components and circuits, as such, integrated circuits and logic cards. The system provides a broad range of test capability with application production testing, incoming inspection and quality control/reliability analysis areas. The system is divided into two basic sections. These being control and measurement. The control section provides digital control information to the measurement section. The measurement section performs the measurement as instructed by the control.

Model 800



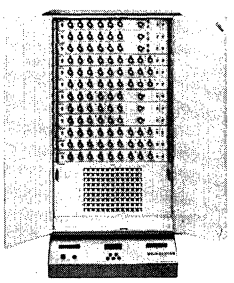
Integrated Circuit Test Set

The Model 800 provides pushbutton test sequencing; similar parameters may be tested sequentially without reprogramming.

Standard modules include a 5-unit power supply (one a constant current source, all with digital programming); matrix; and readout. Also available: a dual-channel pulse generator module for dynamic testing, and decade resistor/capacitor loads. Hook-up is provided for external inputs or monitoring lines.

A unique matrix system allows up to 40 separate pins/contacts to be independently programmed by the 5 individual voltage/current supplies, dual pulse generator and 4 external inputs.

Model 7000



Automatic Semiconductor Test System

The Model 7000 is an inexpensive system with many uses: small production-run testing; incoming inspection; pre-assembly classification and matching of semiconductor devices.

Performs all DC tests for a broad range of low-and-medium-powered transistor types, plus breakdown, leakage, and forward conduction testing of all types of diodes.

Testing may be either Go/No-Go, or devices may be classified into 10 bin categories. Test rates of up to 2000 devices per hour can be achieved by even unskilled operators.

PRECISION STANDARDS CORPORATION

PSC

1701 Reynolds · Santa Ana, Calif. 92705 · (714) 546-0431

Quan-Tech
Division of KMS INDUSTRIES, INC.

■ WAVE AND SPECTRUM ANALYZERS

Model 304-TDL

TRACKING WAVE AND SPECTRUM ANALYZER

Frequency Range: 1 Hz to 5 KHz. **Frequency Readout:** 5 place electronic digital display. **Bandpasses:** Flat topped, 1, 10, and 100 Hz at —3 db, Broadband, 10 to 6500 Hz. **Skirt selectivity:** 24 db per ½ bandwidth. **Sensitivity:** Logarithmic, 0 to 70 db, 10 MV to 100 V F.S., Linear, 30 μV to 300 V F.S. **Tuning:** Electronic, 6 selectable modes: manual, manual plus AFC. Automatic sweep, tracking, search and track, external control. **Outputs:** BFO, restored signal, analogs of meter reading, frequency setting and automatic sweep, phase outputs for phase plot Built-in Master-Slave capability for multi-channel analysis systems. **Price:** $3875

Model 304-TD

Same as Model 304-TDL except without logarithmic amplitude analysis range. **Price:** $3575

Model 304-T

Same as Model 304-TD except with 5000 division linear frequency dial in place of electronic display. **Price:** $3025

Model 304

Same as Model 304-T except without AFC, tracking, or master-slave capabilities. **Price:** $2700

SLAVE ANALYZER AND PHASEMETER Model 1304

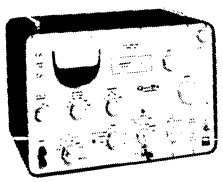
For use with Model 304-T or 304-TD in multi-channel phase locked analyzer systems. The Model 1304 has a built-in phasemeter but no tuning controls. Mechanical impedance and transfer function analysis is simplified. Bandwidths and sensitivity are the same as for the Model 304-TD. **Price:** $2050

CROSS SPECTRAL DENSITY ANALYZER Model 3304

For use with the Models 304T and 1304 for computing cross spectral density. Values of Cxy, Qxy, and Gxy are presented on front panel meters. **Price:** $1800

Model 3305

Similar to Model 3304, but for use with Models 305 and 1305. **Price:** $1800



Model 305

TRACKING WAVE AND SPECTRUM ANALYZER

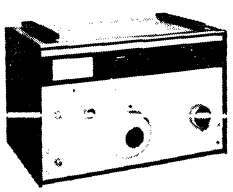
Frequency Range: 10 Hz to 50 KHz. **Bandpasses:** Flat topped 10, 100 and 1000 Hz at — 3 db. **Sensitivity:** 30 μV to 300 V F.S. **Tuning:** Manual, manual plus AFC, automatic sweep, tracking, search and track, external. **Outputs:** BFO, restored signal, analogs of sweep, amplitude, frequency and phase. Master-Slave capability for multi-channel analyzer systems. **Price:** $2800

SLAVE ANALYZER AND PHASEMETER Model 305-D

Same as Model 305 except 5 place electronic digital frequency readout instead of frequency dial. **Price:** $3350

Model 1305

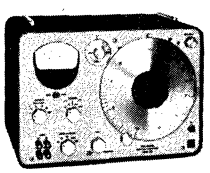
Similar to Model 1304, but for use with Model 305 or 305-D. **Price** $2050



Model 350

HIGH FREQUENCY WAVE ANALYZER

Frequency Range: 10 KHz to 10 MHz. **Frequency readout:** 5 place electronic digital display. **Bandpasses:** 4 KHz and 40 KHz at —3 db. **Sensitivity:** 10 μV to 10V, continuously variable precision capacitive attenuator with input overload indicator. **Outputs:** BFO, rectified signal envelope, and meter analog. **Price:** $2495



Model 303

WAVE AND SPECTRUM ANALYZER

Frequency Range: 30 Hz to 100 KHz, semi-log frequency dial. **Bandpasses:** 10, 30, 100 and 1000 Hz at —3 db (100 and 1000 Hz bandwidths flat topped). **Sensitivity:** 100μ V to 300 V, F.S. **Price:** $1700

WAVE AND SPECTRUM ANALYZER Model 2156

Similar to Model 303 except: **Frequency Range:** 10 Hz to 30 KHz. **Bandpasses:** 3, 10, 30, 300 Hz. **Price:** $2375

WAVE AND SPECTRUM ANALYZER Model 2223

Similar to Model 303 except: **Frequency Range:** 10 Hz to 200 KHz. **Bandpasses:** 10, 100, 750, 1000 Hz. **Price:** $3525

All prices shown are F.O.B. Whippany, N. J. Prices and specifications subject to change without notice.

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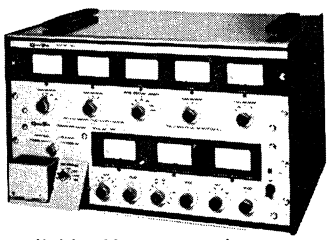
Quan-Tech
Division of KMS INDUSTRIES, INC.

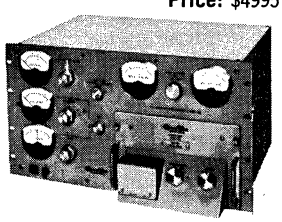
- **NOISE TEST SYSTEMS FOR TRANSISTORS, FET AND LINEAR I.C.'s**
- **RESISTOR AND DIODE NOISE TEST SETS**



Model 2173C -2181

TRANSISTOR NOISE ANALYZER

The most versatile unit available. Measures noise current and voltage at 10 and 100 Hz, 1, 10, and 100 KHz simultaneously. **Noise spectral density range:** 3 to 3000 nanovolts FS. **Base resistance range:** 0, 500, 1K, 10K, 100K, and 1M ohms plus external position. **Collector voltage range:** 0.3 to 60 volts. **Collector current range:** 0.3 μa to 30 ma. Also measures FET's. **Price:** $4995



Model 340

R.F. TRANSISTOR NOISE ANALYZER

Measures noise figure directly of transistors and FET's at radio frequencies. Plug-in heads available for test frequencies between 1 MHz and 60 MHz. **Noise figure range:** 0 to 40 db. **Base resistance range: 50,** 100, 200, 500, 1K, 2K, 5K ohms. **Collector voltage range:** $\pm$ 1 to 30 volts. **Collector current range:** 30 μa to 30 ma. **Price:** $2500

Model 1340 TRANSISTOR TEST HEADS

1340 - 1 MHz - 10.7 MHz **Price:** $1400
1340 - 2 MHz - 45 MHz - 60 MHz **Price:** $1800

Model 1341 LINEAR I.C. TEST HEAD

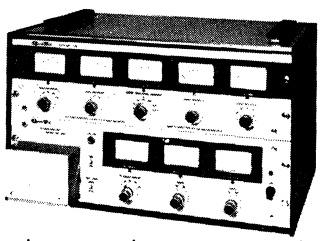
Measures noise in integrated circuits at 10.7 MHz. **Price:** $1800

Model 310 TRANSISTOR NOISE ANALYZER

Measures noise current and voltage at 100 Hz, 1 KHz and 10 KHz as well as I_{cbo}, I_{ebo} and beta. **Noise spectral density range:** 0.01 to 3μV, FS. 1 to 300 pa, FS. **Collector Current range:** 0.05 to 30 ma. **Collector voltage range:** 0.1 to 30 V. **Base resistance range:** 0, 500, 1K, 10K, plus external position. **Price:** $2725

Model 311

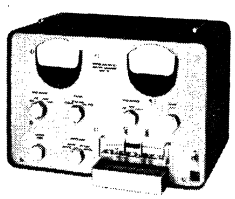
Similar to above, except that collector current range is from 2.5 to 1000 μa for noise measurement in low-collector-current devices. Measures Gm instead of beta. Also measures FET's. **Price:** $2725



Model 2283 -2181

INTEGRATED CIRCUIT NOISE ANALYZER

This extremely versatile noise measuring system was designed primarily for measuring noise in linear IC's and Op Amps. **Bias voltages:** plus and minus 12V fixed, plus and minus 0 to 30V independently variable at 100 ma. **Noise spectral density:** 3 to 3000 nanovolts. **Filter frequencies:** 10 and 100 Hz, 1, 10, and 100 KHz measured simultaneously.
Price: Model 2283 Control Unit $1600
Model 2181 Filter Unit $2500



Model 315

RESISTOR NOISE TEST SET

Measures noise in resistors in conformance with specifications recommended by NBS and Method 308 of MIL STD 202B. **Test-resistor range:** 100Ω to 22 meg Ω. **Measurement range:** 0.6 μV in a decade to 1000 μV in a decade. **Outputs:** Sample of noise voltage; analogs of meter readings. External cable supplied for remote location of test jig. **Price:** $2375

Model 2136 RESISTOR NOISE TEST SET

Similar to above, but measures resistors down to 10 Ω. **Price** $2550

Model 512 TRANSISTOR NOISE TEST SET

Measures broadband noise figure directly in db. **Noise bandwidth:** 15.7 KHz (—3 db at 10 Hz and 10 KHz). **Noise Figure range:** 0 to 62 db. **Collector voltage range:** $\pm$ 3 to 30 volts. **Collector current range:** 10μ a to 1 ma. **Base resistance:** 50, 500, 1K, 10K ohms and ext. **Price:** $1375

Model 327 DIODE NOISE ANALYZER

Measures noise in back-biased semi-conductor diodes at 10 Hz and 1 KHz simultaneously. **Noise spectral density range:** 0.03 μV to 1 mV. **Test Voltage:** 0 to 500 V, continuously variable. **Test Current:** 0 to 100 ma continuously variable. Internally supplied ramp automatically sweeps test current and/or voltage within maximum ratings. A wide variety of outputs for data logging, external monitoring, actuating external equipment, etc. **Price:** $3250

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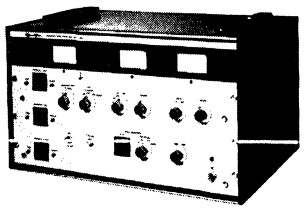
Quan-Tech
Division of KMS INDUSTRIES, INC.

- **AUTOMATIC AND SEMI-AUTOMATIC COMPONENT TEST SYSTEMS**
- **COMPONENT HANDLERS**

Model 2310

AUTOMATIC TRANSISTOR NOISE TEST SYSTEMS



Measures 1 KHz, 10 KHz, or broadband (—3 db at 10 Hz and 10 KHz). Noise figure in 200 milliseconds. Front panel reject levels settings and Go-No Go indicators. PASS and REJECT information at rear connector. **Collector Voltage:** ±5 to 30 volts. **Collector Current:** 5 μA to 10 mA. **Noise Figure:** 0 to 20 db. **Base Resistance:** 50 ohms to 99K ohms.

Price: $8000

Model 2307

Similar to Model 2310, but simultaneous tests at 3 frequencies 1 KHz, 10 KHz and Broadband. Not supplied with variable Pass-Reject controls. **Price:** $8000

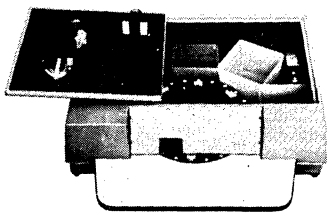
Model 5012

AUTOMATIC RESISTOR NOISE TEST SYSTEM

Automatic Measurement of Resistance and Current Noise at a speed of 1 test per second for thick or thin film chips. **Resistance Range:** 5 ohm to 1.2 Megohms, digital displays with BCD outputs for recording. **Test power:** 0.1 or 0.25 watts (250V max.) selectable. Test sequence program set by test cable connections. Go-No Go programming, spot scan selection and special test fixtures available.

Model 005

SEMI-AUTOMATIC COMPONENT HANDLER-SEGREGATOR



Portable bench mount Component Handler-Segregator. Fluidic control systems with variable timing. Tests and sorts items into 3 or more categories, at speeds up to 3000 devices per hour. Positions for 2 separate test heads. Rapid changeover for different test devices. **Price:** $7500

Special Instruments and Systems

Quan-Tech manufactures a great many "specials", ranging from one unit only to production quantities on an OEM basis. We can supply not only automatic measuring systems, but the automatic component handling equipment to go with them. We will assume system responsibility and are prepared to interface our systems with computers and other data programming, handling, and storage equipment. Your inquiry will receive a prompt reply.

High Speed Dynamic Tester

FOR LINEAR INTEGRATED CIRCUITS

Measures total distortion, noise and closed loop gain, test powers to greater than 10 watts. Test time 250 milliseconds. Easily interface with automatic component handler. **Optional accessories:** Go-No Go program, digital data displays, **BCD** recording outputs.

Model 167

AUTOMATIC RESISTANCE CAPACITANCE AND INDUCTANCE BRIDGE

Fully automatic component bridge with digital readout of value. **Ranges; Resistance:** 1 Ω to 11 MΩ. **Capacitance:** 1 pf to 11 μF. **Inductance:** 100 μH to 1100 H. **Accuracy:** better than 0.1%. Digital outputs for permanent recordings.

Price: $3000

Model 367 PROGRAMMED LIMIT DETECTOR

Interfaces with Model 167. Front panel settings of high and low limit values — Pass or fail front panel lamps and rear panel data. **Price:** $1100

Model 467 IMPURITY DIGITIZER

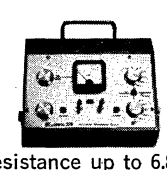
Interfaces with Model 167. Automatic digital readout of Q or tan d. Accuracy 1%. **Price:** $2150

Model 368 COMPONENT COMPARATOR-CLASSIFIER

Automatic measurements of C, R or L also dissipation factor, Insulation Resistance test and Flash test. Dial in Nominal value, % tolerance selections in 0.1% steps to an accuracy of 0.03% up to 12 classifications at a speed of 1 classification every 40 milliseconds. Reject levels for tan d, excess leakage, flash breakdown, high and low component values.

Model 270

D.C. INSULATION RESISTANCE TESTER



Measures d.c. insulation resistance up to 6.8 x 10^{12} ohms. Test voltage up to 3 kilovolts, pass or reject programming.

Price: $2000

All prices shown are F.O.B. Whippany, N. J. Prices and specifications subject to change without notice.

43 SOUTH JEFFERSON ROAD, WHIPPANY, NEW JERSEY 07981 • PHONE (201) 887-5508 • TWX 710-986-8251

Quan-Tech
Division of KMS INDUSTRIES, INC.

- **SOLID STATE AMPLIFIERS**
- **AMPLITUDE DISTRIBUTION ANALYZERS**
- **RANDOM NOISE GENERATORS**

Model 420

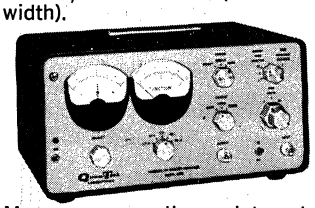
RANDOM NOISE GENERATOR

Stable "white" noise output having true gaussian amplitude distribution. **Frequency range:** DC to 100 KHz; **Output spectral density:** 0.01 to 1000 μV, continuously variable, calibrated; **DC offset:** less than 10 mV at max. output.
Price: $700

Model 421

RANDOM NOISE GENERATOR

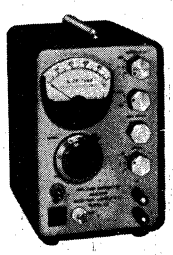
Similar to Model 420 but covering higher frequencies. **Frequency Range:** 10 KHz to 12.5 MHz flat $\pm$0.5 db. **Output Spectral Density:** .02 to 300 μV, continuously variable, calibrated, into 75 ohms. (1.34V RMS maximum for full bandwidth).
Price: $1100



Model 317B

PROBABILITY DENSITY ANALYZER

Measures manually or plots automatically amplitude probability density or cumulative probability functions of random, complex, and repetitive signals. **Frequency Range:** DC or 10 Hz to 1.75 MHz. **Sweep:** —3 sigma to +3 sigma, automatic or manual. Gated clock pulse for low probability density.
Price: $990



Model 317

AMPLITUDE DISTRIBUTION ANALYZER

Determines amplitude-probability distribution of random signals. **Amplifier response:** 3 db down at approx. 12 Hz and 1 MHz; **Switching rate:** 5 MHz. **Amplitude ranges:** 100%, 10%, 1% F.S.; Normal or "inverted" operation; provision for external sweep of level.
Price: $495

Model 318

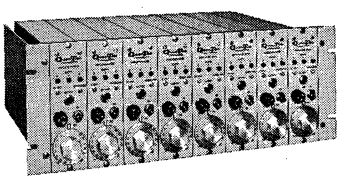
IMPULSE DISTRIBUTION ANALYZER

Determines amplitude and width of random or repetitive pulses. **Frequency Response:** DC to 15 MHz. **Amplitude Sensitivity:** —10 dbm to —60 dbm. **Input Impedance:** 75Ω, 135Ω and 600Ω. **Width Analysis:** 100 ns to ∞. **Price:** $4500

Model 2365

AUTO-RANGING A.C. AMPLIFIER

Functions: Autoranging, manual or remote program (BCD). **Voltage gain:** 0 to 78 db in 6 db steps, front panel digital display. **Bandwidth filter:** High pass; 10 Hz and 400 Hz. Low pass, 4 KHz, 20 KHz and 100 KHz selectable with front panel display.
Price: $1350



Model 2220

INSTRUMENTATION AMPLIFIER

Modular amplifiers mount 8 units in a 7" rack panel. **Voltage gain:** 0 to 80 db in 5 db steps. **Controlled frequency characteristics:** (selected by plug-in cards) voltage gain flat 10 Hz to 100 KHz or 10 Hz to 20 KHz, rising 3 db/octave 10 Hz to 100 KHz or 6 db/octave 10 Hz to 20 KHz.
Price: $590
*Digital Outputs Available

Model 206 B

SELECTABLE GAIN AC AMPLIFIER

Bandwidth: 1 Hz to 100 KHz (within 0.5 db); —3 db at 500 KHz. **Typical noise spectral density:** 5 x 10^{-9} V and 3 x 10^{-12} A at 1 KHz. **Gain:** 10, 100, & 1000, selectable at front panel; **Power:** 105-125 V AC or optional self-contained battery pack (automatically recharging).
Price: $200
Batteries: $35

About Quan-Tech

Quan-Tech specializes in the amplification and measurement of extremely low level signals which approach the theoretical limits of sensitivity. This capability enables us to offer a technical service in the development, design and manufacture of custom electronic equipment, instrumentation and systems which challenge the state of the art. We invite inquiries which put us to the test.

All prices shown are F.O.B. Whippany, N. J. Prices and specifications subject to change without notice.

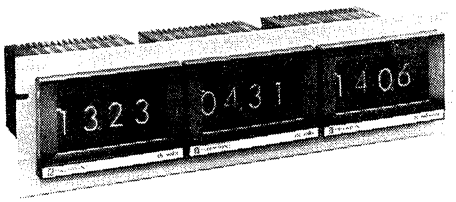
43 SOUTH JEFFERSON ROAD, WHIPPANY, NEW JERSEY 07981 • **PHONE (201) 887-5508** • **TWX 710-986-8251**

PRESTON

SCIENTIFIC INCORPORATED
805 East Cerritos Ave., Anaheim, Calif. 92805
Tel. (714) 776-6400

DIGITAL PANEL METERS

X-MOD/DPM



- Automatic Polarity
- Digital Output Option
- Self Contained Power Supply
- 100% Overrange

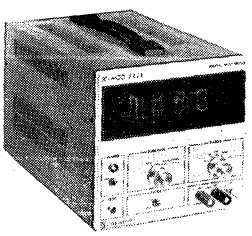
SPECIFICATIONS

Type	Resolution	Accuracy	Reading/ Sec	Input Z	Options	Function	Temp.	Size**	Price
Integrating	3 digits & sign 100% overrange	DC voltage ±0.1% ±1 digit	10 (100 option)	10 megohms	outputs BCD	DC V current	+10°C to +50°C	F	$225.

** (F) 3.62H, 5.81W, 6.25L

DIGITAL MULTIMETERS

X-MOD 722

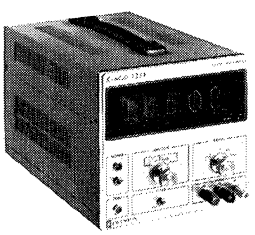


- Automatic Polarity Indication
- 10 Megohm Input Resistance
- Digital Output Option
- Exceptionally Low Cost

SPECIFICATIONS

X-Mod	Type	Resolution	Accuracy	Read. per sec.	Input Z	Options	Range	Function	Temp.	Size **	Price
722	Dual Slope Integration	3-digit & sign 100% overrange	±0.1% ±1 digit	10 (100 option)	10 megohms	BCD outputs & AC-DC converter	1, 10, 100 & 1000v FS	DC volts & ohms	10° to 50°C	D	$295.

X-MOD 723



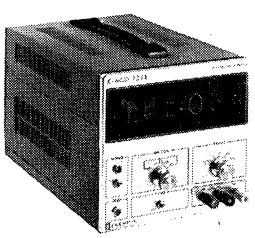
SPECIFICATIONS

X-Mod	Type	Resolution	Accuracy	Read. per sec.	Input Z	Options	Range	Function	Temp.	Size **	Price
723	Dual Slope Integration	4-digit & sign 100% overrange	±0.01% ±1 digit	10 (50 option)	10 megohms	BCD outputs & AC-DC converter	100 mv, 1, 10, 100, 1000v FS	DC volts & ohms	10° to 50°C	D	$645.

** (D double 6.70H, 6.90W, 12.22L

DIGITAL VOLTMETER

X-MOD 723A



- 0.01% Accuracy
- 100 Microvolt Resolution
- 10 Millisecond Conversion Time
- Automatic Polarity Indication

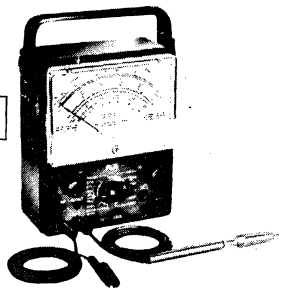
SPECIFICATIONS

X-Mod	Type	Resolution	Accuracy	Read. per sec.	Input Z	Options	Range	Function	Temp.	Size **	Price
723A	Dual Slope Integration	4-digit & sign 100% overrange	±0.01% ±1 digit	10 (50 option)	10 megohms	BCD outputs	1, 10, 100, 1000v FS	DC volts	10° to −50°C	D	$485

**(D double 6.70H, 6.90W, 12.22L

PRESTON SCIENTIFIC also manufactures Instrumentation Amplifiers. See EEM Section 1100 Page 1293 . . . Analog-to-Digital Converters and Multiplexers. See EEM Section 2000 Page 373. For the location of your nearest PRESTON representative refer to the Yellow Section.

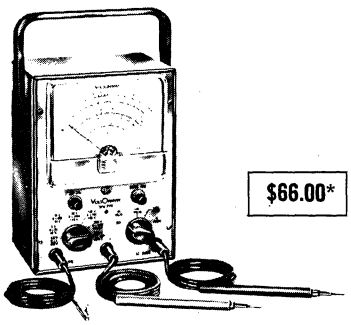
RCA Test Equipment



$66.00*

WV-38A Volt-Ohm-Milliammeter

- Measures ohms, DC volts, AC volts, direct current, audio signals in db units
- Precision ±1% resistors insure high accuracy
- Meter movement protected against burnout



$66.00*

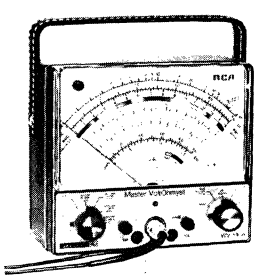
WV-77E VoltOhmyst

- Measures dc and ac rms voltage up to 1500 volts, ac p-p voltage of complex waveforms to 4200 volts, and resistance from 0.2 ohms to 1000 megohms
- 11 megohm imput resistance

$99.00*

WV-98C Senior VoltOhmyst

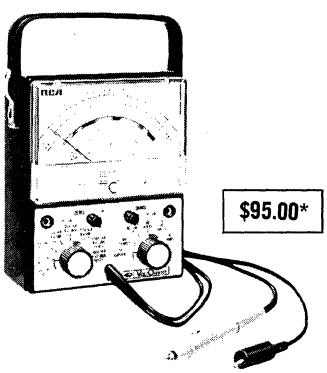
- Measures dc and ac rms voltage up to 1500 volts, ac p-p voltage of complex waveforms to 4200 volts, and resistance from 0.2 ohms to 1000 megohms
- Large mirror scale meter & dc/ac ohms switch-probe with shielded cable



$128.00*

WV-510A Master VoltOhmyst

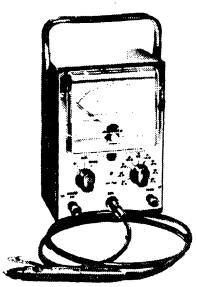
- All solid-state, battery / AC operated
- 7 overlapping ranges for AC, resistance, and DC current; 8 ranges for DC voltage
- 21-megohm resistance on all DC ranges
- ± 3% accuracy of full-scale reading for all voltage and current functions



$95.00*

WV-500B Transistorized VoltOhmyst

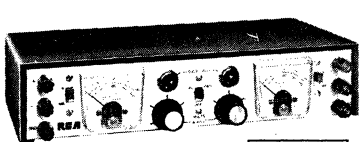
- All solid-state, battery operated and portable
- Eliminates warm-up time and zero-shift
- Measures ac /dc voltage and resistance



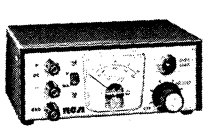
$ 99.00*

WV-76A High Sensitivity AC VTVM

- Measures 0.0002 volt to 100 volts (9 overlapping AC volt ranges)
- Measures —40 to +40 db levels on separate decibel scale
- Probe permits measurements to 500 volts or +56 db



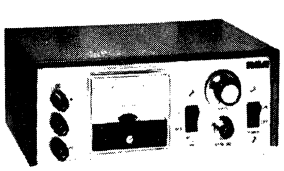
$87.00*



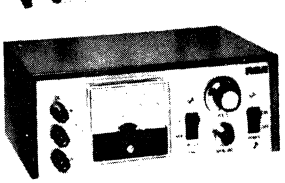
$48.00*

WP-700A & WP-702A (dual unit) Power Supplies

- 0 to 20 volts at 200 MA
- Negative feedback regulator circuit
- All silicon transistors and diodes



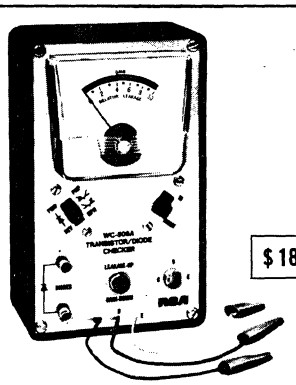
$60.00*



$60.00*

WP-703A & WP-704A Power Supplies

- 0 to 20 volts at 500 MA for WP-703A; 0 to 40 volts at 250 MA for WP-704A
- Negative feedback regulator circuit
- All silicon transistors and diodes
- Electronic short-circuit protection



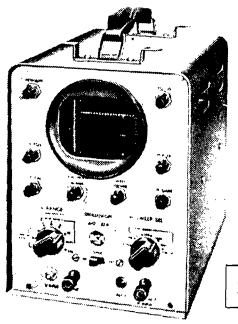
$ 18.00*

WC-506A Transistor / Diode Checker

- Checks relative gain and leakage levels of out-of-circuit transistors
- Checks relative front to back current ratio of diodes

*Optional User Price

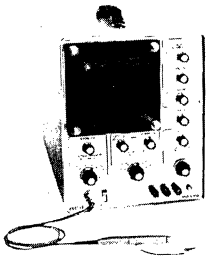
RCA Test Equipment



$180.00*

WO-33A Super Portable Oscilloscope

- Flat response to 5.5 Mc
- Frequency compensated 3-to-1 vertical attenuators
- Automatic switching from wide-band to narrow-band on range switch

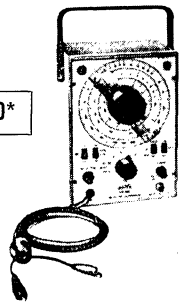


$299.00*

WO-505A 5″ Solid-State Oscilloscope

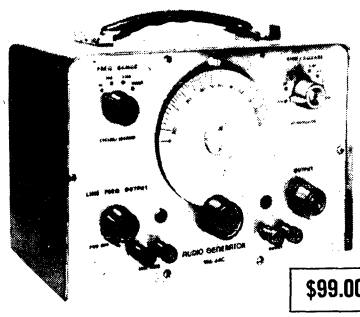
- Flat-face 5″ CRT with illuminated graph screen
- DC vertical amplifier; DC/AC input
- High sensitivity (.05 V range)
- Useable response to 8 MHz
- Regulated power supply for maximum stability

$75.00*



WR-50B RF Signal Generator

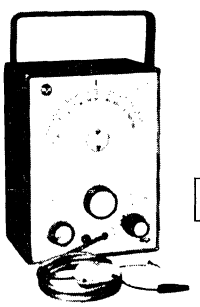
- Frequency range — 85 kHz to 40 MHz (6 overlapping ranges)
- Internal 400 Hz audio oscillator
- Sweep output at 455 kHz
- Includes crystal oscillator for use with external crystals



$99.00*

WA-44C Sine/Square Wave Audio Signal Generator

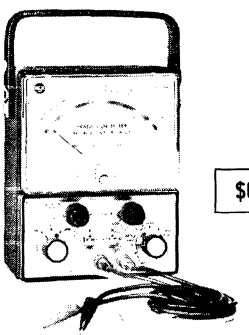
- Wide frequency range — 20 Hz to 200,000 Hz
- Distortion only 0.25% from 30 Hz to 15 kHz
- Stable signal — amplitude variation only ± 1.5dB



$95.00*

WA-504A Transistorized Sine/Square Wave Audio Signal Generator

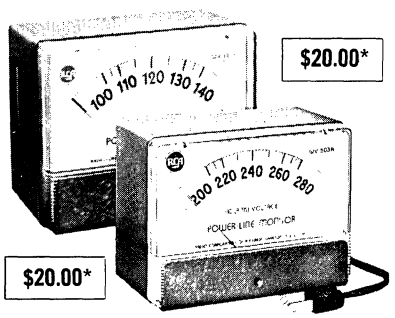
- Frequency range — 20 Hz to 200,000 Hz
- Stable signal — amplitude variation only ± 1.5dB
- Distortion only 0.25% from 30 Hz to 15 kHz



$68.00*

WT-501A In-Circuit/Out-of-Circuit Transistor Tester

- Battery operated and portable
- Tests both low and high power transistors
- Collector current adjustable from 20μA to 1 A

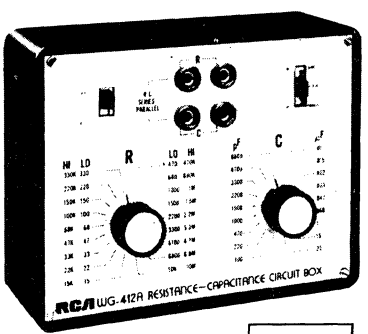


$20.00*

$20.00*

WV-120A and WV-503A Power Line Monitors

- Continuous, accurate indication of ac line voltage
- Expanded 2-color scale (WV-120A . . . 100-140V; WV-503A . . . 200-240V)
- Wide frequency range from 25 to 400 Hz



$30.00*

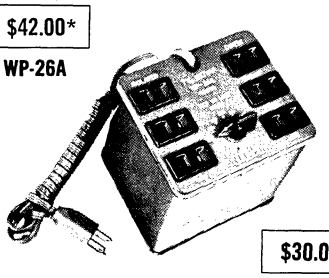
Kit $22.00*

WG-412A RC Circuit Box

- Resistor values from 15 ohms to 10 megohms
- Capacitor values from 100 pF to .22 μF
- Test leads with alligator clips

$42.00*

WP-26A



$30.00*

WP-25A

TV Isotap Isolation and Autotransformer

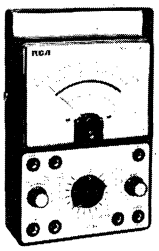
- Checks high-low-medium line-voltage operation
- WP-25A . . . 275VA; WP-26A . . . 400VA
- Minimizes shock hazards . . . prevents damage to test equipment

*Optional User Price

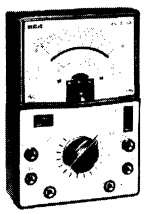
RCA Test Equipment

A complete line of high-quality, general-purpose VOMs

- Meter movements protected against burnout
- Precision resistors provide accuracy of ±3% on DC; ±4% on AC
- Attractively styled in dark blue cases with easy to read 3-color meter scales



WV-520A
Extremely high-sensitivity-DC: 100K ohms/volt, AC: 10K ohms/volt. Has three-color aluminum panel and mirror scale meter. Measures DC voltages from 10 mV to 1500 V in DC voltages from 10 mV to 1500 V in eight ranges, AC voltages (rms) from .01 to 1500 V in six ranges; DC current from .05 uA to 5 A in six ranges; resistance from .5 ohms to 20 megohms in four ranges.
Optional User Price: $48.00



WV-519A
Three-color aluminum panel and mirror scale meter. Has DC polarity switch. High-sensitivity DC: 50 K ohms/volt, AC: 10 K ohms/volt. Measures DC voltages from 5 mV to 1200 V in eight ranges, AC voltages (rms) from .01 to 1200 V in six ranges; DC current from 5 μA to 6 A in five ranges; resistance from 1 ohm to 100 megohms in four ranges.
Optional User Price: $36.00

WV-516A
Compact, economical - measures DC or AC rms volts from 0.1 to 1000 V in four ranges; DC current from 10 μA to 250 mA in three ranges; resistance from 2 ohms to 200 K ohms in two ranges. Pin-jack connectors used for all functions and ranges.
Sensitivity: AC/DC 2000 ohms/volt
Optional User Price: $9.95

WV-517A
Has convenient panel switch for selection of all functions and ranges; measures DC voltages from .01 to 600 volts in four ranges; AC voltages (rms) from 0.2 to 660 V in four ranges; DC current from 10 μA to 300 mA in three ranges; resistance from 1 ohm to 5 megohms in three ranges; and decibels from −20 dB to +37 dB.
Sensitivity: DC- 20 K ohms/volt
AC- 10 K ohms/volt
Optional User Price: $18.00

WV-518A
Panel mounted fuse to protect ohms-divider resistors. Mirror scale meter. Measures DC voltages from .01 to 500 V in four ranges, AC voltages (rms) from .05 to 500 V in four ranges, DC current from 10 uA to 500 mA in four ranges; resistance from 1 ohm to 2 megohm.
Sensitivity: DC- 20 K ohms/volt
AC- 10 K ohms/volt
Optional User Price: $28.50

Test Equipment Accessories

Type	Description	Optional User Price*
WG-206	1090-Megohm Resistor for H.V. Probe	$ 3.75
WG-210	900-Megohm Resistor for H.V. Probe	3.75
WG-211	495-Megohm Resistor for H.V. Probe	3.75
WG-270A	Carrying Case for WV-38A	5.25
WG-271A	Adapter for using WG-300B Cable and Probe on WO-33A	2.50
WG-277A	Test Leads for WV77E	7.50
WG-289	High Voltage Probe (less resistor) with microphone type connector	15.00
WG-297	High Voltage Probe (less resistor) with banana plugs	15.00
WG-299E	DC/AC-Ohms Probe and Cable for WV-98C	9.75
WG-300B	Direct/low-Capacitance Probe	12.00
WG-301A	Crystal-Diode Probe for WV-98C	8.25
WG-302B	RF/IF-VF Signal-Tracing Probe	12.00
WG-349A	Direct-Low Cap. Probe for WO-33A	6.75
WG-350A	Demodulator Probe for WO-33A	5.25
WG-351A	RF Probe for WV-77E	5.25

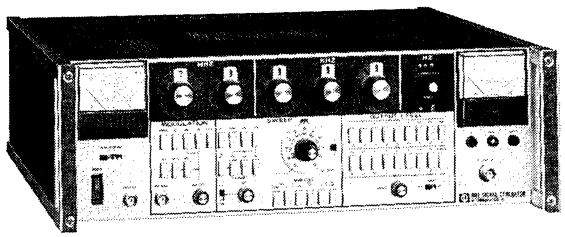
*Optional User Price

Type	Description	Optional User Price*
WG-354A	Capacitance-Type Voltage Divider Probe for WG-300B	11.00
WG-361A	Current Measuring Adaptor	$ 5.25
WG-400A	Direct/Low Capacitance Probe and Cable for WO-505A	10.50
WG-401A	AC/DC Ohms Probe and Cable for the WV-510A	9.00
WG-410B	AC/DC Ohms Probe and .150″ Diameter Cable	9.00
WG-411A	Slip on High Voltage Probe	15.00
WG-413A	Test Leads with Dual Banana Plugs	3.75
WG-414A	3 Clip Probes	13.50
WG-426A	RF Output Cable for the WR-514A	11.25
WG-427A	Direct Cable for the WR-514A	6.00
WG-428A	Connector Adapter for the WR-514A	3.75
WG-429A	VF/IF 75 Ohm Terminated Adapter for WR-514A	4.50
WG-430A	Direct Cable Adapter for WR-514A	4.50
WG-436A	2079-Megohm Resistor for High Voltage Probes	3.75

RF COMMUNICATIONS, INC.

ELECTRONIC INSTRUMENTATION OPERATION

80 MHz SYNTHESIZED GENERATOR/SWEEPER



MODEL RF-808

$3576

- 50 KHz to 80 MHz
- Stability 5 PP 10^9/Day
- 0.1 μV to 10V into 50 ohms
- AM, FM, or Pulse Modulation
- Manual and Automatic Sweep
- Fully Programmable
- Low Spurious and Harmonics
- All Solid State

The RF-808 Signal Generator is a synthesizer and sweeper in addition to a standard signal generator covering .05 to 80 mhz in 1 khz steps with a vernier settable to 1 hz. The unit features remote programmability, digital frequency setting, high signal power output, FM, AM, pulse, automatic sweep, and manual sweep.

The RF-808 has digital synthesizer performance, yet retains the manual and vernier tuning and low spurious output of conventional signal generators. Applications include automated test systems where frequency, amplitude, and modulation must be computer controlled; general purpose lab use where high stability, digital or analog tuning, sweep, and modulation versatility are needed; receiver and communication system testing from ultrasonic up into VHF ranges. The unit is intended for bench use, but a standard rack panel adapter is available using only 5¼ inches of rack space.

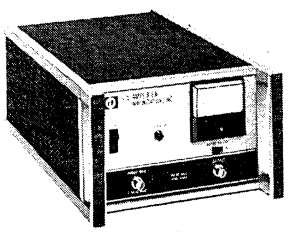
80 MHz WIDEBAND RF POWER AMPLIFIER

The RF-805 is a solid state amplifier, broadband from .05 to 80 mhz, producing ten watts with —30 db harmonic and intermodulation distortion, lower distortion at lower output levels. Gain is 47 db minimum, constant within 1 db. Full output is developed with less than 0.1 volt at the 50 ohm input. Accurate output metering and overload protection is provided.

The RF-805 will raise the power of most manual and swept tuned signal generators extending their versatility. Receiver testing, wattmeter calibration, antenna testing, RFI testing, attenuator measurements, and filter and component testing will be aided with this equipment. Optional rack mounting uses 5¼" rack height.

MODEL RF-805

- 10 Watts Output into 50Ω
- 0.1 Volts In—22.5 Volts Out
- .05 MHz to 80 MHz Broadband
- Flat 47 db Gain
- Solid State
- Low Distortion

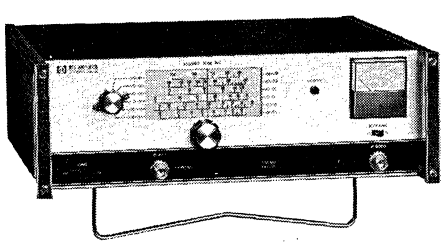


$1176

10-500 MHz TUNABLE RF POWER AMPLIFIER

Tunable in six bandswitched ranges from 10 to 500 MHz, the RF-815 provides up to 8 watts of RF power into a 50 ohm load. With about 40 db of gain, the 3 db RF bandwidth is 1.0 MHz at the low end of the frequency range, increasing to 5 MHz wide at 500 MHz. Accurate output metering and overload protection is provided.

Applications include amplification of signal generator outputs up to 20 volts, selective amplification of RF signals as provided by a receiver preselector, exciter driver stage for transmitters, RFI testing, attenuator measurements, harmonic amplification, and many others. All solid state except for the one tube output stage. Simple mechanical design provides for easy maintenance. Light weight of 25 pounds makes the unit portable for bench use. Optional rack mounting uses 5¼" rack height.



$1150

MODEL RF-815

- Up to 8 Watts into 50 Ohms
- > 35 DB Gain
- Bandwidth 1-5 MHz
- Low Distortion
- Small and Lightweight

OTHER EQUIPMENT

Other models available include amplifiers, both wideband and tunable, low level to 100 watts, audio to 500 MHz; frequency synthesizers, signal generators, and programmable signal sources to 500 MHz. Modifications to your specifications can be furnished. Contact our local sales representative or the factory. Our other divisions are leaders in commercial and military two-way radio equipment. For information about our Single Sideband, VHF-FM, Marine, Mobile, or Military lines, contact the factory.

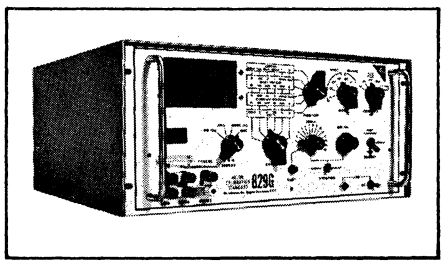
For complete information
contact Sales Manager,
Electronic Instrumentation Operation.

RF COMMUNICATIONS, INC.
1680 UNIVERSITY AVENUE—ROCHESTER, NEW YORK 14610
PHONE: 716-244-5830, TWX: 510-253-7469

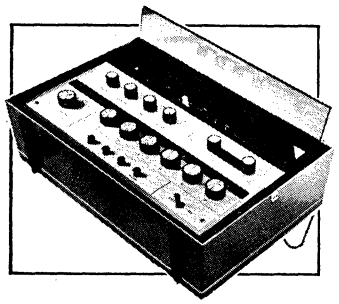
INSTRUMENTATION DIVISION

Since 1922

AC/DC Voltage, Current and Power Standards



Model 829G
Digital Standard



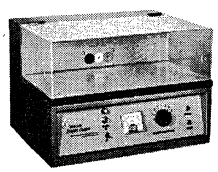
Model 1000

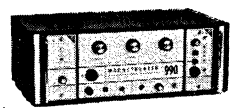
Model 829G	Measure & Deliver
Full-scale ranges	AC/DC Volts 0.1V—1000V AC/DC Current 100μA—10A Ohms 0.1-10 meg.
Accuracies of reading	±0.05% DC ±0.08% AC ±0.06% Ohms
AC Frequencies	50, 60 400, 1000 Hz
Price	$3,350.

Model 1000 Potentiometer with accuracy of ±3 ppm to 2.3 V. Plant or field use. Self calibration and easy to read digital presentation.
Price: **$2100.**

Magnet Chargers and Treaters

Model 2470-350
Variable output voltage with energies up to 440 watt-seconds for saturating up to 4 lbs. of Alnico V using wire-wound fixture. Bench or rack mounting available. Accessory Booster available for doubling output. **$1,145.**





Model 990
Magnetreater®
Completely solid state demagnetizer for stabilization of permanent magnets. Power continuously variable from less than 1VA to in excess of 80,000VA. Resolution, 0.1%. Can be programmed for automatic or semi-automatic operation. **$ 750.**

Model 1500
Produces 225 watt-seconds for large Alnico meter magnets plus cobalt platinum and barium ferrite materials. Wire-wound fixtures plug into front panel through safety interlocks. **$1,350.**

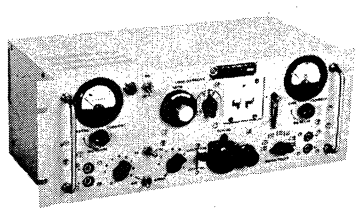
Model 942
Saturate Alnico magnets to 34 lbs. and high coercive force barium ferrite compounds of any shape or number of poles. Outputs to 3,600 watt-seconds. Safety interlocked.
$2,200. to $2,800.

Model 3260
First all solid state impulse charger variable output to 54 watt-seconds. Capable of magnetizing a wide range of materials and configurations. **$775.**

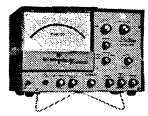
Model 107A
Saturates most medium size and instrument magnets, including core types, using variety of fixtures. Two output ranges: Maximum 18 watt-seconds. Booster unit also available. **$ 750.**

Crystal Impedance Meters

Model	Frequency Range	Impedance Range	Price
459A	800KHz-15 MHz	0-9,900 ohms	$1265.
531	10-140 MHz	10-150 ohms	915.
541C	2.5-1100 kHz	200 ohms-0.5 megohms	1175.
1207	75-200 MHz	10-125 ohms	1500.



Reference standards for measuring resonance and anti-resonance of quartz crystals in determination of capacitance, inductance and performance index. Meet U.S. MIL-C-3098E/Amd. 1 and U.K. Defense DEF-5271 A.



Model 3265

Gaussmeters

Model 505, a low cost unit ranging from 5 gauss to 50 kilogauss in 7 full-scale ranges. Measures permanent magnet, DC and AC fields to 20 kHz. Built in probe calibration and zero center mode for determining polarity. Accuracy: ±3% Price: **$210.00**

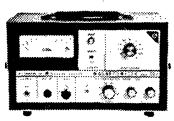
Model 750, a wide range device for flux density measurements from .02 gauss to 50 kilogauss in 24 full-scale ranges. Measures permanent magnetic fields, DC and AC from 20 Hz to 400 Hz. Easy to read 7" meter. Line or battery operation for field use. Accuracy: ± 1%① Price: **$ 720.00**

Model 3265, three-in-one gaussmeter capable of measuring absolute flux densities from .02 gauss to 50 kilogauss (DC and AC to 400 Hz). In the expanded scale mode, measurement to a resolution of 1 ppm and a differential mode for simultaneous measurement of two separate fields or field gradients. Accuracy: ± 1%① Price: **$ 1050.00**
①Plus accuracy of reference.
Gaussmeters are solid state, Hall effect instruments that yield laboratory accuracy traceable to NBS.

Probes — Are InAs elements for temperature stability. Choice of flat, axial or tangential in various sizes to fit most gaps. Flat ranges from .006" thick x .135" wide x .625" long. **$95.00 to $470.00**

Reference Magnets — Traceable to NBS with 50 gauss to 20K gauss fields and gaps from .040" to .343" are standards for probe calibration. **$50.00 to $500.00.**

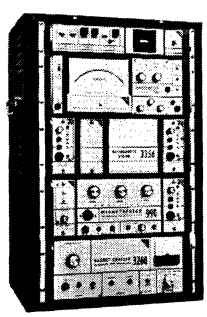
Magnetometer



Model 101

Solid state low level magnetic flux density measurements from 1 gamma to 100,000 gamma (1 oersted). Temperature compensation is provided to enable virtual drift-free operation.
Price: **$630.** — Standard Probe: **$145.**

Automagnetic® Systems



A combination of RFL standard magnetizing, measuring and demagnetizing equipment permits interconnection for semi-automatic and completely automatic systems, designed for individual requirements. Processing includes TWT, BAR and C shaped magnets, DC meters, Torque motors, accelerometers and other designs embodying permanent magnets.

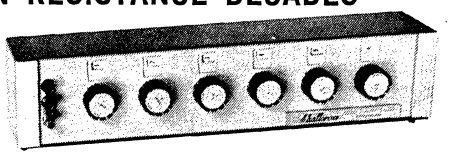
RFL Industries, Inc.
Instrumentation Division • Boonton, New Jersey 07005 • U.S.A.
Tel. (201) 334-3100 / TWX: 710-987-8352 / CABLE: RADAIRCO, N. J.

See page 1983 **Thermocontrol Division**
Temperature Measurement Control

shallcross
A CUTLER-HAMMER COMPANY
SELMA, NORTH CAROLINA 27576 / TELEPHONE: (910) 965-2341 / TWX: 510-920-0740

PRECISION RESISTANCE DECADES

SERIES 6800



SPECIFICATIONS

DC Accuracy at Terminals
±.03% above 100 ohms
±.05% 10 to 100 ohms
±.1% 1 to 10 ohms
±.5% .1 to 1 ohm
±2% .01 to .1 ohm

Zero Resistance
2 milliohms ±2 milliohms per decade (approximate). Each instrument is supplied with exact reading.

Wattage Rating per Step
½ watt above 1 ohm, ¼ watt for .1 ohm steps, .16 watt for .01 ohm steps.

Maximum Voltage
1500 volts DC where individual resistor ratings are not exceeded.

6800 SERIES BENCH AND RACK MOUNTED DECADE MODELS

Bench Model No.	Rack Model No.	No. Dials	Resistance Step Increments (Ohms)	Total Resistance (Ohms)	Bench Size (Inches)
6840	6840 RM	4	.01	111.1	17⅓ x 5 x 5
6841	6841 RM	4	.1	1,111	17⅓ x 5 x 5
6842	6842 RM	4	1	11,111	17⅓ x 5 x 5
6843	6843 RM	4	10	111,110	17⅓ x 5 x 5
6844	6844 RM	4	100	111,000	17⅓ x 5 x 5
6845	6845 RM	4	1,000	110,000	17⅓ x 5 x 5
6850	6850 RM	5	.01	1,111.1	19½ x 5 x 5
6851	6851 RM	5	.1	11,111	19½ x 5 x 5
6852	6852 RM	5	1	111,110	19½ x 5 x 5
6853	6853 RM	5	10	111,100	19½ x 5 x 5
6854	6854 RM	5	100	111,000	19½ x 5 x 5
6860	6860 RM	6	.01	11,111.1	19½ x 5 x 5
6861	6861 RM	6	.1	111,111	19½ x 5 x 5
6862	6862 RM	6	1	111,110	19½ x 5 x 5
6863	6863 RM	6	10	111,100	19½ x 5 x 5

SERIES 800

SPECIFICATIONS

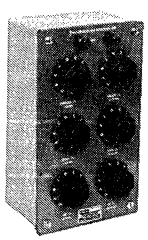
Resistor DC Accuracy
±.1% 10 ohms and above
±1% .1 ohm to 10 ohms
±5% .01 ohm to .1 ohm

Stability per Year
±.01% when operated within rated wattages over 10°C-40°C range.

Temperature Coefficient
Less than ±20 PPM 20°C-30°C.

Maximum Wattage
½ watt per resistor.

Maximum Voltage
2000 volts DC if wattage rating for resistors is not exceeded.



800 SERIES BENCH AND RACK MOUNTED MODELS

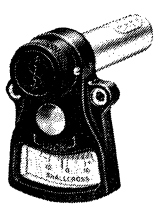
Bench Model No.	Rack Model No.	No. Dials	Resistance Step Increments (Ohms)	Total Resistance (Ohms)	Bench Size (Inches)
817-A	817 ARM	4	.01	111.1	9⅝ x 7¼ x 5¼
819	819 RM	4	.1	1,111	9⅝ x 7¼ x 5¼
825	825 RM	4	1	11,110	9⅝ x 7¼ x 5¼
826	826 RM	4	10	111,100	9⅝ x 7¼ x 5¼
827	827 RM	4	100	1,111,000	9⅝ x 7¼ x 5¼
828	828 RM	4	1,000	11,110,000	9⅝ x 7¼ x 5¼
817-B	817 BRM	5	.01	1,111.1	10⅞ x 6¼ x 5¼
8285	8285 RM	5	.1	11,111	10⅞ x 6¼ x 5¼
829	829 RM	5	1	111,110	10⅞ x 6¼ x 5¼
830	830 RM	5	10	1,111,100	10⅞ x 6¼ x 5¼
831	831 RM	5	100	11,111,000	10⅞ x 6¼ x 5¼
817-C	817 CRM	6	.01	11,111.1	10⅞ x 6¼ x 5¼
8315	8315 RM	6	.1	111,111	10⅞ x 6¼ x 5¼
832	832 RM	6	1	1,111,110	10⅞ x 6¼ x 5¼
833	833 RM	6	10	11,111,100	10⅞ x 6¼ x 5¼

6800 AND 400 SERIES UNMOUNTED DECADES — SPECS EQUAL TO 800 SERIES

Dials	Ohm Steps	Total (Ohms) Resistance	Weight (Lbs.)	Model No.	Dimensions (Inches)	Model No.	Dimensions (Inches)
1	.01	.1	½	6800	2⅞ x 3	435	3 x 3
1	.1	1	½	6801	2⅞ x 3	436	3 x 3
1	1	10	½	6802	2⅞ x 3	437	3 x 3
1	10	100	½	6803	2⅞ x 3	438	3 x 3
1	100	1,000	½	6804	2⅞ x 3	439	3 x 3
1	1,000	10,000	½	6805	2⅞ x 3	440	3 x 3
1	10,000	100,000	½	6806	2⅞ x 3	441	3 x 3
1	100,000	1,000,000	½	6807	2⅞ x 3	442	3 x 3
1	1,000,000	10,000,000	½	6808	2⅞ x 3		

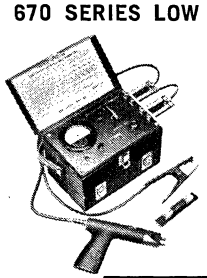
VALUE IN RESISTANCE MEASUREMENT

GALVANOMETER SYSTEMS WITH INTERNAL MAGNET CONSTRUCTION



Part No.	Price	Sensitivity/ Div. in Microamps	Period Seconds	Coil Resistance	External Critical Damping Resistance
1961-A	20.00	1.0	3	250	950
1961-B	20.00	0.5	3	1000	2400
1961-C	20.00	2.0	3	50	125
1961-D	20.00	4.0	3	20	50
1966-B	25.00	0.25	4	1000	2000
1966-C	25.00	1.0	4	50	100
1964-D	25.00	1.5	4	30	40

670 SERIES LOW RESISTANCE TEST SETS

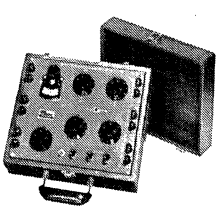


Six portable test sets offering the facility and operating speeds necessary for efficient production line testing of low resistances. Applications include the testing of welding bond resistances, welding cable resistances, switch contact resistances, etc. Six different measurement ranges (see chart below) with accuracies of ±5% of full scale values are available. A pistol grip probe and fixed clamp are standard accessories to facilitate production line tests.

657B pistol grip probe
676 fixed clamp
271 test standard 0.0025 ohm ±2%

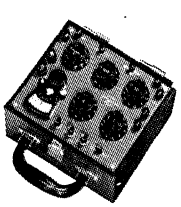
Shallcross Type	No. of Ranges	Ranges in Ohms — Reading From 0 to Full Scale Value Indicated
670-A	6	0.001 0.005 0.01 0.05 0.10 0.50
673-D	5	0.005 0.01 0.50 1.0 5.0

638-R KELVIN WHEATSTONE BRIDGE



A portable Kelvin Wheatstone Bridge offering exceptional versatility and practicality. Wide measurement range is afforded by integrated Kelvin (.001 ohm to 10 ohms) and Wheatstone (1 ohm to 11 megohms) circuits. Internal galvanometer and compartment for 3 (1.5 volt) flashlight batteries supply portable operation in 0.1 ohm to 50,000 ohm range. Binding posts to connect external galvanometer (.005MA/MM sensitivity) and power supply (1 to 45 volts) supplied for higher resistance measurements. Limits of error are ±.75% (Kelvin circuit) and ±.2% (Wheatstone circuit). Rheostat arm is brought out to two binding posts to provide resistance decade operation (11,110 ohms on 1 ohm step increments) with ±.1% accuracy above 10 ohms and ±.25% for 1 ohm steps. Separate current and potential terminals are available for low resistance measurements.

6100 WHEATSTONE-FAULT LOCATION BRIDGE



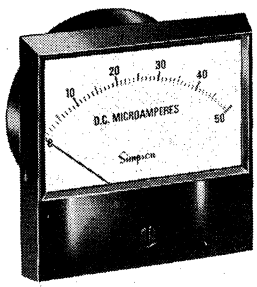
All purpose portable instrument for laboratory and field resistance measurements. Fault location capabilities of wires and cables performed with, Murray, Varley, Hilborn and Fisher loop tests. DC resistance from 1 ohm to 1.011 megohms with ±2% limit of error. Built-in galvanometer and compartment for 3 (1.5 volt) flashlight batteries permit portable measurements to 50,000 ohms — binding posts to connect external galvanometer and power supply available for testing of higher resistances. Rheostat arm of bridge connects to two binding posts for decade resistance operation. Available housed in weatherproof metal case and removable lid or with wooden case and removable lid.

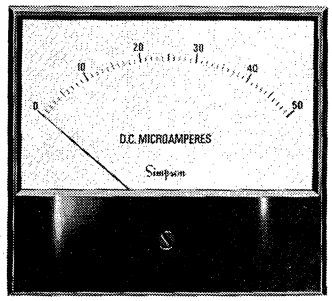
Simpson®

INSTRUMENTS THAT STAY ACCURATE

PANEL INSTRUMENTS

OVER 1500 STOCK RANGES, SIZES, AND TYPES

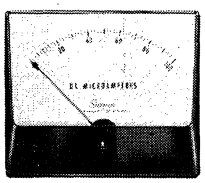




■ NEW! CENTURY SERIES

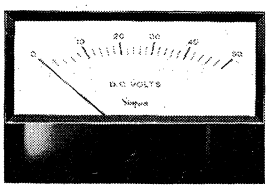
A MODERN BLEND OF PHENOLIC AND GLASS

Simpson's new panel instrument design concept. Rugged glass and phenolic construction **plus** a modern clean-cut design. Directly replaces older panel instrument designs. A complete line to meet all electrical needs — AC and DC Ammeters, Wattmeters and Elapsed Time Meters. Available in four sizes, 1½", 2½", 3½" and 4½". Features Simpson's self-shielding movements with spring-loaded pivot and jewel or shock-proof Taut Band suspensions. Available from stock in a wide selection of ranges. Write for bulletin 3000A or see listings in RADIO-ELECTRONIC MASTER.



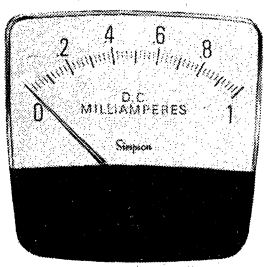
■ WIDE-VUE

Simpson's most popular panel instrument designs. Clear acrylic viewing areas will not yellow or develop hairline cracks. Available from stock in 1½", 2½", 3½", 4½" and 8" sizes and the widest selection of ranges. Behind panel bezel mount also available for 3½" and 4½" sizes.



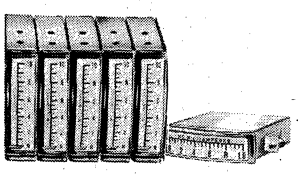
■ DESIGNER SERIES

3½" and 4½" sizes, made for today's compact equipment designs — without sacrificing readability. 4½" model uses less than 3" of panel height, yet has a clear, readable scale over 3½" long. Clean, crisp glass windows.



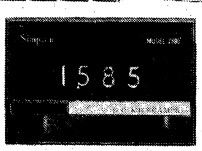
■ BOLD-VUE

Now you can have Simpson quality in this bold looking 3-hole mount design. Large numerals and wide tapered pointer make reading easy. Simpson movements are built for stay-accurate dependability. Bold-Vue is available in 2½" and 3½" sizes.



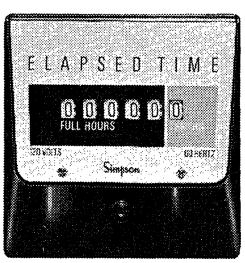
■ EDGEWISE METERS

1½" and 2½" sizes. Single or stackable design. Self-shielding core magnet movements.



■ DIGITAL METER

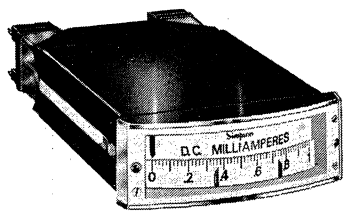
Compact Model 2800 has three full-time digits plus 100% overrange. ±0.1% accuracy.



CALL SIMPSON FOR ALL YOUR PANEL INSTRUMENT NEEDS . . .

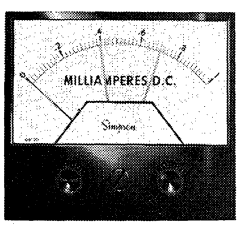
- **Elapsed Time**
- **Radio Frequency**
- **Pyrometers**
- **Behind Panel Mounts**
- **Decibel/VU**
- **Electro-Mechanical Counters**

Write today for bulletin 3000A.



■ NEW! EDGEWISE CONTROLLER

Compact 3.3" wide by 1.2" high by 4.6" long, new Model 3623XA Edgewise Controller fits standard ASA panel cutout. Features: anti-parallax scale; 5-amp plug-in load relays; 2-piece offset illuminated dial; operating mode indication lamps; removable set-point adjust knobs; front panel mounting. Stocked in single and double set-point types for electrical and temperature control applications. Also supplied as indicating meter. Write for Bulletin C-1206.



■ CONTROLLERS

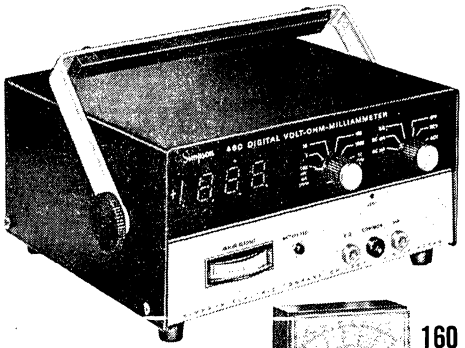
Maximum reliability design for control, alarm, or limit applications. Photoconductor sensing eliminates all interference with the indicating meter. High gain transistor amplifier provides accurate switching and a "dead band" of just 0.25% maximum. Rugged Seal construction withstands rigorous environmental conditions. Write today for bulletin 3000A.

SIMPSON ELECTRIC COMPANY • 5200 W. KINZIE STREET • CHICAGO, ILLINOIS 60644 • (312) 379-1121

TEST EQUIPMENT
CONTROLLERS • CHART RECORDERS

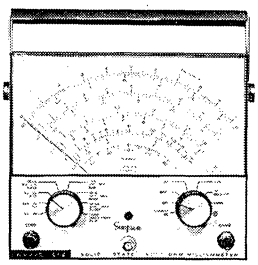
Simpson®
INSTRUMENTS THAT STAY ACCURATE

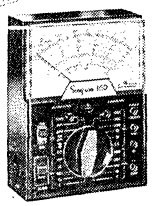
■ TEST EQUIPMENT



NEW!
460 Digital Volt-Ohm-Milliammeter

Provides seven segment, non-blinking digit display with automatic + and — indication. Front panel analog meter lets you see at a glance normal peaks or nulls. Measures AC and DC volts, AC and DC amps and resistance. Operation by line power, 120V 50-400 Hz, or re-chargeable D cell batteries (not supplied). $395.00



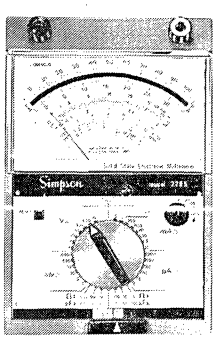


160 Handi-VOM

Full-size VOM features in a palm-size package! 20,000Ω/V DC, 5000Ω/V AC. Overload and shock protected Taut Band movement. Built for today's VOM needs, including solid-state circuit testing, the 160 has 0.25 VDC and DC μA ranges. $55.00.

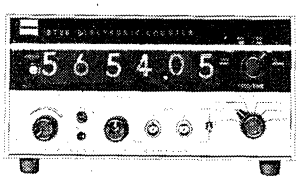
313 FET-Input VOM

VTVM features plus VOM convenience. Battery operated, with 11 MEGΩ DC, 10 MegΩ AC input impedance. Operates for over 300 hours on easily obtained inexpensive batteries. Large 7″ scale for maximum resolution. FET input withstands high voltages. Taut Band movement only is overload protected. $125.00.



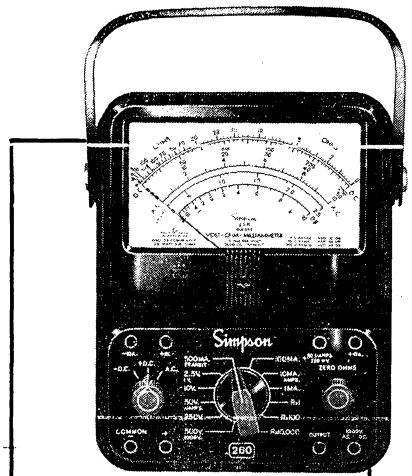
NEW! 2795 Electronic Multimeter

Portable, laboratory accuracy. Solid state, FET input. 68 switch selectable functions: 13 AC and DC voltage ranges start at 1 mV, FS . . . 14 AC and DC current ranges start at 1 μA, FS . . . 6 low power, IC compatible resistance ranges . . . 6 self-contained capacitance ranges . . . 2 temperature ranges . . . **plus** 12 output ranges. ±1% accuracy for AC and DC. $230.00.
Write for Bulletin L-1010.



2726 Frequency Counter

32 MHz counter has six full-time digits plus overrange. Measures average frequency, frequency ratios, time periods, time intervals, and totalizes. Also provides multiple measurement of period and ratio. Accuracy 0.001, $600.00. Five-digit model also available, $550.00.

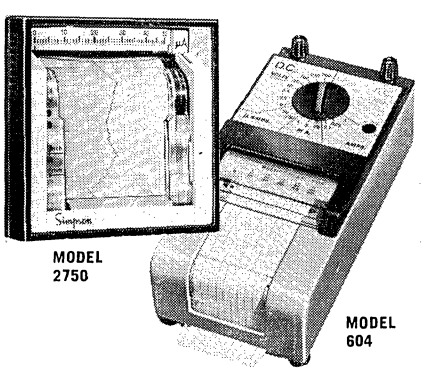


NEW!
260® Series 6 VOM

Features external access rear battery and fuse compartment. Only 2 batteries. New multi-purpose test leads with combination probe and screw-on alligator clips New range selection: 0-1 VDC and 0-500 AC and DC. Optional 5 kV AC or DC safety probes. Rugged, Taut Band movement. $68.50.
NEW 260-6P with above features **plus** goof-proof OVERLOAD PROTECTION also available.
Write for Bulletin T-810

■ CHART RECORDERS

Model 2750 panel mounts in just 3¾″ x 3¾″ of panel space. Records for over a month— unattended. Model 604 has 22 ranges, switch selectable, for low cost-per-range. Simpson also has fast response potentiometric and XY recorders. Write for complete information, or call your local Simpson representative.

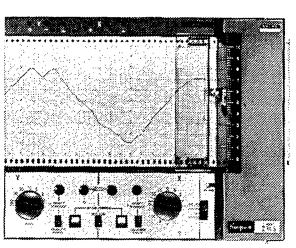


MODEL 2750

MODEL 604

■ NEW! 2745 X-Y and Y-T Portable Recorders

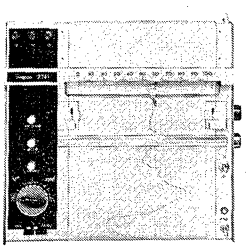
Choice of X-Y or Y-T recording at the flick of a switch. Wide switch selection of sensitivities starting at 1 MV/cm at 1 Megohm input impedance. Ink or inkless recording in a lightweight, compact, battery-powered unit. Only $750.00 ready to operate. Write for Bulletin L-1012.



MODEL 2745

■ NEW! Potentiometric Desk-top Recorders

Model 2741 has one channel with 11 switch selected ranges. Model 2742 has two channels, each with 11 switch selected ranges. Fast response. All solid-state. 6 switch selected chart speeds. Zero center and segmental scales. Many options. Prices start at just $735.00. Write for Bulletin L-1005.



MODEL 2741

■ TEMPERATURE CONTROLLERS . . . Wide variety available. Write for details or call your local Simpson Representative.

SIMPSON ELECTRIC COMPANY • 5200 W. KINZIE STREET • CHICAGO, ILLINOIS 60644 • (312) 379-1121

Precision Linear Ohmmeter

. . . . for accurate resistance testing

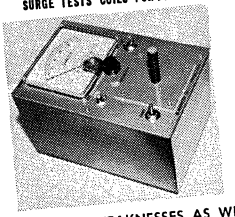
SERIES **203**

0.1 to 5000 Ohms Range

LINEAR RESISTANCE SCALES . . . CONTINUOUSLY SELF-CHECKING . . . GO/NO-GO LIMIT STYLE WITH BUZZER REJECTION SIGNAL.

High Energy Coil Tester

SURGE TESTS COILS FOR . . SHORTS . . GROUNDS . . OPENS



SERIES **640**

High Level Tester

DETECTS WEAKNESSES AS WELL AS DEFECTS . . . USE WITH CORE OR SOLENOID TYPE COILS . . . REQUIRES NO OPERATOR SKILL.

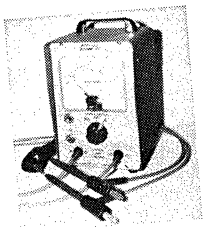
Coil & Winding Testers

WRITE FOR DATA SHEETS ON THE UNITS SHOWN ALL ARE STANDARD PRODUCTION ITEMS, AVAILABLE FOR EARLY DELIVERY . . . LET US QUOTE ON YOUR REQUIREMENTS FOR MODIFIED UNITS OR SPECIAL TEST EQUIPMENT.

SLAUGHTER CO.
MOORE & HAILEY STREETS
ARDMORE, OKLAHOMA
TELEPHONE: 405-223-4773 TWX: 405-223-6832

Adjustable Limit Megohmmeter

. . . . . with buzzer signal on rejections



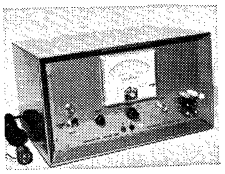
SERIES **205**

1 to 2000 Megohms

DRIFT FREE . . . NO WARM-UP . . . RUGGED TAUT BAND MOVEMENT . . . ADJUSTABLE REJECTION LIMIT WITH BUZZER SIGNAL.

Universal Comparator

tests coils and windings for impedance
. . . . . shorts
. . . . . opens
. . . . . turns



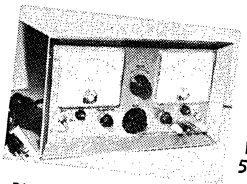
SERIES **635**

0.1 Percent Sensitivity

COMPARES COILS AND WINDINGS WITH STANDARD ON HIGH PRODUCTION GO/NO-GO BASIS . . . EXCELLENT AS A TURNS COUNT CHECKER . . .

Adjustable HI Voltage Surge Tester

tests coils and windings for shorts
. . . grounds
. . . . . opens



SERIES **648**

Ratings to 5000 Volts

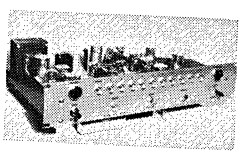
DIRECT READING PULSE-SURGE TESTER . . . REQUIRES NO ACTIVE MASTER . . . PRECISE ENERGY CONTROL . . . GO/NO-GO OPERATION FOR UNSKILLED PERSONNEL . . .

Automatic Test Equipment

WRITE FOR DETAILS ON THE EQUIPMENT SHOWN THESE ARE FULLY ENGINEERED, PROVEN, STANDARD DESIGNS AVAILABLE ON A REASONABLE DELIVERY SCHEDULE . . . LET US QUOTE ON YOUR REQUIREMENTS . . .

SLAUGHTER CO.
MOORE & HAILEY STREETS
ARDMORE, OKLAHOMA
TELEPHONE: 405-223-4773 TWX: 405-223-6832

Automatic Test Sequence Controller

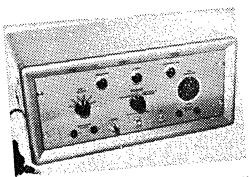


SERIES **910**

Brain Package

FULLY AUTOMATIC CONTROLLER WITH START — ACCEPT — REJECT — DELAY — SKIP — STOP — RESET FUNCTIONS . . . SELF-TIMING . . . PROGRAMMABLE.

Universal Cable & Harness Tester for continuity . . . breakdowns

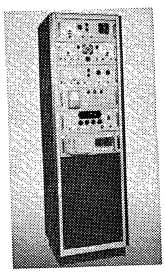


SERIES **701**

17 Circuit Capacity

SEMI-AUTOMATIC ECONOMY UNIT FOR GENERAL PURPOSE TESTING . . . REQUIRES NO OPERATOR SKILL . . . ELIMINATES COSTLY RE-WIRING.

Automatic Cable & Harness Tester for continuity . . . breakdowns . . . megohms

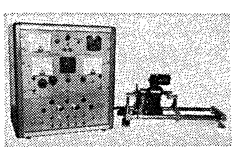


SERIES **707**

Expandable to 10,000 Circuits

INTERCHANGEABLE PROGRAM BOARDS FOR RAPID SET-UP CHANGES . . . MODULAR CONSTRUCTION . . . TESTING RATES TO 200 CIRCUITS/MINUTE . . . ALL LIMITS ADJUSTABLE.

Automatic Wound Armature Tester for insulation weakness . . . opens . . . grounds . . . shorted turns

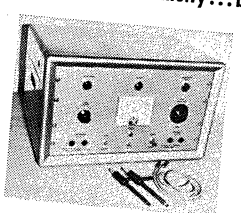


SERIES **920**

360 Parts Per Hour

CHECKS WOUND ARMATURES ON GO/NO-GO BASIS AT HIGH PRODUCTION RATES . . . HIGHLY EFFECTIVE PULSE-SURGE TEST SPOTS WEAKNESSES AS WELL AS DEFECTS.

Automatic Cable & Harness Tester for continuity . . . breakdowns



SERIES **706**

Expandable to 50 Circuits

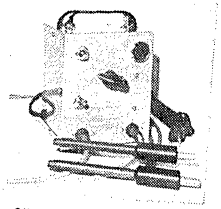
FULLY AUTOMATIC PROGRAMMABLE UNIT FOR HIGH PRODUCTION ON SIMPLE ASSEMBLIES . . . GO/NO-GO OPERATION . . . ADJUSTABLE LIMITS.

Insulation Testers

WRITE FOR DATA SHEETS ON THE INSTRUMENTS SHOWN . . . ALL ARE STANDARD PRODUCTION MODELS, AVAILABLE FOR IMMEDIATE DELIVERY FROM STOCK . . . LET US QUOTE ON YOUR REQUIREMENTS FOR MODIFIED UNITS OR SPECIAL TEST EQUIPMENT.

SLAUGHTER CO.
MOORE & HAILEY STREETS
ARDMORE, OKLAHOMA
TELEPHONE: 405-223-4773 TWX: 405-223-6832

High-voltage Insulation Tester
with buzzer signal on breakdowns
. . . grounds
. . . . shorts

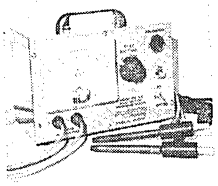


MODEL **101**

Watch what you are doing . . . not the tester

SIX TEST VOLTAGES . . 500 to 2500 V.A.C. PRICED SO YOU CAN AFFORD TO SPOT A FEW ALONG YOUR ASSEMBLY LINES.

Adjustable High-voltage Tester
with buzzer signal on breakdowns
. . . grounds
. . . . shorts

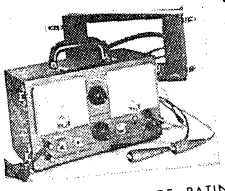


MODEL **106**

Voltmeter shows actual Test Voltage

CONTINUOUSLY VARIABLE TEST VOLTAGE RATINGS TO 10,000 VOLTS AC & DC . . RECOMMENDED FOR BREAKDOWN TESTING AT FINAL ASSEMBLY AND INSPECTION

High-voltage Leakage Tester
checks insulation for . . . leakage
. . . grounds
. . . . . arcing

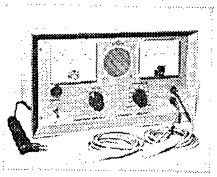


MODEL **122**

16 lb. Portable for lab and field work

VARIABLE VOLTAGE RATINGS TO 5 KV AC & D.C. DUAL RANGE LEAKAGE METER 0/100/1000 μa. . . . CAPACITY COMPENSATION. . . MEASURES INSULATION RESISTANCE, CAPACITY, POWER FACTOR.

High-voltage Leakage Tester
audibly signals excess leakage
. . . grounds
. . . . . arcing

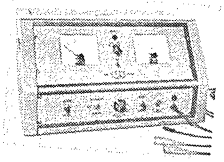


MODEL **103**

Measures Leakage . . . not capacity current

TEST VOLTAGE CONTINUOUSLY VARIABLE ADJUSTABLE LEAKAGE LIMIT. . CAPACITY COMPENSATION ON AC TESTS. . . RATINGS TO 10,000 VOLTS AC & DC. . . . LIMITED ENERGY. . NON-DESTRUCTIVE. . . FOR LAB AND PRODUCTION LINE SERVICE. . . . . .

Automatic H-V Insulation Tester
for precision checking . . . breakdowns
. . . leakage
. . . grounds



MODEL **103-MP**

Automatic Test Cycle

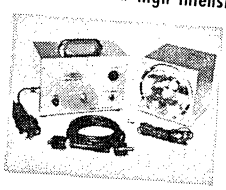
FULLY AUTOMATIC TEST CYCLE. . . CONTROLLED RATE-OF-RISE. . . ADJUSTABLE TEST VOLTAGE, DWELL TIME, & LEAKAGE LIMIT. . . CAPACITY COMPENSATION ON AC TEST. . . FOR PRECISION TEST OF CRITICAL PARTS & ASSEMBLIES. . .

Stroboscopes

WRITE FOR DATA SHEETS ON THE INSTRUMENTS SHOWN . . . ALL ARE STANDARD PRODUCTION MODELS, AVAILABLE FOR IMMEDIATE DELIVERY FROM STOCK . . . LET US QUOTE ON YOUR REQUIREMENTS FOR MODIFIED UNITS OR SPECIAL TEST EQUIPMENT.

SLAUGHTER CO.
MOORE & HAILEY STREETS
ARDMORE, OKLAHOMA
TELEPHONE: 405-223-4773 TWX: 405-223-6832

Inspection Stroboscope
. . . with extra high intensity daylight lamp

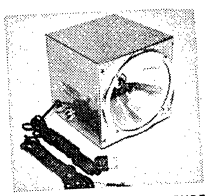


MODEL **167**

0/600 Flashes per Minute

SUPER INTENSITY TRIGGERED FLASH UNIT . . . PUSH—TO—SEE SWITCH. . . . FOR INSPECTION ON-THE-GO UNDER HIGH AMBIENT LIGHT CONDITIONS.

Inspection Stroboscope
. . . . . with high intensity daylight lamp

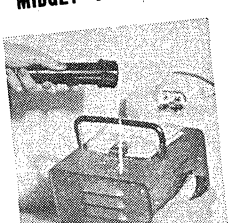


MODEL **161**

0/2,000 Flashes per Minute

LIGHT WEIGHT INEXPENSIVE TRIGGERED FLASH UNIT. . . . . PUSH-TO-SEE SWITCH. . . . INTENSE WHITE LIGHT FOR INSPECTION ON—THE—GO

MIDGET STROBOSCOPE FLASH HEAD

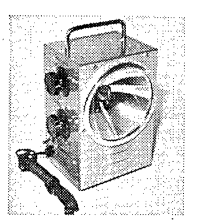


MODEL **166**

0/10,000 Flashes per Minute

FOR WORK ON MINIATURIZED EQUIPMENT . . . . FOR PRINTING TRADES. . . . FOR BIO—MEDICAL WORK. . ADAPTS TO ANY SLAUGHTER STROBOSCOPE. . .

Universal Stroboscope
. . . with high intensity daylight lamp

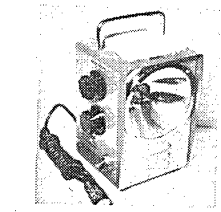


MODEL **163**

50/16,000 Flashes per Minute

UNIVERSAL UNIT FOR MOTION STUDY & INSPECTION ON-THE-GO. . . INSTANT STARTING . . . HIGH INTENSITY WHITE LIGHT . . . . TRIGGER EXTERNALLY OR OPERATE FROM INTERNAL OSCILLATOR

Metered Precision Stroboscope
. . . . . with high intensity daylight lamp



MODEL **165**

50/16,000 Flashes per Minute

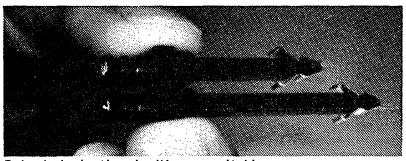
PRECISION STROBOSCOPE TACHOMETER INSTANT STARTING. . . HIGH INTENSITY WHITE LIGHT. . . OPERATES FROM EXTERNAL CONTACTS OR INTERNAL OSCILLATOR. . EASILY SYNCHRONIZED. . OUTPUT JACKS TO COUPLE SCOPE, ETC. . . .

DATA GENERATORS/COMPARATORS/AMPLIFIERS*

*Partial listing. SRC transducers and power supplies covered in other sections of this publication. Send for detailed literature on specific products.

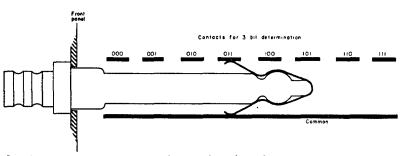
DIGITAL DATA WORD GENERATORS

These ultra compact instruments provide the same capability as toggle switch generators in a fraction of the space. For example, the compact Model 912 provides 960 binary bits (equal to 960 toggle switches) in 3″x8″ panel space. The entire line of programmable digital data generators can simulate the digital input or output of computers or computer peripheral equipment. They can also be used to operate and control production test equipment and other externally controllable test devices.



Patented plastic pin (linear switch) is equivalent to 3 toggle switches.

The key to SRC Digital Data Word Generator capabilities is the unique plastic pin (linear switch). The pins are available in eight discrete lengths, each equaling an octal increment (0 thru 7) which is capable of programming 3 binary bits.



Contact arrangement when plastic pin (linear switch) is inserted.

For example, to program 12 binary bits (110, 101, 010, 011) simply convert to decimal equivalents (6, 5, 2 & 3 respectively) and insert the octal pins numbered 6, 5, 2 & 3.

Word/bit length depends on model. For example, the Model 912 can program:

30 words of up to 32 bits
48 words of up to 20 bits
60 words of up to 16 bits

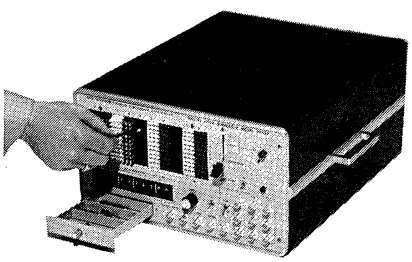
and an almost infinite number of other combinations.

APPLICATIONS

- **Develop** • IC's • computers • magnetic tape recorders • process control systems • wire memories • communication equipment • interfaces • calculators • pulse circuits • line printers • CRT displays • nucleonic equipment •
- **Simulate** • telemetry data • teletype messages • paper and magnetic tape •
- **Test** • D to A converters • IC's • IC testers logic circuit modules • LSI's • CRT displays • electromechanical/digital/facsimile systems • digital plotters • wire memories • MOSFETS • data modems • line printers
- **Checkout** • data communications lines • delay lines • PCM equipment • computer terminals • data acquisition systems • desk top calculators • cash registers • train control systems •
- **Calibrate** • digital instruments • Numerical control for machine tools • Receiving inspection checks

MODEL 900

• 900 bits • serial words from 4 to 900 bits • 9 parallel outputs, 100 bits each • octal programming • versatile general test instrument • receiving inspection •

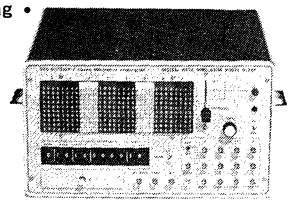


MODEL 905

• Internal or external clock • portable • versatile • low cost • binary programming • 100 bits serial one channel, or two channels of 50 bits each • ideal for development engineering •

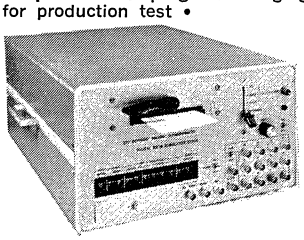
MODEL 912

• 960 bits • multiple serial words from 4 to 960 bits • octal programming • 12 parallel outputs, 80 bits each • quick data insertion programming • use with SA912 for MOS LSI testing •



MODEL 912 CR

• 960 bits • IBM card programming from the front panel • fast program changing • a must for production test •

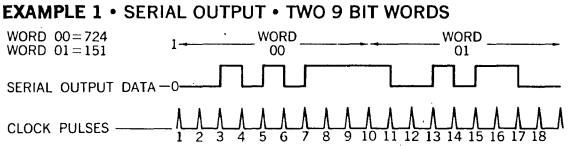


MODEL 916

• Binary/coded/octal programming • internal or external clock • 480 bits serial • 30 bits for each of 16 parallel outputs • 60 bits, 8 parallel outputs • 240 bits, 2 parallel outputs • use for IC development and testing as well as other parallel applications •

EXAMPLE OF PROGRAMMING

EXAMPLE 1 • SERIAL OUTPUT • TWO 9 BIT WORDS

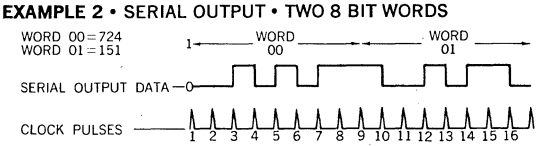


EXAMPLE: 8 BIT WORD

If the bit/word was set to 8, the most significant bit in each word would be omitted.

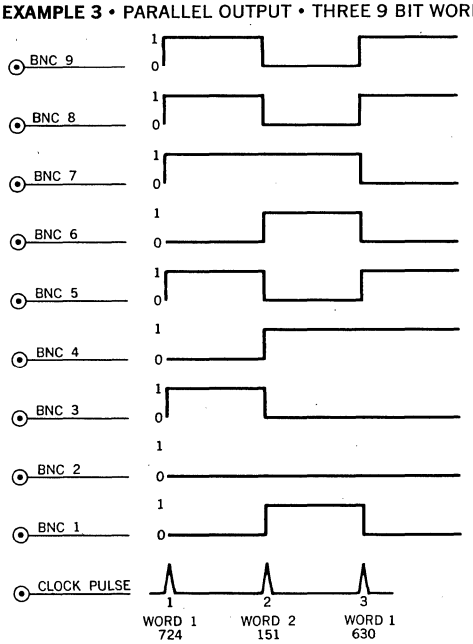
1st word = 724 = 11 010 100
2nd word = 151 = 01 101 001

EXAMPLE 2 • SERIAL OUTPUT • TWO 8 BIT WORDS



The output NRZ pulse train would appear as follows: The same format holds true for even shorter word lengths. A 7 bit word would eliminate the TWO most significant bits from each octal word, while a 6 bit word would mean the THREE most significant bits were omitted.

EXAMPLE 3 • PARALLEL OUTPUT • THREE 9 BIT WORDS



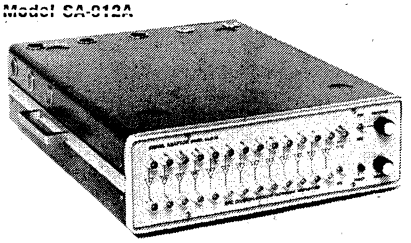
SRC DIVISION/MOXON INC. ■ 2222 Michelson Drive ■ Newport Beach, California 92664 ■ (714) 833-2000 ■ (213) 623-1892 ■ TWX 910-596-1362

DATA WORD GENERATOR SPECIFICATIONS

	MODEL 905	MODEL 916	MODEL 900	MODEL 912 & 912CR
Frequency	0 to 10 MHz min.; 15MHz typical. Serial or parallel		SERIAL: 0 to 10MHz min.; 12MHz typ. PARALLEL: 0 to 5 MHz min.; 6 MHz typ.	
Clock	INTERNAL OSCILLATOR: 1Hz to 10MHz. EXTERNAL CLOCK: Min. amplitude 0 to +3V. Min. pulse width 25ns.		External clock required: pulse, sine or square wave; +2V min., 10V max. amplitude above ground; 40ns min. pulse width.	
Output Data Format	Positive or negative logic sense. RZ or NRZ format (RZ to 5MHz)		Positive going signal with either positive or negative logic sense, selectable with front panel switch. NRZ format.	
Output Data Signal	Amplitude 0 to 10V above base-line with offset −3 to +3V.	Amplitude adjustable from +2 to +6 volts. Optional serial bipolar output		
Rise and Fall Time	20ns max.; 10ns typical into 50-ohm load		20ns max.; 10ns typical into 75 ohm load.	
Output Impedance	50-ohms average		LOGIC "0"; 12-ohms typical. LOGIC "1"; 70 ohms typical.	
Input to Output	Approximately 160ns delay.		Typically 100ns delay from input clock to output data.	
Data Programming	100-bit binary plugboard	480-bit octal plugboard	900-bit octal plugboard	960-bit octal plugboard*
Data Capacity	1 CHANNEL: 1-100 bits, serial 2 CHANNELS: 1-50 bits ea., parallel	1 CHANNEL: 1-480 bits, serial 2 CHANNELS: 1-240 bits ea., parallel 8 CHANNELS: 1-60 bits ea., parallel 16 CHANNELS: 1-30 bits ea., parallel	1 CHANNEL: 4-900 bits, serial 2 CHANNELS: 4-400 bits ea., parallel 9 CHANNELS: 1-100 bits ea., parallel	1 CHANNEL: 4-960 bits, serial 2 CHANNELS: 6-480 bits, ea. parallel 3 CHANNELS: 4-320 bits ea., parallel 12 CHANNELS: 1-80 bits ea., parallel
Input	STEP INPUT: local pushbutton/electronic pulse. STEP PULSE: +2.5 to 5V pulse inpulse width in ONE WORD, ONE CYCLE or ONE CHANNEL mode.		Into 220 ohms. 25ns min. pulse width in ONE BIT mode. Two clock periods min.	
Modes of Operation	ONE BIT: 1 bit/step input ONE CYCLE: 1 cycle/step input CONTINUOUS: 1 bit/clock pulse	ONE BIT: 1 bit/step input ONE CHANNEL: 1 channel/step input ONE CYCLE: 1 cycle/step input CONTINUOUS: 1 bit/clock pulse	ONE BIT: 1 bit/step input ONE CYCLE: 1 cycle/step input	ONE WORD: 1 word/step input CONTINUOUS: 1 bit/clock pulse serial; up to 12 bits/clock pulse parallel
Sync Outputs	FLOATING SYNC: One pulse coincident with any selected data bit in the cycle. BIT SYNC: A replica of the clock input, whose leading edge is coincident with the beginning of each new bit of data presented at the outputs. CHANNEL SYNC (916 only): A pulse coincident with the first data bit of each channel. AMPLITUDE: 0 to +3V min.		BIT SYNC: One sync pulse per bit; pulse amplitude, 3V min. into 300-ohm load; pulse width, 30 ±10ns; rise time, 20ns max. WORD SYNC: One sync pulse per word; characteristics same at BIT SYNC. SELECTABLE WORD SYNC: One sync pulse per cycle; characteristics same as BIT SYNC except pulse width, one word long.	
Data Insertion			Any word may be selected to receive priority data from thumbwheel switches.	
Temperature	Operating: +35 to 135°F		Storage: +5 to 155°F	
Input Power	115 vac, 60Hz @ 1/2A		Optional: 220VAC, 50Hz	
Size & Weight	6"Hx11"Wx15"D 14 pounds		7½"Hx15½"Wx18"D 26 pounds	
Warranty	Warranted against defects for one year.		Output drivers subject to abuse not covered.	
Price	$1895 including 100 binary programming pins.	$2750 including 25 programming sets (200 pins).	$3495	$3995 (912CR & 5995)
			Includes 50 programming sets (400 pins)	

*Model 912CR — 960 bits. Program prepared on IBM card which is fed into a card reader accessible from the front panel.

SIGNAL ADAPTER/AMPLIFIER — Model SA-912A



• Expandable to 13 channels • EIA compatible • −30 to +30 volts output •

The SA-912A is a compact, solid-state, high speed driver amplifier that is ideal for driving MOS or bipolar logic. It is especially suited for power amplifier use in pulse and word generators. A few typical applications include: testing TTY lines and terminals, CRT displays, signal distribution networks or general lab amplifier use.

SPECIFICATIONS

Input Signal Voltage: Binary "0" −0.5 to +0.4 vdc; Binary "1" +2.0 to +6.0 vdc.

Output Amplitude (Open Circuit): 5 to 30 volts adjustable. Negative or positive polarity selectable.

Baseline Offset: −5 to +5 volts adjustable.

Maximum Frequency: 5MHz min., 8MHz typical.

Rise and Fall Time: 25ns typical, 50ns max. into 50 ohm load with 2 ft. cable.

Output Impedance: 50 ohms at both binary "1" and binary "0" levels.

Channel Capacity: Up to 13 channels.

Input Power: 115 vac, ±10%, 60Hz @ 3A max. Optional: 115/220 vac, 50Hz.

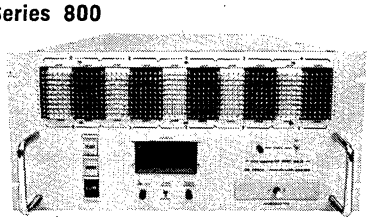
Temperature Range: 0° to +50°C operating; −20° to +70°C storage.

Size: 4½"H x 18"L x 15¼"W.

Weight: 35 pounds.

Price: $1,295.00 basic unit and 1 channel; $100.00 per additional channel.

DIGITAL DATA COMPARATOR — Series 800



• Visual readout of limits and channel • random access or sequential • alarm outputs give feedback to system controls

These Data Comparators can program up to 100 different pairs of limits for comparison at the front panel utilizing unique plastic pins numbered 0 to 9, that visually show programmed limits. Front panel lights and logic level outputs indicate test results. A few typical applications include: monitoring temperature, voltage, stress, loading, component sorting, or pre-processor for computers.

SPECIFICATIONS

Limit: Upper and lower plus sign.

Capacity: 10 through 200 channels.

Input Data Word Length: Up to 6 binary-coded-decimal (1-2-4-8) digits plus sign.

Programming: Patented plastic pins (linear switches) in ten lengths (numbered 0 to 9) plug into matrix and make electrical contacts that decode to BCD equivalents which are compared with the input.

Operating Modes: Sequential or random addressed.

Input Signal Voltage: Max. +10 volts.

Input Impedance: Approximately 1,000 ohms.

Output Signals: High limit error, low limit error, normal (no error) and BCD address of point under test.

Voltage: Variable from +2 to +20.

Output Impedance: 1,000 ohms to +V, approximately 50 ohms to ground.

Rise Time: 100 nanoseconds max.

Point Scanning Frequency: to 1MHz.

Data Comparison Delay: Less than 1 usec.

Alarm Lights: Front panel indicates the status of the comparison results.

Alarm Search: For out of limit channels. Sequential search and display of address.

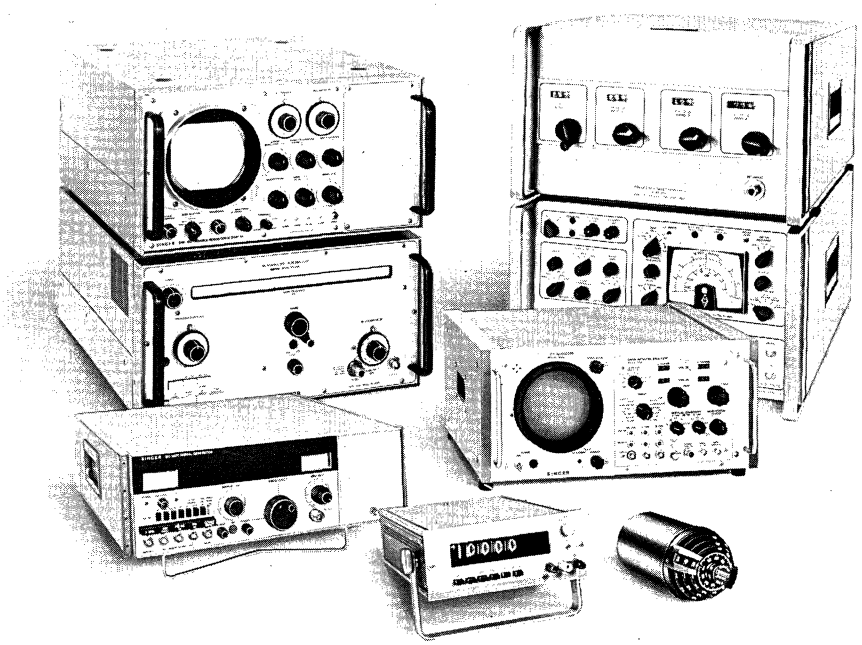
Input Power: 110 VAC ±10%, 1.0 amp.

Price: From $2,250 — consult factory for option prices and discount schedule.

When the name is SINGER, the instruments and service have to be better

A name you've come to rely upon for excellence and technological innovation in instrumentation. A reputation earned by developing and selling quality industrial products for over 100 years . . . based upon our commitment to provide "total" customer service.

Three Instrumentation Centers designing and manufacturing Test Instrumentation to satisfy your most demanding requirements.



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Spectrum Analyzers

Extended coverage from audio through microwave - a complete range of models . . . narrow dispersion, highly selective special purpose analyzers to broadband general purpose instruments.

Signal Generators & Sweepers

Highly stable signal generators with unique Nixie frequency readouts, full modulation capability and automatic signal leveling. Sweepers that span the spectrum from RF through microwave.

Noise & Field Intensity Meters

Exciting new concepts in automated EMI surveillance techniques. A complete range of instrumentation and accessories . . . audio through microwave.

Network Analyzers

Analyze insertion gain or loss, return loss (VSWR) or gain. Exclusive 60 dB dynamic range on log CRT displays. Swept or single frequency measurements.

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At the heart of this line of equipment is the RatioTran . . . the finest inductive voltage divider for over 18 years . . . plus a complete line of the highest resolution Angle to Digital, Analog to Digital, and Digital to Analog instruments found anywhere.

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Measure voltage power or phase utilizing the most advanced and proven measurement concepts . . . new digital systems to measure True RMS (without regard to waveform) up to 10 MHz. Phase angle meters that feature broadband or fixed frequency plug-ins, 0.1^{o} phase resolution, and isolated inputs with 10 megohm impedance.

Electrical Standards

Voltage and power calibration standards traceable to NBS . . . new AC/DC transfer standard allows measurements to be made in seconds using new digital system techniques.

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A complete assortment of fixed and step attenuators to cover your most exacting needs. Crystal detectors and samplers to use in conjunction with your own test systems or to complement the full range of Singer Instrumentation.

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3211 South La Cienega Blvd., Los Angeles, Calif. 90016 (213) 870-2761

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INSTRUMENTATION

STICHT INSTRUMENTS

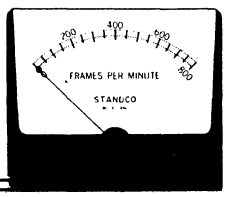
TACHOMETERS

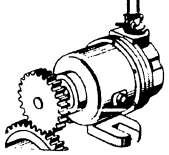
FOR EVERY NEED . . . EVERY SPEED

ELECTRICAL TACHOMETERS

Furnished complete with Generator, Indicator and all necessary Drive Equipment such as gears, couplings, etc.

Indicator sizes from 3" to 18" (extra large sizes)



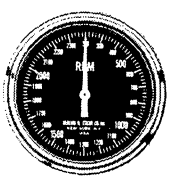


With heavy-duty generator, high accuracy and dependability, steady pointer, clear, easy-to-read indicators

Bulletins 720, 723

RPM FPM YPM ETC.

CENTRIFUGAL STATIONARY TACHOMETERS

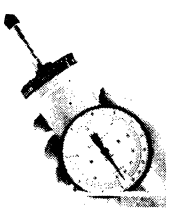


For permanent mounting on machines and engines. Model "J", with 3", 4", 5½", 8" or 10" dial diameter. Flexible cable driven. Many standard ranges reading RPM, FPM, YPM, and other operations.

Bulletins 793, 794, 795, 796, 798

PORTABLE TACHOMETERS

CENTRIFUGAL HAND TACHOMETERS



With one, two, three, five or six ranges in one tachometer. All speeds up to 100,000 RPM with overspeed protection.

Type "UO"	Cat. No. 303	30-12,000 RPM	5 ranges
Type "UO"	Cat. No. 322	60-24,000 RPM	5 ranges
Type "UY"	Cat. No. 630	25-30,000 RPM	3 ranges
Type "UY"	Cat. No. 640	30-40,000 RPM	3 ranges
Type "UH"	Cat. No. 666	30-100,000 RPM	6 ranges

Bulletins 750, 751, 756, 765, 790

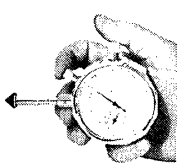
CHRONOMETRIC HAND TACHOMETERS

With built-in chronometric movement, timing period 3 or 6 seconds.

JAQUET

Guaranteed accuracy ½%.
Cat. 2302 0-2000 RPM
Cat. 2301 0-20,000 RPM
Cat. 2304 0-200 RPM

Bulletin 735

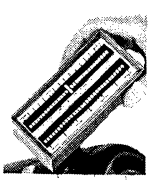


HASLER

Guaranteed accuracy ¼%
Cat. 4402 0-2000 RPM
Cat. 4401 0-20,000 RPM

Bulletin 745

VIBRATING REED TACHOMETERS



PORTABLE AND STATIONARY TYPES

Measure speed by touch.

Many different ranges from 600-30,000 RPM.

Bulletin 770

HIGH INTENSITY STROBOSCOPE

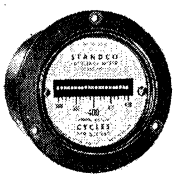
MODEL 510 AL

With Brilliant Daylight Flasher Unit for maximum readability.
Range 60-15,000 RPM
"Industry's Seeing Eye"

Bulletin 781

VIBRATING REED FREQUENCY METERS

In 2½" and 3½" sealed or unsealed cases, meeting all MIL Specs. Rugged, dependable, accuracy ±0.5%, reeds aged. Standard voltage ranges: 100-150, 200-250, 400-450 volts.

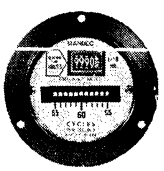


Bulletin 806

REPRESENTATIVE RANGES

Cat. No.	Range CPS	No. of Reeds	Intervals Between Reeds
359	58-62	5	1
360	57-63	7	1
361	56-64	9	1
357	57.5-62.5	11	0.5
358	55-65	21	0.5
369	48-52 & 58-62	10	1
390	47-53 & 57-63	14	1
374	380-420	5	10
364	380-420	9	5
375	380-420	17	2.5
367	380-420	21	2
370	395-405	11	1

"STANDCO" COMBINATION FREQUENCY AND RUNNING TIME METERS

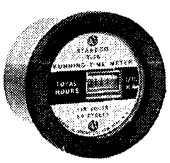


Bulletin 811

In 3½" flush mounting, round bakelite cases.

Cat. No.	Freq. Range	No. of Reeds	Time Range
TF 362	55-65 CPS	11 Reeds	9999.9 hrs.
TF-356	58-62 CPS	9 Reeds	9999.9 hrs.
TF-360	57-63 CPS	7 Reeds	9999.9 hrs.
TF-359	58-62 CPS	5 Reeds	9999.9 hrs.

"STANDCO" RUNNING TIME METERS



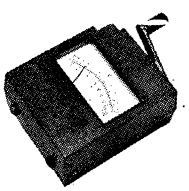
Bulletin 810

In 2½" and 3½" round, flush mounting, sealed or unsealed cases

3½"		2½"	
Type T-1	9999.9 hrs.	Type T-25	9999.9 hrs.
Type T-3	99,999 hrs.	Type T-30	99,999 hrs.
Type T-4	99,999 min.	Type T-35	99,999 min.
115V, 220V, 440V, 60 or 50 cycles		115V, 220V, 440V, 60 or 50 cycles	

"MEGOHMER" INSULATION TESTERS

DC GENERATOR (HAND CRANK) TYPES

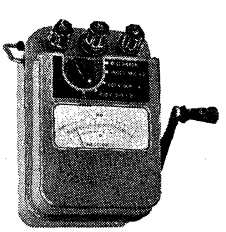


"DWARF" MEGOHMER — 500 volts, D.C. Bulletin 421

Cat. No.	Cat. No.
703 - 0-100 Megohms 0-10,000 Ohms	705 - 0-100 Megohms 0-500 Ohms

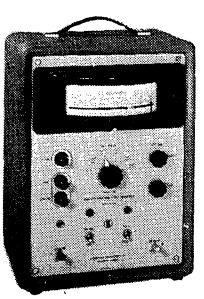
STANDARD MEGOHMER MARK II

Multi-Range — Multi-Test Potential



Cat. No.	Test Potential	Insulation Range
718	1000 volts	0-200 megohms
	500 volts	0-100 megohms
	250 volts	0-50 megohms
	100 volts	0-20 megohms
		Continuity Range
		0-100 ohms

Cat. No.	Test Potential	Insulation Range
719	1000 volts	0-2000 megohms
	500 volts	0-1000 megohms
	250 volts	0-500 megohms
		Discharge
		Continuity Range
Bulletin 435		0-20,000 ohms



HIGH RESISTANCE MEGOHMMETER

MODEL 29-U

20,000,000 MEGOHMS

Direct Reading: Unusual stability, fast in operation, high accuracy.

11 Ranges: From 300,000 ohms to 20 million megohms.

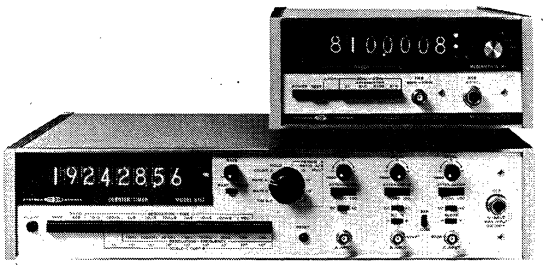
Power Supply: 115 volts AC, 60 cycles.

Test Potentials: 100 volts DC and 500 volts DC. Also: 0.5 volts to 1000 volts by external supply.

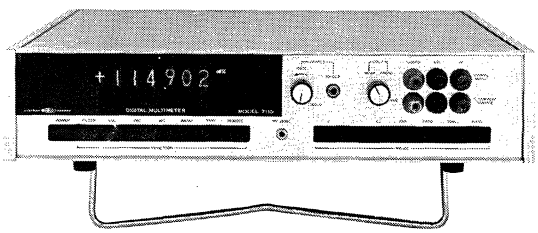
Bulletin 1029U

HERMAN H. STICHT CO., INC. 27 PARK PLACE, NEW YORK, N.Y. 10007

Right for the times

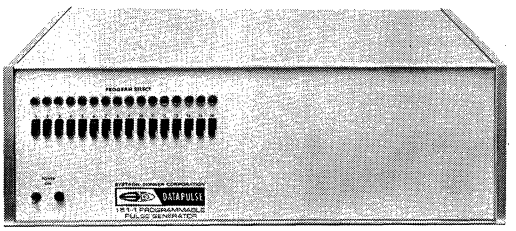


Electronic counters. S-D's comprehensive line of counters and counter-timers features a new concept in expandable instruments. The 6150 series expandable universal counter-timers consists of four basic models covering frequency ranges of 50, 200, 512 MHz, and fully automatic 3 GHz. The frequency range of the basic 50 MHz unit is expanded simply by inserting a new PC card. BCD outputs, extra readout digits, and many other features also may be added by use of PC cards. S-D's 6050 series are low cost, half-rack width frequency measuring instruments available in four basic ranges to 3 GHz using the same expandability concept. Other S-D counters range from simple 12.4 MHz frequency meters to fully automatic microwave counters to 40 GHz with time base stability as high as 5 parts in 10^{10} per 24 hours.

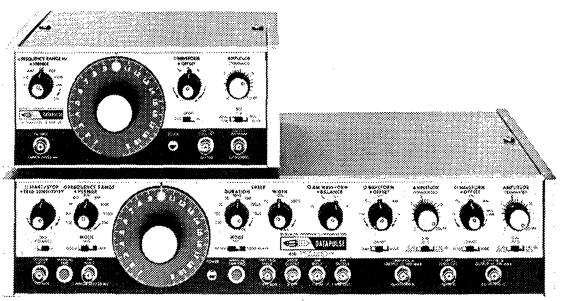


Digital voltmeters and multimeters. The full line ranges from a simple 3-digit DC voltmeter priced at $319 to .005% five and one-half digit multimeters that measure voltage (AC and DC), current (AC and DC), and resistance. The precision integrating meters feature 1 μv resolution, 120 dB noise rejection, selectable input filtering, and reading speeds up to 30 per second. Models 7000A, 7005, and 7110 are completely expandable.

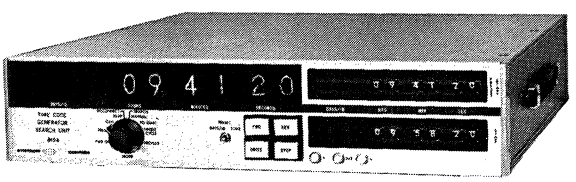
Power Supplies. The Trygon Division manufactures a wide range of precision regulated DC power supplies. Standard lines include wide voltage range laboratory and systems power supplies in bench, rack, and half-rack series; systems power supplies, slot and wide range; and a wide choice of rack adaptors and accessories. Trygon also offers a strong OEM special design capability with emphasis on the computer peripheral area.



Pulse and Data Generators. Datapulse offers a complete line of manually operated and automatic fast rise time pulse generators with a wide range of repetition rates and output powers. Baseline offset, complementary outputs, linear variable rise and fall, and sync/async gating are typical of the many advanced features provided. Full control over width, delay, and output polarity is standard. Line includes compact, low cost ($395.00) models, versatile high frequency (250 MHz) models, and new 150 programmable series which comes in 16 different models for every type of automatic test application.



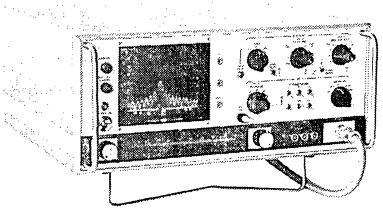
Function generators. Datapulse function generators provide basic sine, square and triangle waveforms of exceptional clarity. Model 401 Function Generator offers small size, wide frequency range, and clean waveforms at low cost. Model 410 Sweep/Function Generator features a multiplicity of operating modes, dual 40-volt output amplifiers, and built-in sweep generator (the industry's most versatile waveform source).



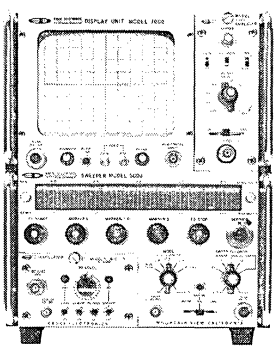
Timing. Full line includes compact generator/readers priced at $1495, a digital clock for $675, portable battery-powered generators for field use, and high-precision generator/readers with automatic tape search equipment. Time can be located to the millisecond. Any serial time code can be supplied. All equipment is built with modern integrated circuits for maximum reliability at minimum cost.

For more details call or write for 1971-72 free 250-page catalog of all Systron-Donner products. Contact S-D at 888 Galindo St., Concord, CA 94520. Phone (415) 682-6161.

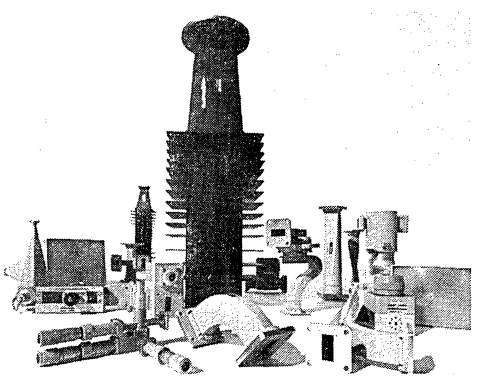
New S-D instrumentation



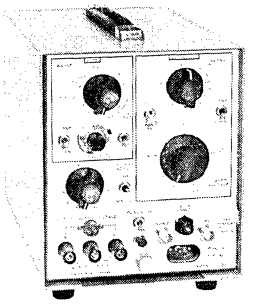
Calibrated Spectrum Analyzers. Solid state wide range units for measurement-analysis of AM, FM, CW, SSB and microwave signals up to 40 GHz. All units feature a battery power option. Model 751 (shown) has a 500 MHz scan width, 1 kHz IF resolution and selectable RF attenuation in 10 dB steps. Adding a converter module boosts the operation of the 751 to 40 GHz. Ideal for radar pulse analysis, EMI measurements, communications evaluation and microwave component testing.



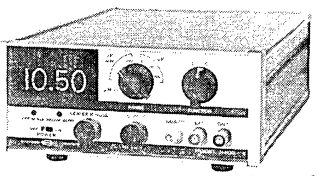
Sweepers. Kruse Model 5000A (shown) operates from 10 MHz to 18 GHz with wide range plug-ins. Extremely compact and versatile. Ideal for testing power gain, insertion loss, and frequency response characteristics of communications systems. Basic sweeper expands easily. Available are multiband power units, multiplexers, and controllers. You get direct readout of data on a compact X-Y CRT Display Unit, Model 7000.



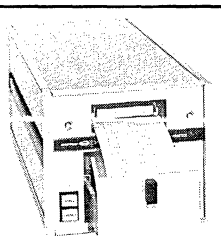
Microwave Components. Over 3,000 components are available in waveguide, coax, AIR-STRIP® and solid state —spanning frequency ranges from 1 GHz to 140 GHz.



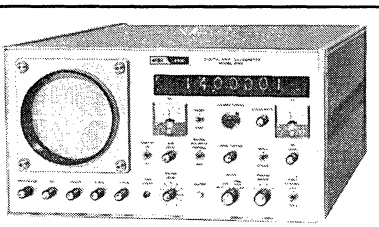
Curve Tracers. Two models priced at $750 and $1,760. S-D's self-powered 9550 tracer plugs into any X-Y scope. It draws 8 curves and offers all basic functions for full-range testing of two and three-terminal devices. Use it as a bench unit or as a plug-in to Tektronix 530, 540, and 550 series scopes.



Digital L-C Meter. The automatic digital readout of S-D's unique L-C meter saves hours of measuring time. Priced at $550, the instrument rapidly pays for itself. Model 9400 measures inductance from 0.1 μH to 100 mH and capacitance from 0.1 pF to 100 μF with an accuracy of ±1%.



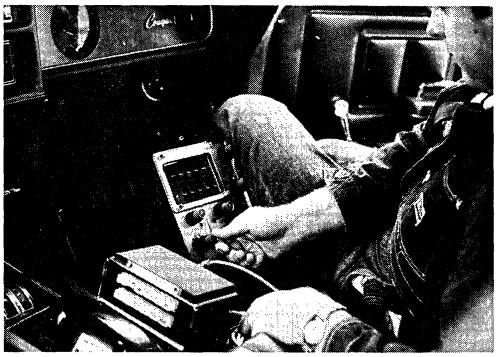
Digital Printers. The basic Model 5103 is a 5-column, asynchronous, 3-line/sec printer. It expands to a 21-column printer with 16 characters/column simply by adding economical 5-column plug-in boards. Any 4-line BCD code can be handled with a single IC socket change. Many other features, such as dual source operation, are standard. Price of basic 5103: $945.



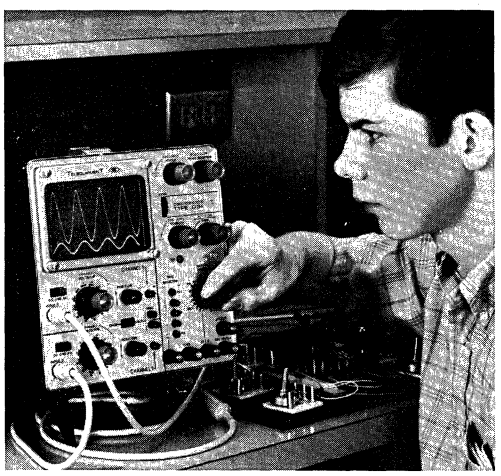
Gaussmeters, Magnets and Digital Voltage Calibrators. Alpha Scientific, a subsidiary of Systron-Donner Corporation, manufactures a complete line of NMR and Hall Effect gaussmeters, precision electromagnets for every application, magnetic susceptibility systems, and a broad range of 1 kilowatt to 3 megawatt power supplies. The Alpha M106 Precision Digital Voltage Source is a unique 0-1,000 VDC digital calibrator with 0.003% accuracy, 0.001% stability.

SYSTRON DONNER

Single Trace—Type S54A—$450



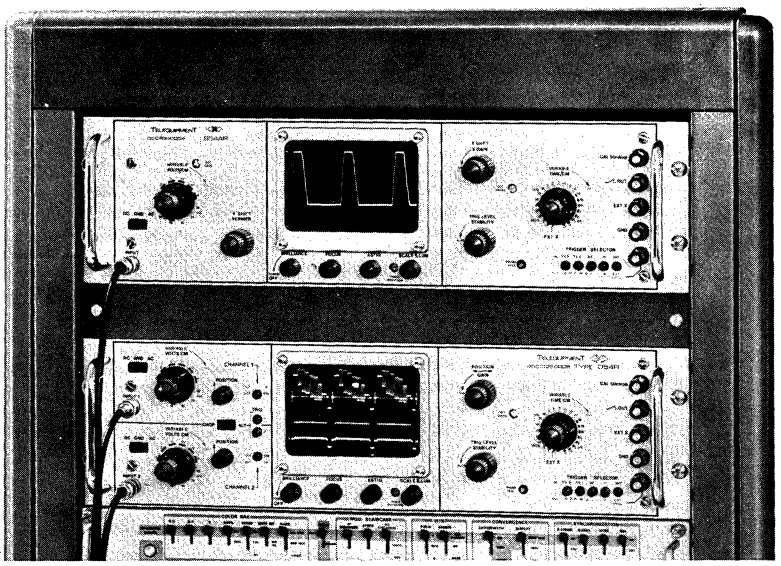
AC, DC Battery Powered—Single Trace—Type S54U—$715



Dual Trace—Type D54—$595

the world's most popular low-cost 10-MHz oscilloscopes

...the 54 series from Telequipment



5 1/4-Inch Rackmounts—Single Trace—Type S54AR—$495—Dual Trace—Type D54R—$640

- 10 mV/cm DEFLECTION FACTOR
- 200 ns/cm SWEEP RATE
- VERSATILE TRIGGERING
- BRIGHT TRACE
- FET INPUTS
- SOLID STATE

On your bench, in the field, or built into your system, if you require a 10-MHz oscilloscope, look no further. One of the 54 Series from Telequipment is designed to meet your needs.

Telequipment products are marketed and supported in the U.S. through the Tektronix network of 58 Field Offices and 30 Service Centers. The instruments are warranted against defective parts and workmanship for one year. A catalog with full specifications and prices is available on request. For a demonstration or more information, call your nearby Tektronix Field Engineer or write: Tektronix, Inc., P.O. Box 500, Beaverton, Oregon 97005.

U.S. Sales Prices FOB Beaverton, Oregon

TELEQUIPMENT®

..... a subsidiary of **TEKTRONIX®**

TRIPLETT CORPORATION, BLUFFTON, OHIO 45817
TEL: (419) 358-5015 TWX 810-490-2400

2¾ DIGIT V-O-M

MODEL 6028

(Patent Pending)

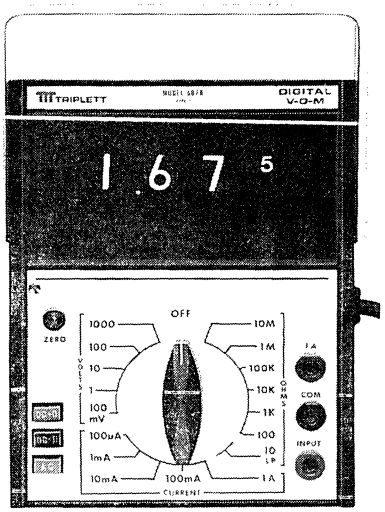
1 **2¾ DIGITS — Provides high accuracy with resolution to 500 microvolts.**

2 **10 OHMS TO 10 MEGOHMS FULL SCALE — 7 Ohms ranges with zero adjust to null lead resistance.**

3 **LOW CIRCUIT LOADING — Greater measurement accuracy with 10 megohm input resistance for all AC and DC voltage ranges.**

RANGES

DC Volts: 0-100 mV-1-10-100-1,000 V. Input resistance 10 megohms. Accuracy ±0.25% RDG ±½ digit (100 mV-1V) except ±0.35 RDG ±½ digit on 10-100 and 1,000 V ranges.
AC Volts: 0-100 mV-1-10-1,000 V. Input impedance 10 megohm. Accuracy ±0.5% RDG ±½ digit except ±0.75% RDG ±½ digit on 1,000 V range.
Ohms: 0-10-100-1k-10k-100k-1M-10M. Maximum voltage across resistor under test is 1V except 100 mV for 10 ohm range. Accuracy ±0.5 RDG ±½ digit except ±1% RDG ±½ digit on 10M range.
AC and DC Microamperes: 0-100 at 100 mV.
AC and DC Milliamperes: 0-1-10-100 at 100 mV.
AC and DC Amperes: 0-1 at 100 mV.
Current Accuracy: AC ±1% RDG ±½ digit; DC ±0.5% RDG ±½ digit except ±0.75% RDG ±½ digit on 1A range.



CONSTRUCTION

Out of Range Indication: All numbers displayed simultaneously.
Polarity Indication: Unipolar, soft glow with 0 half digit displayed indicates wrong polarity.
CMR: Greater than 80 dB with 1k ohm unbalance at 60 Hz.
NMR: Greater than 25 dB at 60 Hz.
Power Requirements: 105-125 V AC, 50/60 Hz, 4 Watts, or optional battery pack.
Temperature Operating Range: 0°C-40°C.
Case Dimension: 6½"h x 5⅛"w x 3⁹⁄₁₆"d.
Weight: Approximately 4 lbs.
Model 6028 Cat. No. G050 ..... **$275.00**

ACCESSORIES

Leather Carrying Case
High Voltage Probe
Rechargeable Battery Pack

3½ DIGIT V-O-M

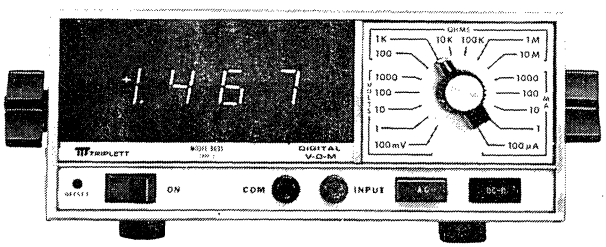
MODEL 8035

(Patent Pending)

1 **EASY OPERATION — Single polarized plug for test leads eliminates switching leads when changing functions.**

2 **LOW POWER CONSUMPTION — Less internal heating for greater stability and reliability.**

3 **LOW CIRCUIT LOADING — Greater measurement accuracy with 10 megohm input resistance for all AC and DC voltage ranges.**



RANGES

DC Volts: 0-100 mv-1-10-100-1,000 V. Input resistance 10 megohms. Accuracy ±0.1% RDG ±1 digit all ranges. Full scale step response is 2 seconds.

AC Volts: 0-100 mV-1-10-100-1,000 V. Input impedance 10 megohm, shunted by less than 50 pf. Accuracy ±0.2% RDG ±1 digit, 100 mV; ±0.3% RDG ±1 digit, 1 V-10 V; ±0.4% RDG ±1 digit, 100 V-1,000 V. Full scale step response is 3 seconds.

Ohms: 0-100-1K-10K-100K-1M-10M. Maximum voltage across resistor under test is 199.9 mV all ranges. Accuracy ±0.25% RDG ±1 digit all ranges except ±0.5% RDG ±1 digit for 1M and ±2% RDG ±1 digit on 10M range.

AC and DC Microamperes: 0-100 at 100 mV.

AC and DC Milliamperes: 0-1-10-100 at 100 mV.

AC and DC Amperes: 0-1 at 100 mV.

Current Accuracy: AC ±0.5% RDG ±1 digit all ranges; DC ±0.2% RDG ±1 digit all ranges except ±0.4% RDG ±1 digit on 1A range.

CONSTRUCTION

Out of Range Indication: Three least significant digits blank.

Polarity Indication: Auto-polarity for DC functions.

CMR: Greater than 80 dB with 1 kΩ unbalance at 60 Hz.

NMR: Greater than 30 dB at 60 Hz.

Power Requirements: 105-125 V AC, 50/60 Hz, 3 watts.

Temperature Operating Range: 0°C to 45°C.

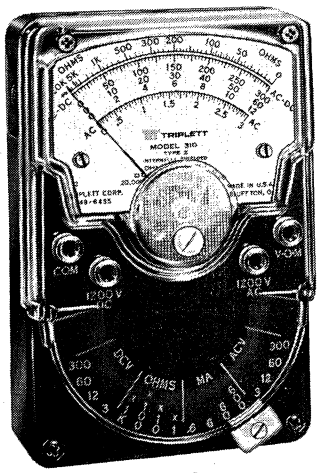
Case Dimensions: 3½"h x 8⅛"w x 10"d.

Weight: Approximately 4½ lbs.

Model 8035 Cat. No. G200 ..... **$385.00**

TRIPLETT CORPORATION, BLUFFTON, OHIO 45817
TEL: (419) 358-5015 TWX 810-490-2400

GENERAL MULTI-PURPOSE V-O-Ms



310

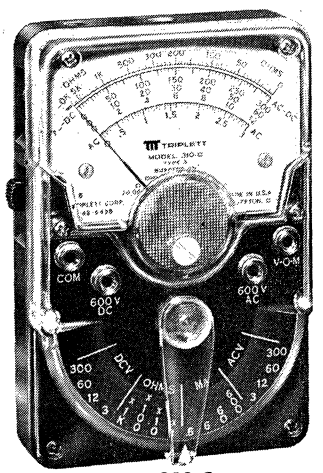
Volt-Ohm-Milliammeter MODEL 310 TYPE 2

1. **Hand-size V-O-M with diode overload protection.**
2. **20,000 ohms per volt DC and 5,000 ohms per volt AC.**
3. **Single range switch; provision for clamp-on AC ammeter.**

Self-shielded for checking in strong magnetic fields.
Rugged, high torque, bar-ring instrument.
Unbreakable plastic meter window.
Fitting interchangeable test prod into top of tester makes it the common probe, freeing one hand.
Standard sensitivity 20,000 ohms per volt DC, and 5,000 ohms per volt AC.
Spring-backed instrument jewels for ruggedness.
Accuracy 3% DC, 4% AC.

RANGES

DC Volts: 0-3-12-60-300-1,200 (20,000 Ohms per Volt).
AC Volts: 0-3-12-60-300-1,200 (5,000 Ohms per Volt).
Ohms: 0-20k-200k-2MΩ-20MΩ.
DC Microamperes: 0-600 at 250 mV.
DC Milliamperes: 0-6-60-600 at 250 mV.
Case—Molded, black, 2¾" x 4¼" x 1 5/16".
Batteries: NEDA #910, 220.
Complete with leads, battery and instruction manual. Shipping wt. 2 lbs.
Model 310 Cat. No. 3018 **$46.00**



310-C

MODEL 310-C TYPE 3

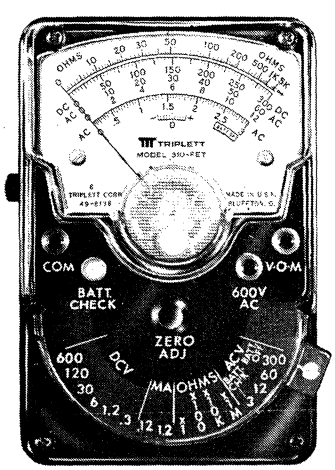
New 310-C is the same as Model 310, above, (except 600 volt ranges replace 1200 volt ranges of model 310) plus the following features: (suspension meter).

1. **Hand-size V-O-M with diode overload-protected suspension movement.**
2. **20,000 ohms per volt DC and 15,000 ohms per volt AC.**
3. **Single range switch minimizes error; DC polarity-reversing switch.**

Model 310-C Cat. No. 3022 **$59.00**

ACCESSORIES FOR MODEL 310's

Model 10. Clamp-on AC ammeter	(Model 310, 310FET)	Cat. No. 60-211	**$21.00**
Ranges: 0-6-12-30-120-300	(Model 310-C)	Cat. No. 60-210	**$21.00**
Model 101. Line Separator Divides 2 conductor cords and increases Model 10 sensitivity 10X and 20X		Cat. No. 60-218	**$ 8.40**
Model 311. Long lead to separate Model 10 from 310 unit for easy reading in awkward spots.		Cat. No. 79-161	**$3.60**
Model 379. Carrying case for Model 310 and Model 10 in combination		Cat. No. 10-1456	**$ 8.80**
Model 369. Carrying case for Model 310's		Cat. No. 10-1258	**$ 4.60**
Model 369-S. Carrying case for Model 310's, front opens permitting use of tester in case		Cat. No. 10-1791	**$11.00**



310-FET

HANDSIZE FET V-O-M

MODEL 310-FET

1. **Hand-size FET V-O-M with 10 megohm DC input resistance.**
2. **Low voltage range of 300 mV DC; X1 megohm range.**
3. **Single range switch; DC polarity-reversing switch.**

Resistance measurements to 5,000 Megohms. Open Ckt. voltage 1.5V on all ranges. Max. short ckt. current 30mA. Max. pwr. across device under test 11 mW. Rugged Suspension Movement. Accuracy is ±3% of full scale on DC, and ±4% on AC. ±3% of DC arc on Ohms. High Sensitivity (300 mV fs DC) allows transistor bias measurements. Zero center mark for null measurements. Polarity reversing switch for DC and ohms.

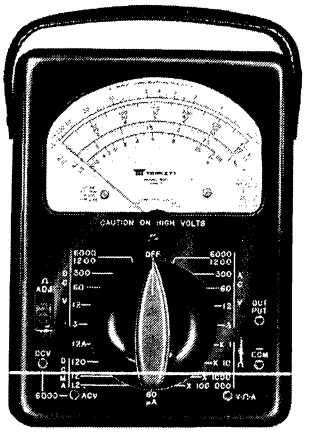
RANGES

DC Volts: 0-0.3-1.2-6-30-120-600. Input resistance 10 megohms.
AC Volts: 0-3-12-60-300-600 (5,000 Ohms per Volt).
Ohms: 0-5k-500k-50MΩ-5,000MΩ (50 Ohm center scale on low range).
DC Milliamperes: 0-0.12-1.2 at 300 mV.
Case: Molded, black, measures 2¾" x 4¼" x 1⅛". .42" leads.
Battery operated, 7V NEDA #1501, 1½V ASA Type N. Battery check on selector switch.
Model 310-FET, complete with leads, instruction manual and batteries.
Cat. No. 3027. **$78.00**
Model 100-FET Cat. No. 3013 **$115.00**

TRIPLETT CORPORATION, BLUFFTON, OHIO 45817
TEL: (419) 358-5015 TWX 810-490-2400

GENERAL MULTI-PURPOSE V-O-Ms

Volt-Ohm-Milliammeter MODEL 630 TYPE 2



1. **Diode overload-protected V-O-M; single range switch minimizes error.**
2. **4 ohmmeter ranges with 4.4 ohms center scale.**
3. **Simplified scale—only 4 arcs for all 27 ranges.**

Popular streamlined tester with long meter scales arranged for easy reading. Outstanding resistance ranges: low reading .1 ohm, high 100 megs. Fuse affords protection to the resistors in the ohmmeter circuit, especially the X1 setting.
Spring-backed instrument jewels for ruggedness. Accuracy ±2% DC, ±3% AC. Meter movement diode protected against instantaneous overloads.

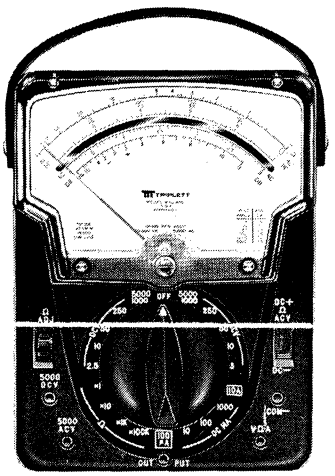
RANGES

DC Volts: 0-3-12-60-300-1,200-6,000 (20,000 Ohms per Volt).
AC Volts: 0-3-12-60-300-1,200-6,000 (5,000 Ohms per Volt).
Ohms: 0-1k-10k-1MΩ-100MΩ (4.4 Ohm center scale on low range).
DC Microamperes: 0-60 at 250 mV.
DC Milliamperes: 0-1.2-12-120 at 250 mV.
DC Amperes: 0-12.
Decibels: −20 to +51 ("0" dB at 1 mW on 600 Ohm line).
Output Volts (AC): 0-3-12-60-300 (5,000 Ohms per Volt).

Case—Molded, black, 3-7/32" x 5½" x 7½". Batteries: NEDA #210, 13F.
Complete with leads, alligator clips, rubber feet, batteries and instruction manual. Shipping wt. 5 lbs.
Model 630 Cat. No. 3030 **$67.00**

Model 630-A. Laboratory version of Model 630 V-O-M above. Has same ranges and sensitivity but comes equipped with mirror scale, knife-edge pointer, suspension movement and accuracy of ±1½% DC and ±3% AC. **Model 630-A** Cat. No. 3034 **$79.00**

Volt-Ohm-Milliammeter MODEL 630-APL TYPE 3



1. **Accuracy 1½% DC and 3% AC; mirrored scale: diode overload-protected suspension movement.**
2. **27 range V-O-M with single range switch minimizes error; DC polarity reversing switch.**
3. **4 ohmmeter ranges with 4.4 ohms center scale.**

A laboratory type Volt-Ohm-Milliammeter with mirrored scale and suspension type movement. Greater accuracy made possible through the use of special ½% resistors. Accuracy ±1½% DC, ±3% AC. High sensitivity: 20,000 ohms per volt DC; 5,000 ohms per volt AC. Polarity reversing switch. Tester usable with frequencies through 500 KHz.

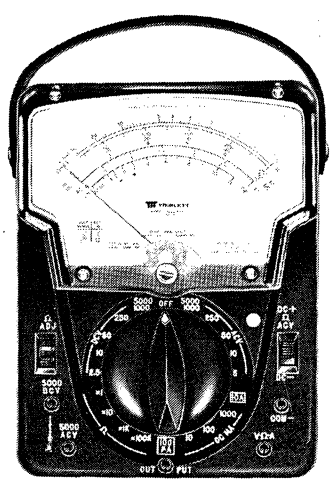
RANGES

DC Volts: 0-2.5-10-50-250-1,000-5,000 (20,000 Ohms per Volt); 0-0.25 at 100 μA.
AC Volts: 0-3-10-50-250-1,000-5,000 (5,000 Ohms per Volt).
Ohms: 0-1k-10k-1MΩ-100MΩ (4.4 Ohm center scale on low range).
DC Microamperes: 0-100 at 250 mV.
DC Milliamperes: 0-10-100-1,000 at 250 mV.
DC Amperes: 0-10 at 250 mV.
Decibels: −20 to +49 ("0" dB at 1 mW on 600 Ohm line).
Output Volts (AC): 0-3-10-50-250 (5,000 Ohms per Volt).

Case: Molded, black, 3-11/32" x 5½" x 7½". Batteries: NEDA #210, 13F.
Complete with leads, alligator clips, rubber feet, batteries and instruction manual. Shipping wt. 5 lbs.
Model 630-APL Cat. No. 3038 **$79.00**

Model 630-PL. A general purpose version of Model 630-APL above. Has same ranges and sensitivity but comes without mirror scale, knife-edge pointer and suspension movement and with accuracy of ±2% DC and ±3% AC. **Model 630-PL** Cat. No. 3050 **$67.00**

Volt-Ohm-Milliammeter MODEL 630-PLK TYPE 3



1. **Burnout-proof solid-state overload protection.**
2. **Single range switch minimizes error; DC polarity-reversing switch.**
3. **4 ohmmeter ranges with 4.4 ohms center scale.**

Transistorized electronic switching circuit (exclusive patent) guards against accidental burn-outs. Now you can virtually eliminate bent pointers, burned-out resistors, damaged pivots, overheated springs, burned-out coils, changes in accuracy due to overheating, in fact nearly any need for repairs. Life of transistor circuit battery is nearly that of shelf life. Automatically checked by using X100K ohms range. Overload protection on meter in addition to transistorized circuit that protects tester.
Accuracy ±2% on DC, ±3% AC. High sensitivity: 20,000 Ω/V DC; 5,000 Ω/V AC. Shipping weight 5 lbs.

RANGES

DC Volts: 0-2.5-10-50-250-1,000-5,000 (20,000 Ohms per Volt); 0-0.25 at 100 uA.
AC Volts: 0-3-10-50-250-1,000-5,000 (5,000 Ohms per Volt).
Ohms: 0-1k-10k-1MΩ-100MΩ (4.4 Ohm center scale on low range).
DC Microamperes: 0-100 at 250 mV.
DC Milliamperes: 0-10-100-1,000 at 250 mV.
DC Amperes: 0-10 at 250 mV.
Decibels: −20 to +49 ("0" dB at 1 mW on 600 Ohm line).
Output Volts (AC): 0-3-10-50-250 (5,000 Ohms per Volt).

Case: Molded, black, 3-11/32" x 5½" x 7½". Batteries: NEDA #210, 13F.
Complete with leads, alligator clips, rubber feet, batteries and instruction manual. Shipping wt. 5 lbs.
Model 630-PLK Cat. No. 3055 **$103.00**

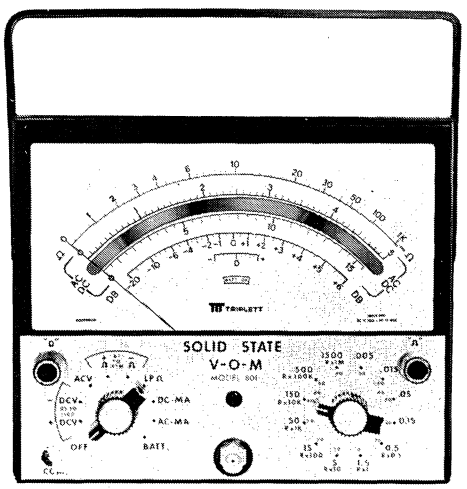
Model 630-APLK. Laboratory version of Model 630-PLK V-O-M above. Has same ranges, sensitivity and burnout proof solid-state overload protection but comes equipped with mirror scale, knife-edge pointer, suspension movement and accuracy of ±1½% DC and ±3% AC. **Model 630-APLK** Cat. No. 3120 **$116.00**

TRIPLETT TEL: (419) 358-5015 TWX 810-490-2400
CORPORATION, BLUFFTON, OHIO 45817

FET V-O-M with LOW POWER OHMS

MODEL 801

1. **Low power ohms—8 ranges with 35 mV power source and 1 ohm center scale.**
2. **High sensitivity—5 mV AC full scale at 10 megohm input impedance; 50 mV DC at 11 megohm input resistance.**
3. **Simplified scale—8" meter with only 4 arcs for all 73 ranges.**



Designed to be one of the most useful instruments in the electronics lab and electronics field service, the Model 801 V-O-M offers 73 measurement ranges embracing a very broad span of measurements at accuracies to please the most exacting user. Featured are: 15 resistance ranges including 8 low-power ranges applying only 35 mV to the device under test; common AC and DC scales to simplify meter dial; low ranges reading 100 Ohms, 0.005 V AC, 0.05 V DC and 5 μA AC and DC full scale; rugged 8", 25 μA suspension meter. Low-power resistance ranges are ideal for in-circuit checking of ICs, transistors and other solid-state components . . . permit measurements without triggering amplifying and semi-conducting devices. Accuracy: ±2% on all DC voltage ranges except 1500 V ±3%; ±3% on all AC voltage ranges and DC current ranges; ±4% on AC current ranges; ±3% of DC V arc on all resistance ranges. AC ranges for frequencies from 50 Hz to 50 KHz.

RANGES

DC Volts: 0-0.05-0.15-0.5-1.5-5-15-50-150-500-1,500. Input resistance 11 megohms with 1 megohm series resistor in probe tip. Includes 40 dB 60 Hz rejection.

AC Volts: 0-0.005-0.05-0.15-0.5-1.5-5-15-50-150-500-1,500. Input impedance 10 megohms. Frequency range 50 Hz to 50 kHz. Capacitance at input jack 60 mm fd max.

Ohms—Low-power: 0-100-1k-10k-100k-1MΩ-10MΩ-100M Ω-1,000MΩ (35 mV and 1 Ohm center scale on low range).

Ohms—Conventional: 0-1k-10k-100k-1MΩ-10MΩ-100MΩ-1,000M Ω (1.5V and 10 Ohm center scale on low range).

AC and DC Microamperes: 0-5-15-50-150-500 at 45 mV.

AC and DC Milliamperes: 0-1.5-5-15-50-150-500 at 45 mV.

AC and DC Amperes: 0-1.5 at 45 mV (Optional external shunt for 0-15A measurements).

Decibels: −70 to +66 ("0" dB is equal to .775 V).

Case: Molded, black, high-impact material with metal handle that can be used to support instrument at approximately 25° angle; etched aluminum panel; 8"x7"x5".

Batteries: 3-4½ V mercury or alkaline; 1-1½ V "D" cell.

Model 801, complete with leads, alligator clips, batteries and instruction manual. Cat. No. 3071 **$210.00**

High Voltage Probe 50 KV Cat. No. 79-292 **$26.50**

RF Probe 250 MHz/20 V Cat. No. 79-289 **$10.00**

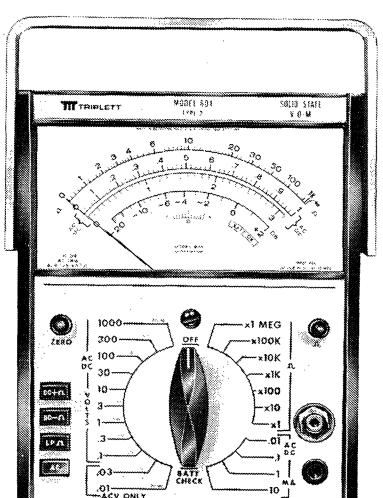
Leather Case Cat. No. 10-2467 **$32.50**

15 Ampere Shunt Adapter Cat. No. 91-620 **$10.50**

FET V-O-M with LOW POWER OHMS

MODEL 601

1. **Low power ohms—7 ranges with 75 mV power source.**
2. **High sensitivity—10 mV AC full scale at 10 megohm input impedance; 100 mV DC at 11 megohm input resistance.**
3. **Simplified scale—only 4 arcs for all 53 ranges.**



Single range selector switch, easy to use. Large 4½" Suspension meter movement. Special Low-Power Ohms circuit has only 0.1 mW of power, permits in-circuit resistance measurements in solid state circuitry. Simple to read uncluttered dial provides quick readings using only four scales for all 52 ranges. 11 Megohm input resistance on all voltage ranges. AC and DC current ranges never before available on a similar unit. Accuracy is ±2% of Full Scale on DC, ±3% AC, (Current, ±3% and ±4%).
Usable with frequencies from 50 Hz to 50KHz.

RANGES

DC Volts: 0-0.1-0.3-1-3-10-30-100-300-1,000. Input resistance 11 megohms with 690k series resistor in probe tip. Includes 40 dB 60 Hz rejection.

AC Volts: 0-0.01-0.03-0.1-0.3-1-3-10-30-100-300-1,000. Input impedance 10 megohms. Frequency range 50 Hz to 50 kHz. Capacitance at input jack 60 mm fd max.

Ohms—Low-Power: 0-1k-10k-100k-1MΩ-10MΩ-100MΩ-1,000MΩ (75 mV and 10 Ohm center scale on low range).

Ohms—Conventional: 0-1k-10k-100k-1MΩ-10MΩ-100MΩ-1,000MΩ (1.5V and 10 Ohm center scale on low range).

AC and DC Milliamperes: 0-0.01-0.1-1-10 at 100 mV.

Decibels: −60 to +62 ("0" dB is equal to .775V).

Case: Molded, black high impact material, $3\frac{3}{16}$" x 5⅛" x 6½".

Batteries: 10 "AA" cells NEDA #15A. Complete with leads, alligator clips, batteries, instruction manual with complete calibration instructions. Shipping weight 5 lbs.

Model 601 Cat. No. 3033 **$166.00**

High Voltage Probe, 30 kV, Cat. No. 79-270 **$27.80**

RF Probe, 250 MHz/50 V, Cat. No. 79-271 **$10.00**

Leather Case, Cat. No. 10-1793 **$16.20**

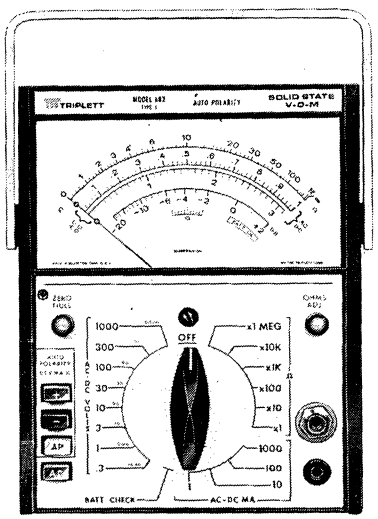
TRIPLETT CORPORATION, BLUFFTON, OHIO 45817
TEL: (419) 358-5015 TWX 810-490-2400

FET V-O-M with AUTO-POLARITY

MODEL 602

1. **FET V-O-M with Auto-Polarity—convenient and time saving.**
2. **Low voltage range of 300 mV; 10 megohm AC input impedance and 11 megohm DC input resistance.**
3. **Simplified scale—only 4 arcs for all 38 ranges.**

Designed to speed testing by reading upscale regardless of circuit polarity, yet handy push-buttons allow selection and determination of polarity when required. 0.3 V full scale in lowest range on both AC and DC. Tester offers 38 ranges, but 24 AC/DC ranges are read from only two arcs on 4½" meter to keep dial clean and readable. Input amplifier incorporates a high degree of feedback so both AC and DC meter tracking scales are linear. In Auto-Polarity mode, instrument is not adjusted for zero, but for zero or lowest null. This means zero adjustment can be made from virtually any angle without introducing a parallax error. 50 μA suspension-type meter movement absorbs shocks and jars that would disable ordinary meters. Accuracy: ±3% on all Voltage ranges except 1000V ±4%; ±4% on all current ranges; ±3% of DCV arc on resistance. AC ranges for frequencies from 50 Hz to 50 KHz.



RANGES

DC Volts: 0-0.3-1-3-10-30-100-300-1,000. Input resistance 11.12 megohms with 1.12 Meg in Probe.

AC Volts: 0-0.3-1-3-10-30-100-300-1,000. Input impedance 10 megohms. Frequency range 50 Hz to 50 kHz.

Ohms: 0-1k-10k-100k-1MΩ-10MΩ-1,000MΩ (10 Ohms center scale on low range).

AC and DC Milliamperes: 0-1-10-100-1,000 at 300 mV.

Decibels: −30 to +62 ("0" dB is equal to .776V).

Case: Molded, black, high-impact material with metal handle that can be used to support instrument at approximately 25° angle. 5⅛" x 6½" x 3$\frac{3}{16}$".

Batteries: 2-9V NEDA 1604; 1-1½ V "D" cell.

Model 602, complete with leads, alligator clips, batteries and instruction manual. Cat. No. 3036 **$105.00**

High Voltage Probe 30 KV Cat. No. 79-270 **$27.80**

RF Probe 250 MHz/20V Cat. No. 79-264 **$10.00**

Leather Case Cat. No. 10-1793 **$16.20**

ELECTRONIC VOLT-OMMETER

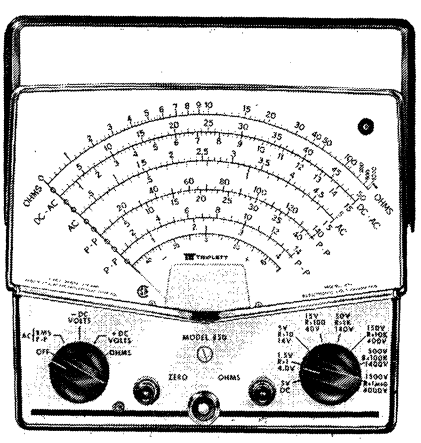
MODEL 850

1. **8" meter with six scales for easy readability.**
2. **29-range VTVM with 11 megohm DC input resistance.**
3. **Color-coded scales for peak-to-peak measurements.**

Among its outstanding features:

ELECTRICAL PROTECTION of meter against burnout. SEPARATE SCALE on easy-view meter for Peak-to-peak readings. SINGLE UNIT PROBE — with built-in switch for AC/DC/OHMS. Line voltage: 115 VAC 50-60 cycles. Ground type plug. Spring-backed instrument jewels for ruggedness.

Accurate within ±3% on AC and DC. Ohms accurate within ±3% of full scale based on DC scale.



RANGES

DC Volts: 0-0.5-1.5-15-50-150-500-1,500 (Input resistance 11 megohms).

AC RMS Volts: 0-1.5-5-15-50-150-500-1,500 (Input impedance minimum 0.83 megohms).

Peak-to-Peak Volts: 0-4-14-40-140-400-1,400-4,000.

Ohms: 0-1k-10k-100k-1MΩ-10MΩ-100MΩ-1,000MΩ (10 Ohm center scale on low range).

Frequency: 15 Hz to 3 MHz (Optional accessory diode probe for 0-250 MHz measurements).

Case: Molded black case, 7⅝" x 6$\frac{7}{16}$ x 3¾". Carrying handle also can be used to place the tester at 25° angle for ease in reading. Shipping wt. 7 lbs.

Panel: Etched aluminum.

Model 850 Cat. No. 3074 **$103.00**

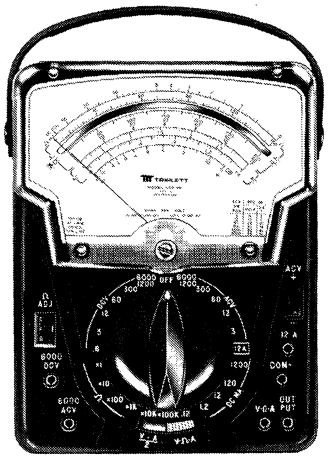
Model 850 (Foreign — 220V, 50 to 60 Hz.) Cat. No. 3075 **$110.00**

Auxiliary Diode Probe for voltages to 20 volts with frequencies to 250 MHz. Cat. No. 79-215 **$10.00**

High Voltage Probe for DC voltages to 50 KV. Cat. No. 79-196 **$27.83**

TRIPLETT CORPORATION, BLUFFTON, OHIO 45817
TEL: (419) 358-5015 TWX 810-490-2400

LABORATORY ACCURACY V-O-Ms



Volt-Ohm-Milliammeter MODEL 630-NS TYPE 2

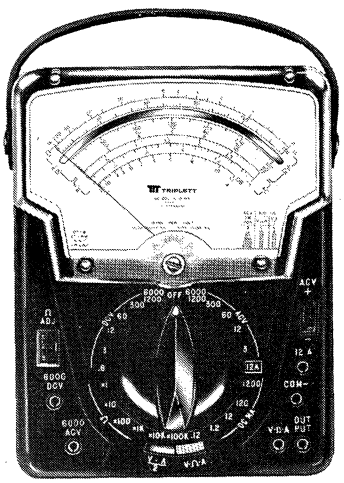
1. **V-O-M with 200,000 ohms per volt DC and 20,000 ohms per volt AC; accuracy 1½% DC and 3% AC.**
2. **5μA suspension movement with diode overload protection; mirrored scale.**
3. **62 ranges with single range switch and DC polarity-reversing switch.**

The unit is precision designed to give maximum coverage, to withstand accidental overloads and to offer greater reading accuracy. Usable with frequencies through 100 kHz. Accuracy 1½% DC, 3% AC.

RANGES

DC Volts: 0-0.6-3-12-60-300-1,200 (100,000 Ohms per Volt).
0-0.3-1.5-6-30-150-600 (200,000 Ohms per Volt).
0-0.150 at 60 microamperes.
AC Volts: 0-3-12-60-300-1,200 (10,000 Ohms per Volt).
0-1.5-6-30-150-600 (20,000 Ohms per Volts).
Ohms: 0-1k-10k-100k-1MΩ-10MΩ-100MΩ (4.4 Ohm center scale on low range).
DC Microamperes: 0-60-600 at 150 mV; 0-5-120 at 300 mV.
DC Milliamperes: 0-6-60-600 at 150 mV; 0-1.2-12-120-1,200 at 300 mV.
DC Amperes: 0-6 at 150 mV; 0-12 at 300 mV.
Decibels: −26 to +51 ("0" dB at 1mW on 600 Ohm line).
Output Volts (AC): 0-3-12-60-300 (10,000 Ohms per Volt).
0-1.5-6-30-150 (20,000 Ohms per Volt).

Case—Molded, black, 3-11/32" x 5½" x 7½". Shipping wt. 5 lbs. Batteries: NEDA #815, 13F.
Model 630-NS Cat. No. 3102 **$122.00**



Volt-Ohm-Milliammeter MODEL 630-NA TYPE 3

Suspension Movement

1. **70-range V-O-M with single range switch and DC polarity-reversing switch.**
2. **Accuracy 1½% DC and 3% AC; mirrored scale.**
3. **Diode overload-protected suspension movement; temperature compensation.**

The super deluxe of V-O-Ms. Usable with frequencies through 500 kHz.
Large open front meter easy to read.
Unbreakable window. Mirror scale.
Meter has special diode protection against the most severe overloads. A fuse affords protection to resistors in the ohmmeter circuit (especially the X1 setting) should too high a voltage be applied. Accuracy 1½% DC, 3% AC.

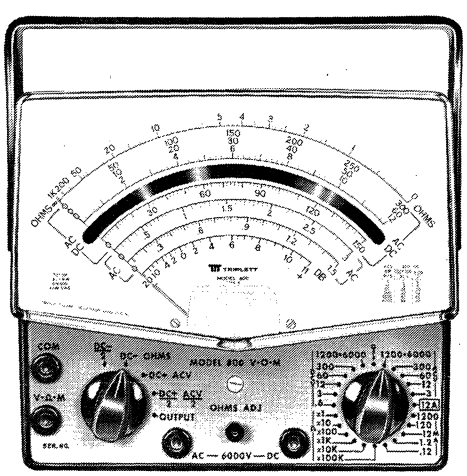
RANGES

DC Volts: 0-0.6-3-12-60-300-1,200-6,000 (10,000 Ohms per Volt).
0-0.3-1.5-6-30-150-600-3,000 (20,000 Ohms per Volt).
0-0.120 at 60 microamperes; 0-0.240 at 120 microamperes.
AC Volts: 0-3-12-60-300-1,200-6,000 (5,000 Ohms per Volt).
0-1.5-6-30-150-600-3,000 (10,000 Ohms per Volt).
Ohms: 0-1k-10k-100k-1MΩ-10MΩ-100MΩ (4.4 Ohm center scale on low range).
DC Microamperes: 0-60-600 at 120 mV; 0-120 at 240 mV.
DC Milliamperes: 0-6-60-600 at 120 mV; 0-1.2-12-120-1,200 at 240 mV.
DC Amperes: 0-6 at 120 mV; 0-12 at 240 mV.
Decibels: −26 to +51 ("0" dB at 1 mW on 600 Ohm line).
Output Volts (AC): 0-3-12-60-300 (5,000 Ohms per Volt). 0-1.5-6-30-150 (10,000 Ohms per Volt).

Case—Molded, black, 3-11/32" x 5½" x 7½". Batteries: NEDA #210, 13F.
Complete with leads, alligator clips, rubber feet, batteries and instruction manual. Shipping wt. 5 lbs.
Model 630-NA Cat. No. 3042 **$103.00**

DELUXE LAB STYLE

Volt-Ohm-Milliammeter MODEL 800 TYPE 2



1. **8" suspension meter with diode overload protection.**
2. **70-range V-O-M with DC polarity reversing.**
3. **Accuracy 1½% DC and 3% AC; temperature compensation; mirrored scale.**

No other V-O-M offers all the Deluxe features of the Model 800. 3% AC ACCURACY to 1200 volts; mirror and knife-edge pointer to eliminate parallax; USABLE with frequencies to 100 kHz; WIRED CIRCUIT, HIGH FLUX BAR-RING self-shielded magnet; DUAL SENSITIVITY provides extra ranges, DC volts at 20,000 and 10,000 ohms per volt, AC at 10,000 and 5,000 ohms per volt. Shatterproof meter window, molded transparent plastic; fully antistat treated.

RANGES

DC Volts: 0-0.6-3-12-60-300-1,200-6,000 (10,000 Ohms per Volt).
0-0.3-1.5-6-30-150-600-3,000 (20,000 Ohms per Volt).
0-0.120 at 60 microamperes.
AC Volts: 0-3-12-60-300-1,200-6,000 (5,000 Ohms per Volt).
0-1.5-6-30-150-600-3,000 (10,000 Ohms per Volt).
Ohms: 0-1k-10k-100k-1MΩ-10MΩ-100MΩ (4.4 Ohm center scale on low range).
DC Microamperes: 0-60-600 at 120 mV; 0-120 at 240 mV.
DC Milliamperes: 0-6-60-600 at 120 mV; 0-1.2-12-120-1,200 at 240 mV.
DC Amperes: 0-6 at 120 mV; 0-12 at 240 mV.
Decibels: −26 to +51 ("0" dB at 1 mW on 600 Ohm line).
Output Volts (AC): 0-3-12-60-300 (5,000 Ohms per Volt).
0-1.5-6-30-150 (10,000 Ohms per Volt).

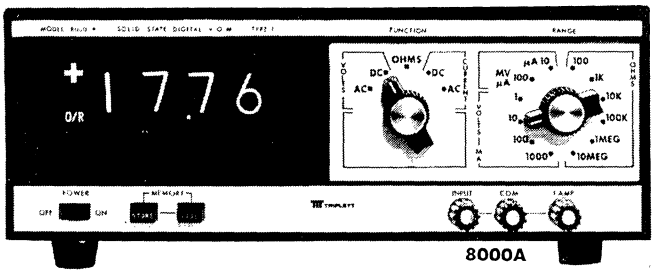
Case—Heavy, molded black case, 7½" x 6¼" x 3⅞", with movable handle, which can also serve as a tester stand. Shipping wt. 7 lbs.
Model 800 Cat. No. 3070 **$122.00**

TRIPLETT CORPORATION, BLUFFTON, OHIO 45817
TEL: (419) 358-5015 TWX 810-490-2400

LABORATORY ACCURACY V-O-Ms

Digital Volt-Ohm-Milliammeter MODEL 8000A

1. **28-range D-V-O-M with instant-replay memory circuit.**
2. **10 megohm AC input impedance and 10 megohm DC input resistance; low voltage range 100 mV AC and DC.**
3. **Accuracy 0.1% DC and 0.2% AC to 50% overrange.**



8000A

Recognizing that the kickback current which occurs in every other digital V-O-M seriously affects accuracy in voltage measurements in high resistance circuits, Triplett has virtually eliminated that deficiency through the use of a new circuit (patent pending). The result . . . the Model 8000A Digital V-O-M delivers "true accuracy," up to 50% overrange, test-after-test on any kind of circuit. Also featuring automatic zeroing, 38 measurement ranges, protective circuitry that prevents damage when up to 1000 V AC or DC is applied on any voltage range, and an instant replay circuit that displays a previously-stored reading for on-demand comparison with a current reading. Ohmmeter voltage for full-scale measurement on any range is on 0.1 V DC.

RANGES

DC Volts: 0-0.1-1-10-100-1,000. Input resistance 10 megohms. Accuracy ±0.1% of reading ±1 digit.

AC Volts: 0-0.1-1-10-100-1,000. Input impedance 10 megohms. Accuracy ±0.2% of reading ±1 digit except ±0.3% of reading ±1 digit on 100 V range and 0.5% at 1000 V.

Ohms: 0-100-1k-10k-100k-1MΩ-10MΩ. Maximum applied voltage for f.s. reading is 0.1 V DC on any range . . . proportionately less for other than f.s. measurements. Accuracy ±0.2% of reading ±1 digit except ±0.3% of reading ±1 digit on 1MΩ and 10MΩ ranges.

AC and DC Microamperes: 0-10 at 100 mV.

AC and DC Milliamperes: 0-0.1-1-10-100 at 100 mV.

AC and DC Amperes: 0-1 at 100 mV. Current accuracy ±0.2% of reading ±1 digit on DC, ±0.4% of reading ±1 digit on AC.

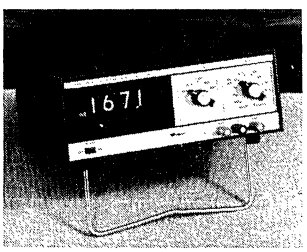
Case: All-steel case and internal module covers provide strength and electrical shielding. Etched aluminum panel for long wear. Self-contained stand may be used to elevate the panel approximately 25° for easy viewing. Weight is approximately 9¼ pounds.

Power Requirements: 115 ±10 V AC at 50/60 Hz -12 W. 230 ±20 V AC available on request.

Complete with leads, alligator clips and instruction manual with calibration instructions.

Model 8000-A with Memory Cat. No. G150 **$662.00**

Model 8000 without Memory Cat. No. G100 **$604.00**



8000

INDUSTRIAL MAINTENANCE ANALYZER

MODEL 990

1. **Industrial analyzer . . . measures AC/DC Volts, Ohms, AC/DC current, temperature, dB and rpm.**
2. **Burn-out proof, solid-state overload protection; DC polarity-reversing switch.**
3. **V-O-M (AC/DC) complete in one carrying case with all accessories.**

Triplett's Model 990 Industrial Maintenance Analyzer, offers a truly unique measurement capability. It's a V-O-M/clamp-on ammeter/tachometer/thermometer.

The entire Industrial Maintenance Analyzer includes Triplett's patented burn-out proof Model 900 V-O-M, Model 10 Clamp-On AC Ammeter Adapter, Model 101 Line Separator, Model 901 Tachometer-Generator, Temperature Probe, 100A DC Shunt, No. 611 Leads and a rugged carrying case. Model 900 V-O-M accuracy ±2% DC and ±3% AC. Model 901 Tachometer-Generator accuracy ±2%. Temperature probe accuracy ±2°F.

RANGES

DC Volts: 0-2.5-10-50-250-1,000-5,000 (20,000 Ohms per Volt); 0-0.25 at 100 μA.

AC Volts: 0-3-10-50-250-1,000-5,000 (5,000 Ohms per Volt).

Ohms: 0-1k-10k-1MΩ-100MΩ (4.4 Ohm center scale on low range).

DC Microamperes: 0-100 at 250 mV.

DC Milliamperes: 0-10-100 at 250 mv; 0-1,000 at 400 mV.

DC Amperes: 0-10 at 600 mV; 0-100 at 250 mV (accessory shunt).

AC Amperes: 0-6-12-30-60-120-300 (accessory adapter).

Decibels: −20 to +49 ("0" dB at 1 mW on 600 Ohm line).

Output Volts (AC): 0-3-10-50-250 (5,000 Ohms per Volt).

Temperature: −50°F to +100°F; +40°F to +300°F.

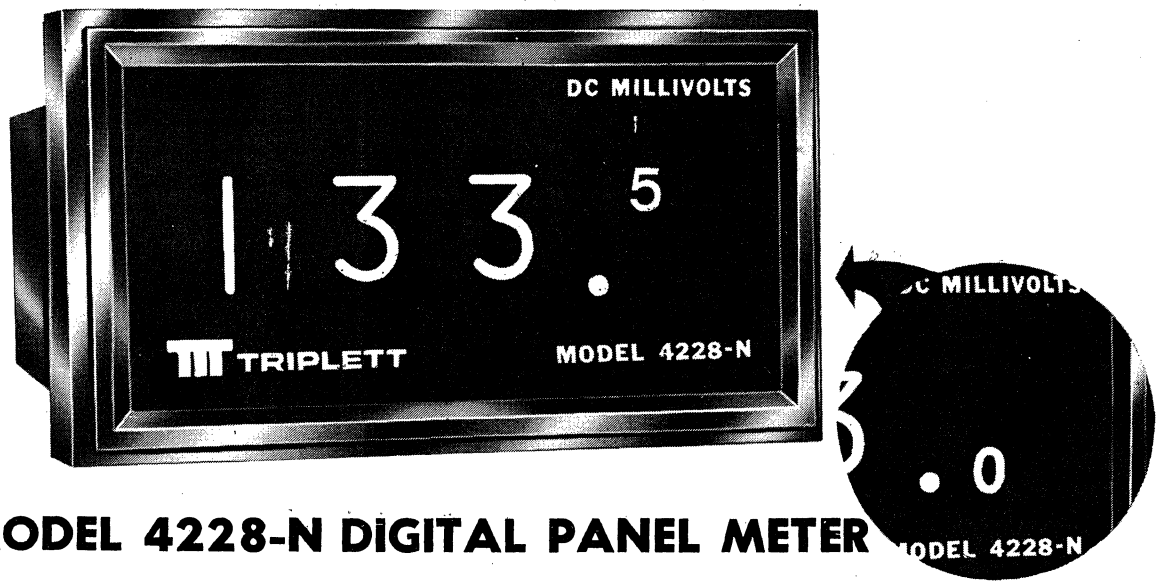
RPM: 0-500-5,000.

Model 900 Case: Molded, black, 3 11/32" x 5½" x 7½". Batteries: NEDA #210, 13F.

Complete with leads, alligator clips, rubber feet, batteries and instruction manual. Shipping wt. 10 lbs.

Model 990 Cat. No. 3115 **$221.00**

TRIPLETT CORPORATION, BLUFFTON, OHIO 45817
TEL: (419) 358-5015 TWX 810-490-2400



MODEL 4228-N DIGITAL PANEL METER

1 **2¾ Digits—Provides double the accuracy, (.25% of reading ± ½ digit) and double the resolution at lower cost.**

2 **INSTANTANEOUS RESPONSE—16 millisecond display rate with 60 times per second sampling rate.**

3 **FOOL PROOF READINGS—Numeral display cannot be read if test measurements are beyond range or of negative polarity.**

The Triplett Model 4228-N is a new, lower cost 2¾ digit instrument designed for the OEM market as well as for use in production and general testing, servicing and educational applications. It has indicating capabilities to 1995.

The Model 4228-N employs an analog to digital converter of the single ramp type, with the ramp being generated through the summing of BCD output signals. This is one of the most accurate methods used for analog to digital conversion. The unique "2¾ digit" concept (patent pending) provides you with double the accuracy and resolution by reading to the nearest half digit.

Other important features are:

- Neon lamps indicating "1" and the half digits 0 and 5.
- Low power drain (2 watts).
- Small compact size.
- Sampling rate 60 times per second.
- Display response time 16 millisecond (0.016 second).
- Over-range input indicated by simultaneous display of all numbers.
- Negative polarity indicated by soft blurred display.
- BCD output as optional extra ($30.00); code: 1 2 4 8
- Higher input resistance available on special order.
- Normal mode rejection variable with external capacitor.
- May be mounted from front or rear of panel.
- Molded case.

MODEL 4228-N SPECIFICATIONS

DC VOLTS

Range	Catalog No.	Input Resistance	Max. Voltage
0-199.5 mV	F89-14-01	1 K Ohm	10 V
0-1.995 V	F89-14-02	10 K Ohm	50 V
0-19.95 V	F89-14-03	100 K Ohm	150 V
0-199.5 V	F89-14-04	1 megOhm	500 V
0-1000 V	F89-14-05	10 megOhm	1000 V

DC CURRENT

Range	Catalog No.	Shunt Resistance	Max. Current
0-199.5 uA	F89-14-06	1 K Ohm	10 mA
0-1.995 mA	F89-14-07	100 Ohm	50 mA
0-19.95 mA	F89-14-08	10 Ohm	150 mA
0-199.5 mA	F89-14-09	1 Ohm	500 mA
0-1.995 A	F89-14-10	0.1 Ohm	2.5 A

Accuracy : Model 4228-N; ±0.25% of reading ± ½ digit, Model 4225-N; ±0.50% of reading ± ½ digit, Model 4220-N; ±1.0% of reading ± 1 digit

Common Mode Rejection: 80 dB (60 Hz)

Normal Mode Rejection: controllable with external filter.

Operating Range : 0-45°C

Temperature Coefficient : ±(0.2% of reading plus 0.02% of scale) °C.

Power Requirement: 105 to 125 V AC, 50-60 Hz less than 2 Watts

Physical Characteristics: Height — 2.359" Max., Width — 4.140" Max., Depth — 4.846" Max., Weight — 1.0 lb. approx.

Model 4228-N With 2¾ digit feature, indicating capabilities to 199.5 and accuracy of 0.25% of reading ± ½ digit.

Price **$140.00**

Model 4225-N Available with indicating capabilities to 99.5 and accuracy of ±0.5% of reading ± ½ digit, retaining all other features of the Model 4228-N.

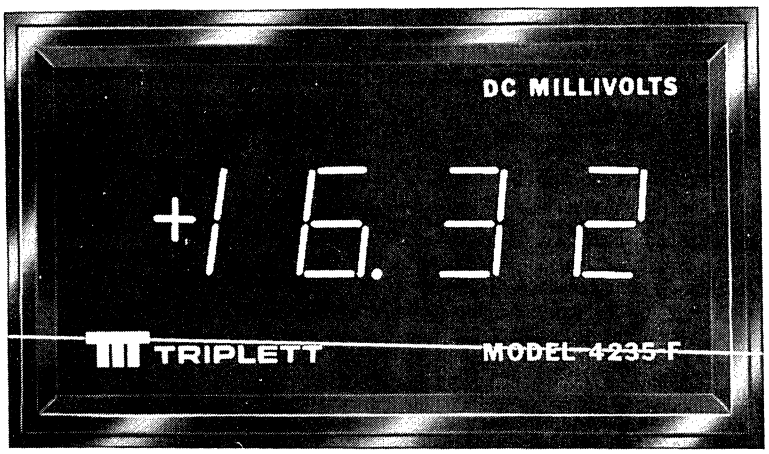
Price **$125.00**

Model 4220-N Available with indicating capabilities to 99 and accuracy of ±1% of reading ± 1 digit, retaining all other features of Model 4228-N except negative polarity indication.

Price **$110.00**

TRIPLETT CORPORATION, BLUFFTON, OHIO 45817
TEL: (419) 358-5015 TWX 810-490-2400

MODEL 4235-F DIGITAL PANEL METER



1 3½ Digits with AUTO-POLARITY.

2 LOW POWER DRAIN—provides low operating temperature and less heat dissipation.

3 SINGLE-PLANE, SEVEN-BAR READOUT—for accurate wide-angle readability.

The Triplett Model 4235-F Panel meter is a 3½ digit instrument with auto-polarity, designed for the OEM market as well as for use in production and general testing, servicing and educational applications. It has indicating capabilities to 1999.

The Model 4235-F employs a dual slope analog to digital conversion technique, providing high noise rejection, stability and accuracy for precise voltage or current measurements. The seven bar fluorescent readout provides a single plane display for wide angle ease of viewing. A green circularly polarized window filter enhances the appearance and readability.

Other important features are:

- Low power drain (2 watts).
- Single plane 7 bar fluorescent display.
- Circularly-Polarized, green viewing window.
- Small compact size.
- Display blanks when over-ranged (prevents error).
- Sampling rate 3 times a second.
- High input resistance (1000 megOhms to 10 megOhms).
- No extra charge for 19.99mV or 1.999 μA ranges.
- Display response time less than 1 second.
- BCD output as optional extra ($25.00); code: 1 2 4 8
- Movable decimal point.
- Display hold capability (terminals included).
- Front calibration.
- May be mounted from front or rear of panel.
- Molded case.

MODEL 4235-F SPECIFICATIONS

DC VOLTS

Range	Catalog No.	Input Resistance	Max. Voltage
0-19.99 mV	F89-13-01	100 megOhms	100 V
0-199.9 mV	F89-13-02	1000 megOhms	250 V
0-1.999 V	F89-13-03	10 megOhms	250 V
0-19.99 V	F89-13-04	10 megOhms	1000 V
0-199.9 V	F89-13-05	10 megOhms	1000 V
0-1000 V	F89-13-06	10 megOhms	1000 V

DC CURRENT

Range	Catalog No.	Shunt Resistance	Max. Current
0-1.999 uA	F89-13-07	10 K Ohms	2 mA
0-19.99 uA	F89-13-08	10 K Ohms	2 mA
0-199.9 uA	F89-13-09	1 K Ohms	10 mA
0-1.999 mA	F89-13-10	100 Ohms	20 mA
0-19.99 mA	F89-13-11	10 Ohms	100 mA
0-199.9 mA	F89-13-12	1 Ohm	500 mA
0-1.999 A	F89-13-13	0.1 Ohm	2.5 Amps

Accuracy (Voltage): ±0.1% of reading ±1 Digit.

Accuracy (Current): ±0.15% of reading ±1 Digit.

Common Mode Rejection: 80 dB (60 Hz)

Normal Mode Rejection: 30 dB (60 Hz)

Operating Range 0 to 45°C

Temperature Coefficient (100.0 mv and above): ±(0.01% of reading +0.005% of scale)/C°

Temperature Coefficient (10.00 mv): ±(0.01% of reading +0.01% of scale)/C°

Power Requirement: 105 to 125 VAC 50-60 Hz 2.0 watts.

Physical Characteristics: Height — 2.359" Max., Width — 4.140" Max., Depth — 4.846" Max., Weight — 1.0 lb. approx.

Model 4235-F Price **$240.00**
($265 with BCD Output)

Model 4230-F Available with indicating capabilities to 999 and accuracy of 0.1% of reading ±1 digit, retaining all other features of Model 4235-F except autopolarity. Over-range indicated by blinking numeral display.
Price **$220.00**

TRIPLETT CORPORATION, BLUFFTON, OHIO 45817
TEL: (419) 358-5015 TWX 810-490-2400

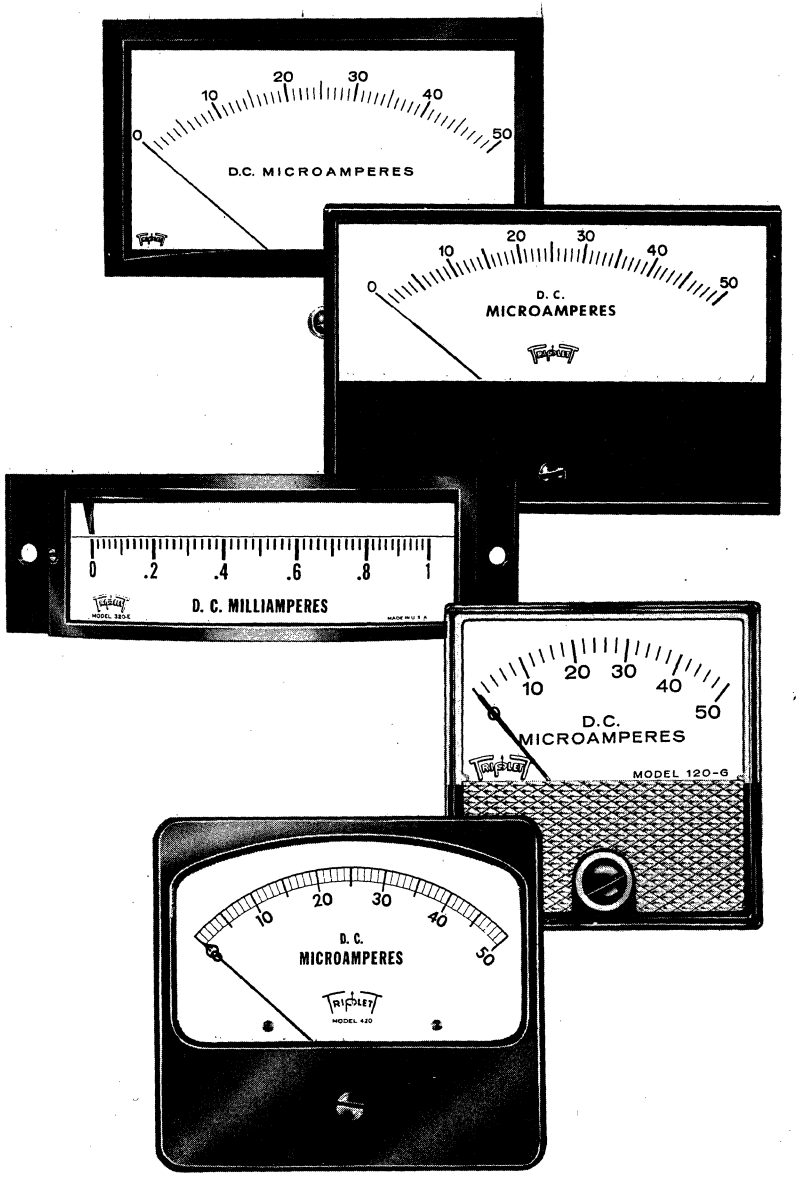
Panel Meters for Every Purpose

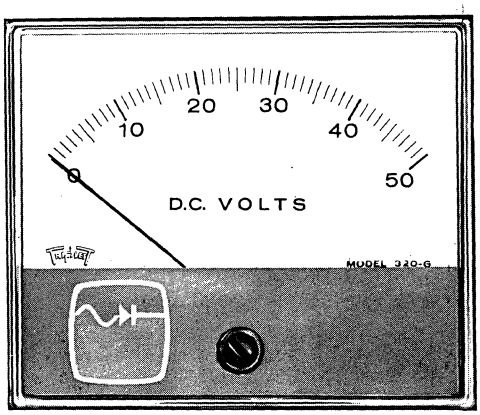
With 1369 different sizes, styles and types of analog panel meters, there's almost certainly one to suit your needs . . . or we'll make special ranges, scales, cases or trim to your specifications. Choose from:

- AC, DC and RF types
- volt, millivolt and VU meters
- amp, milliamp and microamp meters
- null meters, ohmmeters and pyrometers
- pivot and jewel, suspension, iron vane,
- D'Arsonval and electrodynamometer movements

- ½", 1½", 3½", 4½" edgewise types
- 1½", 2½", 3½", 4½", 5½", 6½", 7½", 8½" round, square and rectangular models

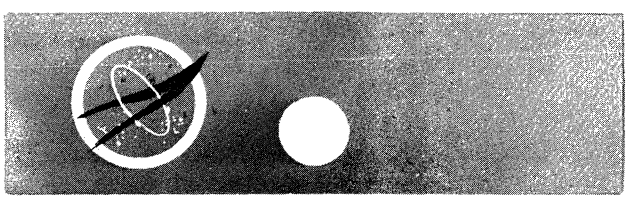
In addition to a large stock of standard models at the Bluffton, Ohio, plant and most Triplett distributors, standard models and specials are available from 40 authorized Sales/Service/Modification Centers throughout the United States and in Canada (see list on page 11).





CUSTOM INSERTS

Personalize your G-Series meters with custom inserts. You may put your name, your logo, message or instructions on these inserts if quantities warrant. Special charges will apply.

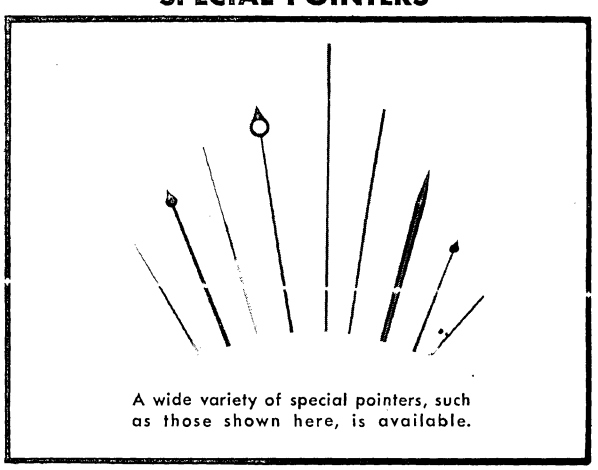


TRIPLETT
TEL: (419) 358-5015 TWX 810-490-2400
CORPORATION, BLUFFTON, OHIO 45817

Panel Meters for Every Purpose

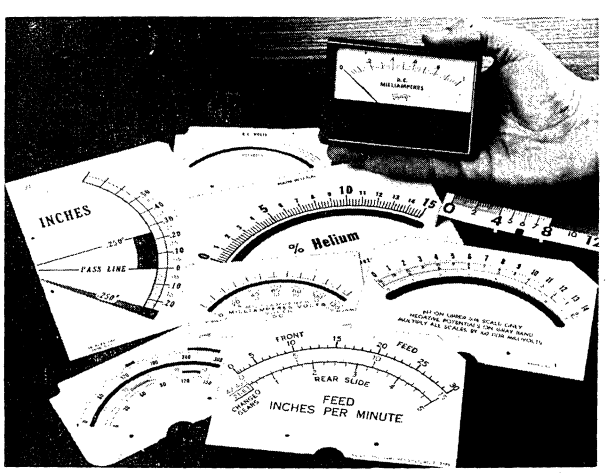
Often a standard panel meter, such as the many thousands listed in this catalog, will not suit a particular application. Sometimes special resistances, scales, cases or other special features are desired. The Triplett Corporation offers over 65 years of meter "know-how" in these areas. We are prepared to offer the engineering assistance needed to solve your special requirements problem. Contact the factory or your representative for your special requirements.

SPECIAL POINTERS



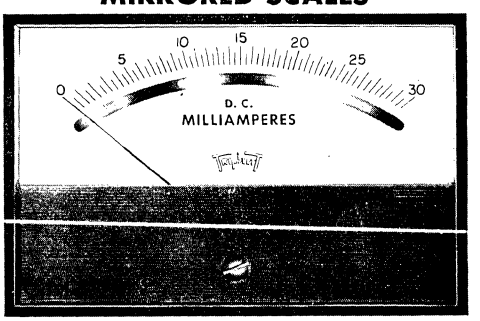
A wide variety of special pointers, such as those shown here, is available.

SPECIAL SCALE READINGS



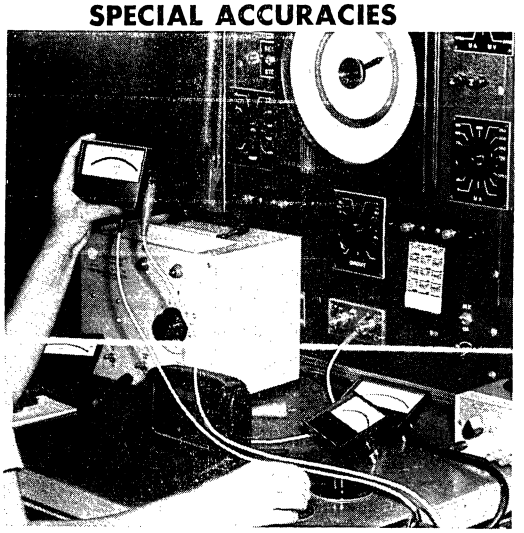
A panel meter can be used to indicate much more than just volts or amperes. Do you need to read pH, Roentgens, smoke density, or inches per minute? These are a few of the uses to which a panel meter may be applied.

MIRRORED SCALES

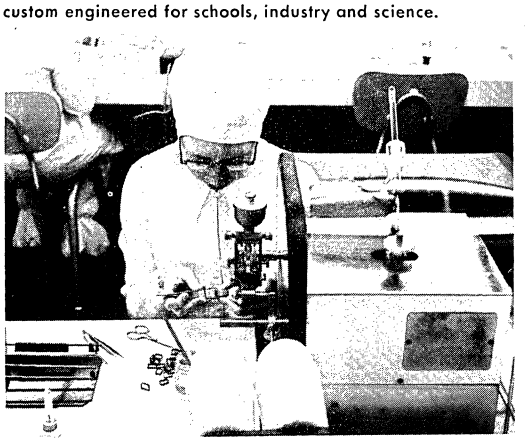


Mirrored scales for use on meters with increased accuracies over the standard ± 2% are frequently required.

SPECIAL ACCURACIES



Our facilities are capable of supplying special ranges, accuracies, and instrument dynamics. Special pointer designs, dials, terminals, and case configurations have been custom engineered for schools, industry and science.



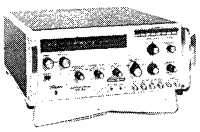
Triplett has been, and remains, a leader in technological advances in the instrument industry.
We invite you to contact us when your requirements dictate extra quality, performance, and function.

Texscan RF Test Equipment

A complete line...
A single source

RF detectors—X-Y large screen display scopes—Coaxial switches—Reflection coefficient bridges—Mismatches—Terminations—Impedance matching pads—Voltage tuned oscillators

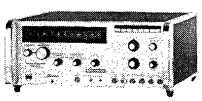
Sweep Generators



VS-90A

- 5 to 2350 MHz • variable sweep rate
- built-in attenuators

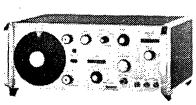
The VS-90A is a multiband general lab sweep signal generator. RF output is 0.7 volts rms with a flatness of ±0.5 dB at maximum sweep width. Built-in marker system provided to accept single frequency and harmonic frequency plug-in markers. Sweep rates are variable from 0.05 Hz to 60 Hz.



VS-60

- 5—1000 MHz • plug-in markers
- variable sweep rate

Texscan's new VS-60 sweep signal generator covers the frequency range 5 to 1000 MHz in one band. Sweeping the entire 5 to 1000 MHz permits viewing of the entire 5 to 1000 MHz spectrum. VS-60 has 5mw output power in both CW and sweep modes. An attenuator system provides 0 to 10 dB attenuation in 1 dB steps of 0 to 70 dB in 10 dB steps, plus a 0-3 dB vernier control. Variable sweep rates from 20 seconds to 16 milliseconds per sweep.



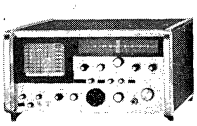
VS-340

- 3.5 GHz to 6.6 GHz • variable sweep rates
- 700 MHz sweep width

VS-340 covers the important communications frequency band. Completely solid state with plug-in card construction for ease of maintainability. VS-340 can work into severe mismatches without frequency pulling or distortion. A marker system for frequency identification is built in with .005% crystal markers at 5, 50 and 100 MHz intervals.

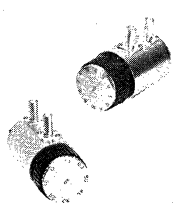
Spectrum Analyzers

- 1 MHz to 13 GHz • solid state
- −100 to +30 dBm



Texscan's new line of spectrum analyzers consists of three different models, AL-70, AL-60 and AL-40. The AL-70 covers a range of 5 MHz to 13 GHz, AL-60, 1 MHz to 3 GHz and AL-40, 1 to 300 MHz. All AL analyzers are solid state instruments designed for maximum reliability and maintainability. Accurate frequency and amplitude identification is available on all models.

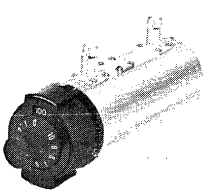
Attenuators



RA Series—Rotary Attenuators

- DC—2000 MHz • direct reading in dB
- 8 attenuation ranges up to 120 dB
- 50 to 75 ohm

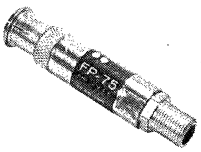
Texscan offers a complete range of attenuators with steps of 0.1 dB, 1.0 dB and 10 dB, covering attenuation ranges of 1.0, 10.0 and 120 dB. Wide selection of connector choices also available. Offered in either 50 or 75 ohm impedance. Texscan stocks the attenuator to fulfill your requirements.



RA-104

- 0—110 dB • DC—1 GHz
- 1 dB steps

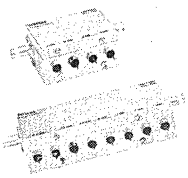
Covering DC—1000 MHz, the RA-104 features an attenuation range of 110 dB in 1 dB steps. Insertion loss is 0.5 dB and VSWR 1.3:1 at 1000 MHz. The RA-104 can be supplied with any of the following connectors: BNC, TNC, N and SMA.



Attenuators/FP Series—Fixed Coaxial

- DC—2000 MHz • 1 watt average power
- values up to 20 dB

Texscan offers a complete line of coaxial attenuators in a wide range of attenuation values from DC to 2 GHz. Each fixed attenuator pad is color coded with calibration points clearly marked on the body. A wide choice of connector types available. Impedance values of 50 and 75 ohms are available.



Attenuators/PA Series—Digitally Programmable

- DC—1250 MHz • 0 to 127 dB
- 4 millisecond switching speed

The PA series of digitally programmable attenuators is comprised of three different units covering 0-127 dB in 1 dB steps. Each pad represents a single binary digit for easy mating to a digital system.

Filters

Tunable Bandpass Filter

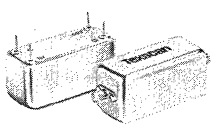
- 48 MHz to 4 GHz • 3 dB BW 1% to 10%
- 3 and 5 sections

Texscan's tunable bandpass filters cover the frequency range of 48 MHz to 4 GHz, with any single model covering more than an octave. A choice of 3 dB bandwidth from 1% to 10% is available.

Bandpass-Lowpass Filter

- 10 MHz to 13 GHz • 48-hour delivery
- 5 different styles

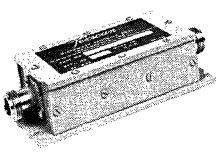
Texscan manufactures fixed frequency filters covering the frequency range 10 MHz to 13 GHz. Five different types of low and bandpass filters are available, each with its own unique characteristics. A choice of connector styles as well as special mechanical designs to fit your packaging requirements. 48-hour delivery available.



Lumped Component Filter

- 5 MHz—100 MHz • 3 to 8 sections
- miniature filters

Texscan's new miniature lumped component filters, because of their size, provide freedom in circuit layout reducing overall package volume. Extremely useful for printed circuit board mounting. Available in bandpass and lowpass filter designs.



Cavity Bandpass Filter

- 30 to 3000 MHz • 2 to 6 sections
- 0.2 to 3% 3 dB BW

Texscan cavity bandpass filters are available with 2 to 6 sections covering the 30 to 3000 MHz frequency range. These units are designed to provide low insertion loss at narrow bandwidths.

TEXSCAN CORPORATION
2446 N. Shadeland Ave., Indianapolis, Ind. 46219
317/357-8781

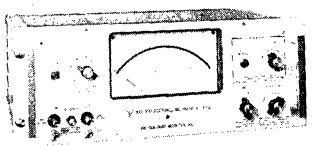
World Famous IN Phase Time MEASUREMENT

UNIVERSAL AD-YU ELECTRONICS, INC.

249-259 TERHUNE AVENUE • PASSAIC, NEW JERSEY
CABLE: UAD PASSAIC • PHONE (201) 472-5622

PRECISION PHASE METERS

Direct Reading In Degrees 1 CPS To 500 KC

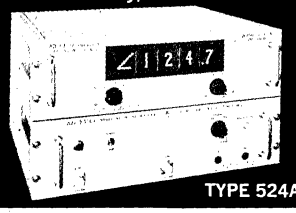


TYPE 406 SERIES

No amplitude adjustment from 0.05 to 90v, no frequency adjustment. Accuracy: ±0.25° relative, ±1° or ±2% absolute. Phase Range: 0-12°, 0-36°, 0-90°, 0-180° up to 360° in 8 ranges. Input impedance: 3 megohms shunted by 20 uuf. Analog output for external recorder available.

DIGITAL PHASE METER

±0.05° Accuracy, 20 CPS to 500 Kc.



TYPE 524A4

Phase angle in degrees directly represented in 4 or 5 digits. No amplitude adjustment from 0.3v to 70v. No frequency adjustment up to 500 kc. Accuracy: ±0.05° relative, ±1° absolute. Analog Output: zero for 0°, increases to −3.6v for 360°, 1 mv change for every 0.1°.

WIDEBAND PHASE VECTOR VOLTMETER

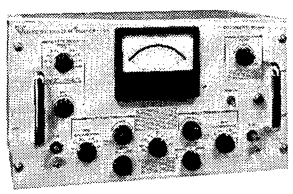
40 CPS To 20 KC Continuous Coverage.

TYPE 248A

Direct reading of total, fundamental, in-phase, quadrature components and phase angle in degrees on panel meter. Accuracy ±0.25° or ±1% for phase, ±2% for vector voltage. Nulling Sensitivity: Less than 2 microvolts. Quadrature Rejection: over 60 db below 5 kc, 40 db up to 20 kc. Input Impedance: 1 megohm shunted with 20 uuf.

VECTORLYZERS

±0.02° or ±2% Accuracy, 0.005° Readability.



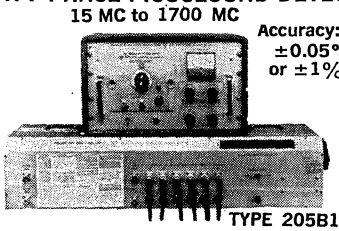
TYPE 202-202A-203

Especially suitable for measuring small phase angle near 0°, 180°, 90° and 270°. Continuously variable filter for isolation of harmonics and noise. Full Scale Sensitivity: 1°, 2°, 4°, 10° up to 360°. Freq. Range: 25 cps to 100 kc for Type 202 and 202A, 50 cps to 20 kc for Type 203.

H-F PHASE PICOSECOND DETECTOR

15 MC to 1700 MC

Accuracy: ±0.05° or ±1%

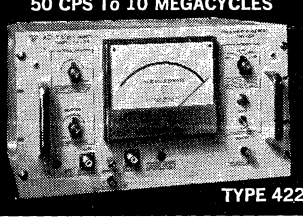


TYPE 205B1-4-5

Useable for continuous sine wave, pulsed or amplitude modulated sine wave. Calibration traceable to National Bureau of Standards. Sensitivity: 50mv with panel meter, 10mv with external receiver. Input Impedance: 50 ohms nominal. Readability: 10ps per division on main scale. 1ps on vernier scale.

VIDEO AND RF PHASE METER

50 CPS To 10 MEGACYCLES

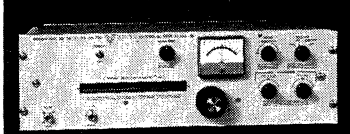


TYPE 422A

Direct reading in degrees. Accuracy: ¼° relative or 2% absolute. Analog output available for plotting phase characteristic curve. No amplitude adjustment from 0.3v to 20v, no frequency adjustment from 50 cps to 10 mc. Input Impedance: 1 megohm shunted by 30 uuf.

MICROWAVE PHASE METERS

1 GC to 8.2 GC ±0.1° Accuracy.

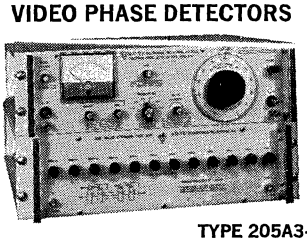


TYPE 206A

Suitable for continuous sine wave or pulsed signal. Infinite resolution. Plot phase response curve on recorder, no adjustment required for variation of signal amplitude up to ten times. Frequency Range: 1 to 8.2 gc. Accuracy: ±0.1° or ±1%. Input Voltage: 50 mv minimum. Readability better than 0.05 pico-second.

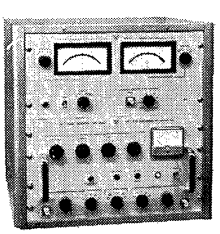
VIDEO PHASE DETECTORS

100 KC To 15 MC



TYPE 205A3-4

Especially suitable for measuring small phase angle. Excellent for phase and delay measurement of filters, amplifiers, etc. at video frequency. Accuracy: ±0.05°. Readability: ¼ ns distortion. Minimum Input Signal: 10 mv rms. Input Impedance: 1 megohm shunted with 12 uuf.



TRANSFER FUNCTION ANALYZER

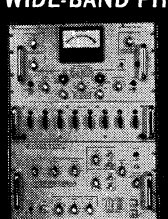
TYPE 308

Reads In-Phase And Quadrature Components Simultaneously.

Input Impedance: 1 megohm shunted with 20 uuf. Accuracy: ±2% of full scale. Frequency Range: 0.1 cps to 10 kc. Voltage Range: 0.03v to 100v in six ranges. Center zero gives direct identification of lead or lag. Analog output available for plotting Nyquist diagram.

WIDE-BAND PHASE STANDARD

0.015° Accuracy, 50 CPS To 10 KC.



TYPE 209

Primary wideband standard, self-calibration, self-checking by means of fundamental bridge balancing, without the use of an external standard. Useful for measuring unknown networks, unknown signals, or checking phase meters. Traceable to NBS standards. Phase shift from 0° to 360° with 7-digit resolution.

INSTANTANEOUS PHASE DETECTOR

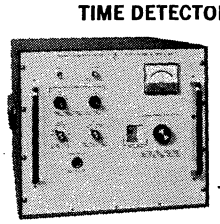
For Pulsed Signals Or CW Signals

TYPE 251

Measures instantaneous phase difference (from cycle to cycle) of pulsed or cw signals. Measures differential phase between steps of a video staircase signal. Measures phase angle between two pulse modulated sine waves or between a pulse modulated sine wave and a cw signal. Infinite resolution, 0.05° phase difference can be detected. Readability: ¼ ns. Operating Frequency: 200 kc to 15 mc. Minimum Input Signal: 50 millivolts.

MICROWAVE PHASE AND TIME DETECTOR

8.2 GC to 18 GC, ±1° or ±1% Accuracy.



TYPE 206B3-4

Accuracy unaffected by amplitude fluctuation. Measures pulse modulated or cw signals. Both input signals enter separate channels and are accurately terminated. Resolution: infinite. Minimum Input Signal: 50 millivolts for pulsed signals; 30 millivolts for cw signals. Frequency Response: 206B3—8.2 gc to 12.4 gc; 206B4—12.4 gc to 18 gc. Input Waveguide Size: 206B3—X-Band waveguide O.D. 1"x½" includes UG-39 / U Flange; 206B4—KU-Band 0.702 x0.391 includes UG-419 / U Flange.

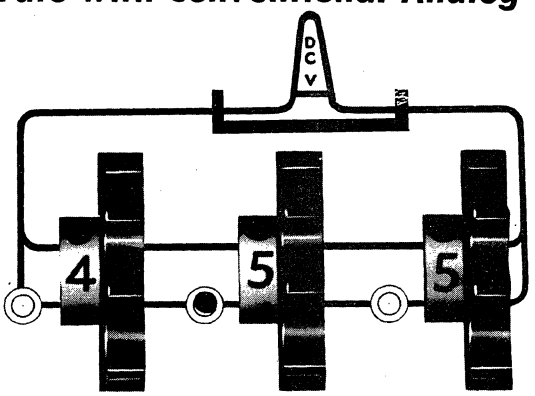
W R E

Basically New

DIGITAL SCALER INSTRUMENTATION

Digital Advantages Priced Commensurate with Conventional Analog

A new "Go" in field compacts! Precision Digital, True RMS Voltmeters, AC Voltmeters, DC Voltmeters, Multimeters — with 3 or more significant figure in-line digital presentation within 1% of indicated value on all measurements. Passive solid state circuitry for long term stability, automatic fail-safe, resettable protection system — rugged, militarized, self-contained portables or custom rack, bench, or build-in mountings to specs.



- **1% OF INDICATED FOR ALL READINGS**

Uniform tolerance of actual readings across the entire measurement spectrum . . . with precise repeatability.

- **UNIVERSAL GO/NO-GO INDICATOR**

Digital dial-in provides equivalent to thousands of precisely calibrated set-point indicators . . . for production check-out or discrete field measurements.

- **WHEATSTONE BRIDGE CIRCUIT**

Built-in direct reading, at operators finger tips.

- **LONG TERM STABILITY**

Passive circuit, no amplifier to drift.

- **COMPACT, RUGGEDLY CONSTRUCTED**

Engineered for humans, built to take it. Militarized versions also available.

- **IN-LINE DIGITAL PRESENTATION**

Dial and read . . . the direct presentation is in numerals. Only significant figures are displayed due to unique and exclusive red-dot decimal automatically positioned.

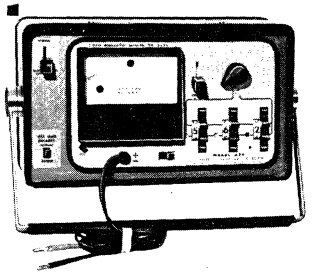
- **AUTOMATIC FAIL-SAFE PROTECTION**

. . . against misapplication or overload. Automatically tailors to each function. Instantly resettable.

- **SAFE OHMMETER**

Maximum 50 millivolts potential controlled for measuring sensitive devices below their threshold of normal conductivity.

Available in a Wide Selection of Packages for Specialized Application or Use Function



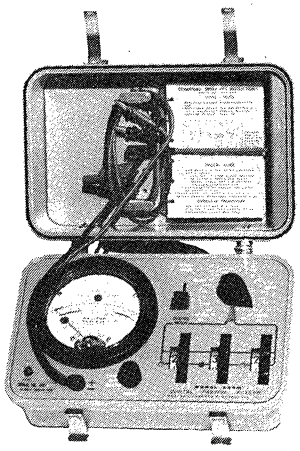
MODEL 320, IN BENCH CASE

DIGITAL TRUE RMS

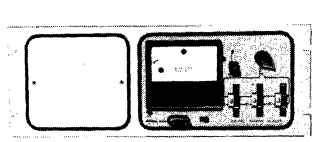
Model 320 . . . Precise digital readout of the RMS value of complex waveforms containing both AC and DC components and with crest factors as great as 10 to 1. Accurate to within 1% of indicated value from 100 mv to 1000V. Freq. Resp.: 20 Hz to 100 kHz.
(Shown in bench case) Supplied in fiberglass lab case 10″ x 6½″ x 3¼″, 4½ lbs. net. Custom build-in or rack style available. Also furnished ruggedized to military environments.

DIGITAL MULTIMETER

Model 300 . . . 3 figure digital. All readings within 1% of indicated. AC or DC voltage: 100 mv to 1000V; response 10 Hz to 100 kHz calibrated in RMS value of sine wave. DC current: 10 μA to 10 A. Resistance 1Ω to 1 MΩ (wheatstone bridge with direct digital readout). Resettable overload protection system. Supplied in waterproof, fiberglass case 10″ x 7¼″ x 4¾″, 6¾ lbs. net. Model 300M (Militarized) for use in extreme environments. Also available in bench or rack style.



MODEL 300M, MILITARIZED



MODEL 310, IN RACK MOUNT

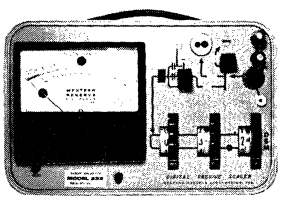
Adapters available for DC & AC current and transistor testing.

DIGITAL DC VOLTMETER

Model 310 . . . Readability, repeatability and within 1% of accuracy of actual readout — at a price of conventional analogs.
3 significant figure indication 100 mv to 1000V DC. (Shown in 19″ rack panel) supplied in fiberglass lab case, 3¾ lbs.
Model 311 available same except overload protection non-resettable. Custom build-in, bench or rack style available. Also furnished ruggedized to military environmentals.

TRANSMISSION LEVEL (dbm) METER

Model 332 . . . For measuring and setting transmission level. Direct reading in dbm for 600 and 900 ohm sources. (0 dbm = 1 milliwatt) 3 digit readout of —20.0 to +20.0 dbm, within ±0.1 db. Range to —35 dbm analog. Freq. response: 10 Hz to 100 kHz. RMS responding. Fail safe resettable overload protection. Fiberglass lab case shown, 10″ x 6½″ x 3¼″. Also available in bench or rack style.



MODEL 332, IN LAB CASE

Specifications subject to change without notice.

WESTERN RESERVE ELECTRONICS, INC.
2150 Highland Road • Twinsburg, Ohio 44087 • (216) 425-4951

Nickel-Cadmium and Silver-Zinc Battery Charger/Analyzer Systems

W R E

MODEL 1575 *Nickel-Cadmium System*

This battery charger-analyzer concept is thoroughly design tested as a system to provide maximum efficiency in programmed maintenance of nickel-cadmium batteries.

Required sequence of events is unitized in a functional package to increase work flow efficiency with minimum equipment. Since all units can function simultaneously, single system has capacity for 3 batteries at a time; i.e., one discharging, one charging, and one under evaluation.

Exhaustive tests have proven this system to assure a full charge — safely! . . . and provide cell restandardization in the process.

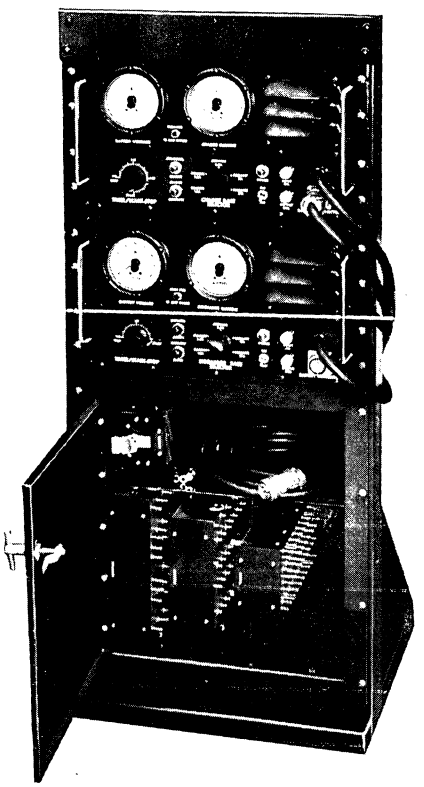
1) Deep discharge of each cell assures total emptying of battery safely — with all cells to "zero". This standardizing effect assures a zero-base for each cell.
2) 150% ampere-hour charge at precise prescribed rate assures "total-fill" of the battery.
3) Evaluation cycle "pulls" 100% of battery rated capacity in 2 hours. Analyzer automatically cuts off at either of 2 points . . . at preset voltage point, or at 2 hours . . . and "holds" the result.

ANALYZER, MODEL 1000 — Discharge Rate: 5 preselectable discharge current ranges: 1.8, 2.5, 5.5, 11, 17 amperes. Discharge Time: 0-2 hours, ±5%. Cut-off Voltage: Internally adjustable, 17-20 volts. Indicators: "Capacity Accept", "Capacity Reject", "Power On". Meters: 250°, 4½", ruggedized. Voltmeter: 0-40 volts. Ammeter: 2-range; 0-10, 0-20 amperes. Circuit: Solid state power switching. Physical: 19" W., 10½" H., 11" D., 33 lbs. Rugged, portable, rack mountable, drip-proof construction. Cooling is forced air.

CHARGER, MODEL 1500 — Charge Current: 5 preselectable ranges: 1.8, 2.5, 5.5, 11, 17 amperes, ±3%. Charge Time: 0-3 hours ±5%. Meters: 250°, 4½", ruggedized. Voltmeter: 0-40 volts. Ammeter: 2-range; 0-10, 0-20 amperes, Overload Protection: Charge terminates if output voltage rises above 33V on all ranges (except 2.5A range — 34.5V). Indicators: "Power On", "Charge Complete", "Abnormal Charge". Circuit: Solid state. Physical: 19" W., 10½" H., 11" D., 72 lbs. Rugged, portable, rack mountable, drip-proof. Cooling is forced air.

5 popular discharge fixtures for fixed resistive load to each cell at the C/2 rate, and MA and MS type battery cables are available from stock. Other fixtures are available on special order.

Specifications subject to change without notice.



Overall system, rack and cabinet, is approximately 22" W., 4' H., 12" D., 192 lbs. and is of strong steel construction with drip-proof finish. Discharge fixtures and cables fit neatly into the compartmentized storage cabinet.

MODEL 1525 *Silver-Zinc Battery Charger*

Also charges Nickel-Cadmium, Silver-Cadmium, and Lead-Acid Types

The Model 1525 is a portable, 3-channel battery charger that meets the most stringent requirements for charging Silver-Zinc batteries (such as BB-451/U types).

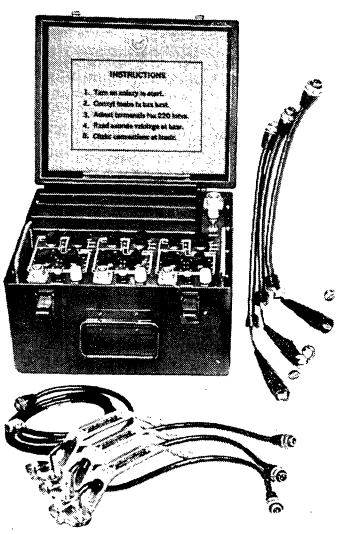
The unit is designed with modular plug-in circuits and features a precision, solid state electronic control that permits front-panel programming of cut-off voltages in one-tenth volt steps, from 0.0 to 36.0 volts. This programming extends the capabilities so that the equipment may be used for charging Silver-Cadmium, Nickel-Cadmium or Lead-Acid battery types.

Each of the 3 channels may be used independently at currents of 1.0 or 2.25 amperes, or connected in parallel to provide up to nine different currents (up to 6.75 amperes).

Fail-safe charging indication is provided via internal sensing circuitry which assures that the programmed charging current is flowing when the charging lamp is lighted. The system automatically prevents damage to batteries or charger due to operator error.

Single cell charge capability permits charge equalizing of a battery. The 1525 is thoroughly militarized . . . including R.F.I. suppression.

Accessories furnished include 3 special charging handles for BB-451/U Silver-Zincs, and universal charging cables for other batteries. Cables, line cord and instruction manual are neatly stored in the case lid. Self-contained, water tight portable case; 13⅝" W., 11" H., 11½" D., 38 pounds net.



Specifications subject to change without notice.

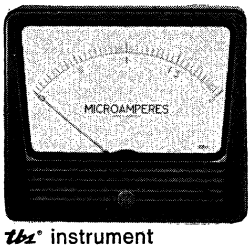
WESTERN RESERVE ELECTRONICS, Inc.
2150 Highland Road • Twinsburg, Ohio 44087 • (216) 425-4951

Westinghouse offers a broad choice of panel instruments

Available through your local Westinghouse distributor. For a full listing of ratings and prices, ask for the descriptive bulletins and price lists shown for each instrument.

J-43012

You can be sure... if it's **Westinghouse**

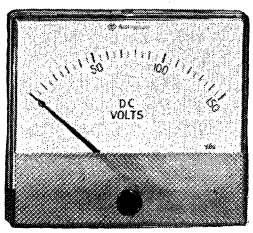


tbz® instrument

Foundation Line

Premium instruments for quality test or instrumentation equipment. Always custom built to meet a specific need. Sizes, 4½ and 5½ inches. Taut-band suspension. D-c: 5 microamps to 20 amps, voltmeters to 600 volts, self-contained. Accuracy and tracking to ½%. A-c rectifier: 5 microamps to 20 milliamps, voltmeters 200,000 ohms per volt. Transducer combinations listed at bottom of page.

Descriptive Bulletin 43-370 Price List 43-300

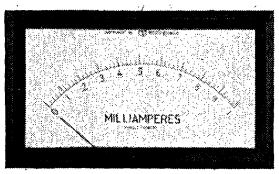


tbz® instrument

20/20 Custom Line, Surface Mounted

Taut-band suspension instruments priced to be generally competitive with quality pivot-and-jewel instruments. Accuracy, 2%. Sizes, 2½, 3½, 4½ and 5½ inches. Most ratings carried in stock. D-c: 50 microamps to 50 amps, 20 millivolts to 800 volts. A-c rectifier: 80 microamps to 20 milliamps, 3 to 800 volts. A-c moving iron: 5 milliamps to 50 amps, 1.5 to 600 volts. Transducer combinations are listed at bottom of page.

Descriptive Bulletin 43-320 Price List 43-300

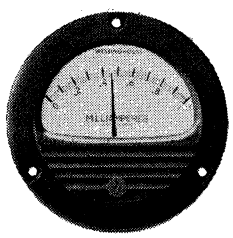


tbz® instrument

Rear-of-panel Mounting

Foundation or 20/20 instruments are available with rear-of-panel mounting kits, with or without illumination.

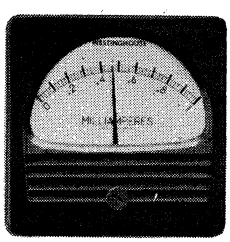
Descriptive Bulletins 43-320 and 43-370
Price List 43-300



Conventional Round

USA standard dimensions. Conventional pivot-and-jewel mechanisms. Sizes, 3½ and 4½ inches. D-c: 20 microamps to 50 amps, 50 millivolts to 800 volts. A-c rectifier: 100 amps to 10 milliamps, 0.5 to 600 volts. A-c moving iron: 5 milliamps to 50 amps, 1.5 to 800 volts. Radio frequency: 10 milliamps to 20 amps a.c. Transducer combinations are listed at bottom of page.

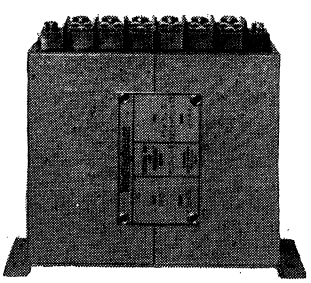
Descriptive Bulletin 43-350 Price List 43-300



Conventional Rectangular

USA standard dimensions. Conventional pivot-and-jewel mechanisms. Sizes, 3½ and 4½ inches. D-c: 20 microamps to 50 amps, 50 millivolts to 800 volts. A-c rectifier: 100 amps to 10 milliamps, 0.5 to 600 volts. A-c moving iron: 5 milliamps to 50 amps, 1.5 to 800 volts. Radio frequency: 10 milliamps to 20 amps a.c. Transducer combinations are listed at bottom of page.

Descriptive Bulletin 43-350 Price List 43-300



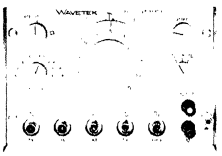
Panel Instrument Transducers

Combine with any panel instruments to read watts, vars, frequency, power factor, rms voltage, rms current, expanded voltage, speed or temperature. Standard frequencies, 60 and 400 Hz. Accuracy, 1%. Outputs compatible with characteristics of panel instruments.

Descriptive Bulletin 43-861 Price List 43-860

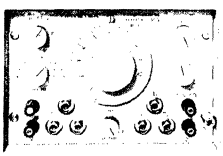
Function Generators

Model 110
Function Generator
0.005 Hz to 1 MHz
∿, ⊓, ⋀.
$445



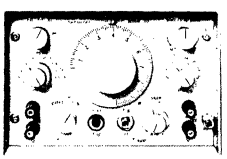
The Model 110 function generator is a calibrated high-purity source of sine, square and triangle waveforms. It operates at servo, audio and video frequencies with six simultaneous outputs. The instrument is a portable laboratory of signal sources in one economical package.

Model 111
Voltage-Controlled
Generator (VCG)
0.0015 Hz to 1 MHz
∿, ⊓, ⋀, ⩘.
$545



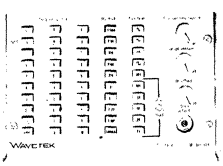
The Model 111 VCG offers remote control or modulation of frequency by external voltage input operating in parallel with the front panel dial. A sine wave input produces frequency modulation. A square wave input results in frequency shift keying. A ramp input allows frequency sweeping.

Model 112
Triggered VCG
0.0015 Hz to 1 MHz
∿, ⊓, ⋀, ⩘, ⩙.
$695



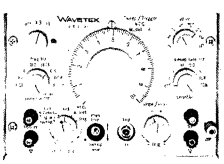
The Model 112 has all the features of the Model 111 plus the ability to trigger from a front-panel control or an external pulse or gate. One cycle is generated on command. If a gate signal is applied, the generator operates until the gate is removed. Trigger start-stop point is selectable over 360°. Trigger level and polarity are selectable from front-panel control.

Model 113
Digital VCG
0.001 Hz to 1 MHz
∿, ⊓, ⋀, ⩘.
$795



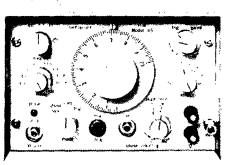
The Model 113 offers pushbutton control of frequency, function and amplitude, plus voltage control of frequency by external input—either dc programming or wideband ac frequency modulation. Amplitude is controlled by a precision 50-ohm attenuator that provides 10-db steps from 0.1 volt to 10 volts peak-to-peak.

Model 114
Sweep/Trigger VCG
0.0015 Hz to 1 MHz
∿, ⊓, ⋀, ⩛, ⩘.
$795



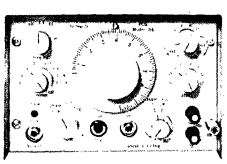
The Model 114 has a built-in sweep capability that allows internal or external voltage control. The unit offers both a sweep and hold mode and triggered sweep—and still operates as a standard function generator and VCG. All outputs are available including a monitor of the sweeping voltage.

VCG Model 115
Trigger/Phase Lock
0.0015 Hz to 1 MHz
∿, ⊓, ⋀, ⩘, ⩚.
$745



The Model 115 has all the capabilities of the Model 112 plus a phase-lock mode. The generator's frequency locks to any external stimulus and can be phaselocked to the fundamental selected frequency or harmonics of that frequency. Phase lock operates from 10 Hz to 1 MHz and is controllable over 360°

Model 116
Multi-Purpose VCG
0.0015 Hz to 1 MHz
∿, ⊓, ⋀, ⩘, ⩛, ⩚.
$845

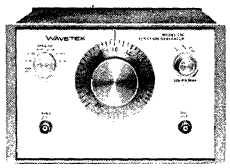


The Model 116 VCG features triggered, gated and phaselock operation. Additionally, an internal cycle counter makes this single instrument capable of tone burst operation. 1, 2, 4, 8, 16, 32, 64, 128, 256 cycles may be generated without need for an external gating generator.

WAVETEK® P.O. Box 651, San Diego, Calif. 92112; Tel. 279-2200, TWX 910-335-2007

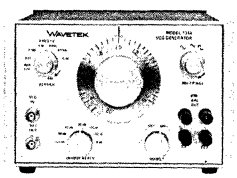
Oscillator/Function Generators

Model 130
Oscillator
Function Generator
0.2 Hz to 2 MHz
∿, ⊓, ⋀.
$295



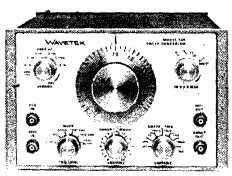
The Model 130 is the first general-purpose laboratory test instrument that offers true function generator versatility at a low oscillator price. Its outputs are selectable and variable from a 50-ohm source with an auxiliary sync output for scope or system timing. The Model 130 is ideal for ultrasonic, audio and video applications — from trouble-shooting to exotic IC design.

Model 131A
Oscillator/VCG
0.2 Hz to 2 MHz
50Ω and 600Ω
Balanced Output
∿, ⊓, ⋀.
$395



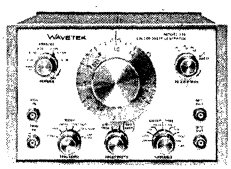
The Model 131A is a precision source of voltage controlled signals. The frequency may be dc programmed or modulated with a wideband ac signal. The frequency can be swept over a 1000:1 ratio covering the audio range of 20 Hz to 20 kHz in a single sweep. The output impedance is selectable with 50Ω or 600Ω balanced output. A 60 dB step attenuator gives precision control over output signal level for increased versatility.

Model 134
Sweep/Trigger VCG
0.2 Hz to 2 MHz
∿, ⊓, ⋀, ◿.
$495



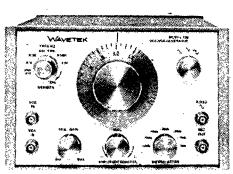
The Model 134 combines (1) a precision VCG having sine, square and triangle waveform outputs, and (2) an independent triggered ramp or sawtooth generator supplying the voltage to sweep the frequency of the first. This unit is virtually a portable oscillator, square wave generator, frequency shift keyer, and a sweep and tone burst generator in one compact package.

Model 135
Lin/Log
Sweep Generator
0.2 Hz to 2 MHz
∿, ⊓, ⋀, ◿.
$695



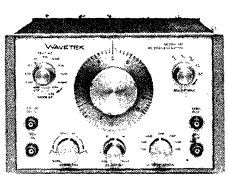
The Model 135 Sweep Generator is an extension of the Model 134 described above. The frequency of this instrument can be swept over a 1,000:1 ratio by a selectable linear or logarithmic sweep function. Among its many uses, the Model 135 is ideally suited for audio testing where uninterrupted sweeping of the entire audio range is desired.

Model 136
VCG/VCA Generator
0.2 Hz to 2 MHz
∿, ⊓, ⋀, ◇◇◇
$595



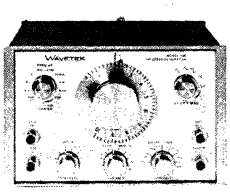
The Model 136 VCG/VCA Generator provides a new dimension in oscillator/function generator performance. In addition to the VCG capability of the Wavetek Model 131, this instrument provides true amplitude modulation (VCA). Either amplitude modulation, frequency modulation or a combination of the two can be externally controlled by remote programming voltages.

Model 142
HF VCG Generator
0.0005 Hz to 10 MHz
∿, ⊓, ⋀, ⊥, ⊤.
$595



The Model 142 is a precision laboratory source of sine, triangle, square, positive pulse, and negative pulse waveforms; whose output waveshape may be made either symmetrical or non-symmetrical (20:1 non-symmetry max.) at the user's option. Its wide frequency range (0.0005 Hz to 10 MHz) and its precision output attenuator (six 10 dB steps) are characteristic of the laboratory quality built into this instrument.

Model 144
HF Sweep Generator
0.0005 Hz to 10 MHz
∿, ⊓, ⋀, ⊥, ⊤, ◿.
$845



The Model 144 combines all the features of a Model 142 with an independent triggered ramp or sawtooth generator supplying a sweep voltage for the output waveforms. In addition to the internal sweep, terminals are provided for external voltage control of frequency (VCG)—either dc programmed or wideband ac modulation. This unit also employs a precision output attenuator, variable in six 10 dB steps.

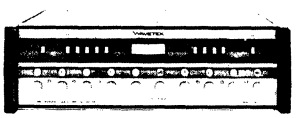
WAVETEK® P.O. Box 651, San Diego, Calif. 92112; Tel. 279-2200, TWX 910-335-2007

Programmable Generators, Sweepers, and Phase Meters

Models 150/155 Programmable Generators
0.01 Hz to 1 MHz
∿, ⊓, ⋀.
$995/$1195

The 150 Series Programmable Voltage Controlled Generators are specifically designed for automatic systems applications. Both instruments can be programmed in frequency, function and amplitude from a remote digital source. The Model 155 also can be operated manually. The frequency of both generators can be controlled by a dc voltage or modulated by an ac signal. Output may be continuous, triggered, or gated by an external signal.

Models 157/170 Programmable Waveform Synthesizer
100μ Hz to 1 MHz
in 10 ranges ∿, ⊓, ⋀.
$2995/ $2395

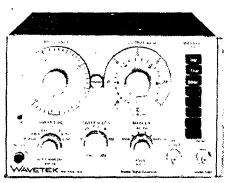


The 157/170 Series allows frequency, function and amplitude to be controlled locally with front-panel switching or remotely by BCD programming. A trigger capability allows a single cycle of any waveform (or a burst of cycles) when gated from an external source. VCO sweep and gated tone burst can be automatically programmed from digital or analog sources.

Model 154 Programmable DC/Signal Generator
0.001 Hz to 10 MHz
∿, ⊓, ⋀, ◇◇.
$1995

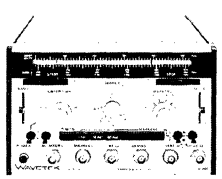
The Model 154 Programmable Generator provides sine, square and triangle waveforms from 0.001 Hz to 10 MHz. In addition to the waveforms, dc voltage output to ±10 volts may be selected. The instrument may be controlled by front panel controls or remote logic level digital programming of all functions. To add to the versatility of the unique instrument, the frequency and amplitude may be modulated by an external analog signal.

Models 1001-1005 Sweep/Signal Generator
0.5 MHz to 1.4 GHz
$995/$1095



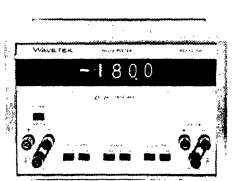
The 1000 Series Sweep Generators are wideband general purpose instruments offering selected frequency bands and multi-function capabilities. The five instruments and their frequency ranges are 1001 — 0.5 to 300 MHz; 1002 — 1.0 to 500 MHz; 1003 — 350 to 650 MHz; 1004 — 500 to 1000 MHz; 1005 — 700 to 1400 MHz. The output signal is controllable over a 77 dB range and sweep width can be adjusted from 200 kHz to the full band of the instrument.

Model 2001 Sweep/Signal Generator
0.5 MHz to 1.4 GHz
$1695



The Model 2001 is a three band Sweep Generator with exceptional versatility in a rugged inexpensive instrument. The easy-to-use controls allow precise selection of operational mode (Start-Stop, Δf, or CW) and of frequency limits. Sweep width can be up to 500 MHz. Output level is controllable over a 90 dB range, from +10 dBm to −80 dBm. The unique capabilities of the 2001 are equally suited to laboratory or production applications.

Models 740/750 Phase Meters
10 Hz to 2 MHz
$895/$1495



The Models 740 and 750 Phase Meters will accurately measure the phase angle between any two ac signals having an amplitude ratio as great as 1,000:1 within the 10 Hz to 2 MHz range. Automatic operation eliminates the need for amplitude matching, frequency tuning and output filtering, resulting in true hands-off operation. The Model 740 has an analog readout; the Model 750 has a 4-digit (0.1°) readout.

Model 755 Programmable Phase Meter
40 Hz to 2 MHz
$1995

The Model 755 is an automatic digital phase meter intended for phase measurement in systems applications. It features automatic/programmable operation and permits measurement over a 1,000:1 range of input signals. The Model 755 may be programmed to update a phase angle reading upon receipt of a read command from an external source. All automatic controls may be operated manually from rear panel for added convenience.

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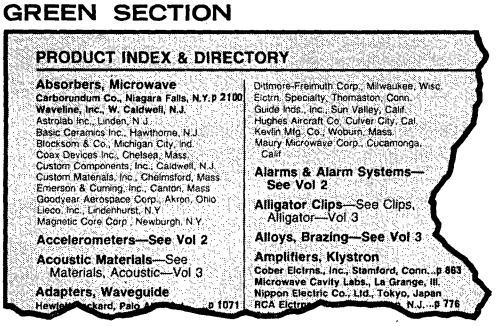
How to use eem

to find manufacturers of a specific product

GREEN SECTION


PRODUCT INDEX & DIRECTORY

Absorbers, Microwave
Carborundum Co., Niagara Falls, N.Y.p 2100
Waveline, Inc., W. Caldwell, N.J.
Astrolab Inc., Linden, N.J.
Basic Ceramics Inc., Hawthorne, N.J.
Blocksom & Co., Michigan City, Ind.
Coax Devices Inc., Chelsea, Mass.
Custom Components, Inc., Caldwell, N.J.
Custom Materials, Inc., Chelmsford, Mass.
Emerson & Cuming, Inc., Canton, Mass.
Goodyear Aerospace Corp., Akron, Ohio
Lieco, Inc., Lindenhurst, N.Y.
Magnetic Core Corp., Newburgh, N.Y.

Accelerometers—See Vol 2

Acoustic Materials—See Materials, Acoustic—Vol 3

Adapters, Waveguide
Hewlett-Packard, Palo A... p 1071
Ditmore-Freimuth Corp., Milwaukee, Wisc.
Elctrn. Specialty, Thomaston, Conn.
Guide Inds., Inc., Sun Valley, Calif.
Hughes Aircraft Co, Culver City, Cal.
Kevlin Mfg. Co., Woburn, Mass.
Maury Microwave Corp., Cucamonga, Calif.

Alarms & Alarm Systems—See Vol 2

Alligator Clips—See Clips, Alligator—Vol 3

Alloys, Brazing—See Vol 3

Amplifiers, Klystron
Cober Elctrns., Inc., Stamford, Conn...p 863
Microwave Cavity Labs., La Grange, Ill.
Nippon Electric Co., Ltd., Tokyo, Japan
RCA Elctrn... N.J....p 776

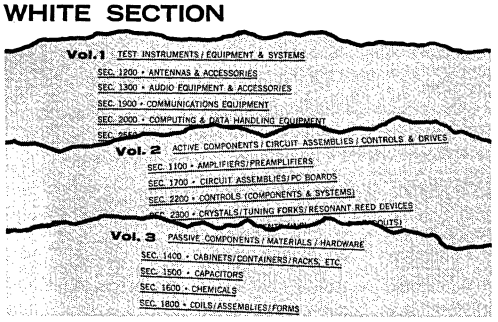
Each of the three volumes of **eem** contains a Product Index and Directory, the Green Section. This Index is a complete alphabetical listing of products. If the product you are looking for appears in the particular volume you are consulting, the green pages will provide a complete list of manufacturers who make that product. If the product is included in another volume of **eem**, the Index will provide a cross reference, directing you to the correct volume.

Boldface listings under product headings indicate that the listed manufacturer has products cataloged in **eem. Boldface** listings with page numbers indicate that this manufacturer's catalog pages include detailed data on the product indicated in the product heading.

Similar products are grouped together. For example, the many kinds of meters are listed in this manner: "Meters, Ampere," "Meters, Capacitance," "Meters, Flux" etc. To help you locate the prime product heading, there are hundreds of cross references, e.g. "Voltmeters — See Meters, Volt."

to find manufacturers' catalog information

WHITE SECTION


Vol. 1 TEST INSTRUMENTS / EQUIPMENT & SYSTEMS
SEC. 1200 • ANTENNAS & ACCESSORIES
SEC. 1300 • AUDIO EQUIPMENT & ACCESSORIES
SEC. 1900 • COMMUNICATIONS EQUIPMENT
SEC. 2000 • COMPUTING & DATA HANDLING EQUIPMENT
Vol. 2 ACTIVE COMPONENTS / CIRCUIT ASSEMBLIES / CONTROLS & DRIVES
SEC. 1100 • AMPLIFIERS/PREAMPLIFIERS
SEC. 1700 • CIRCUIT ASSEMBLIES/PC BOARDS
SEC. 2200 • CONTROLS (COMPONENTS & SYSTEMS)
SEC. 2300 • CRYSTALS/TUNING FORKS/RESONANT REED DEVICES
Vol. 3 PASSIVE COMPONENTS / MATERIALS / HARDWARE
SEC. 1400 • CABINETS/CONTAINERS/RACKS, ETC.
SEC. 1500 • CAPACITORS
SEC. 1600 • CHEMICALS
SEC. 1800 • COILS/ASSEMBLIES/FORMS

Catalog pages in **eem** are divided into three volumes based on very broad product groupings. These are:

Volume 1 — Test Instruments / Equipment and Systems

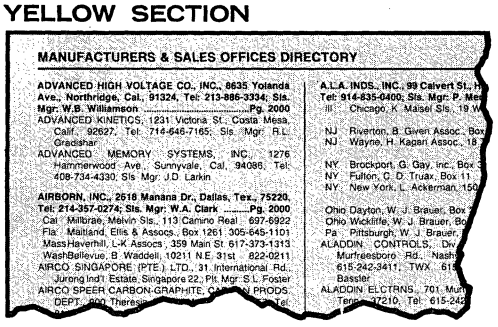
Volume 2 — Active Components / Circuit Assemblies / Controls and Drives

Volume 3 — Passive Components / Materials / Hardware

These volumes are further divided into 55 **eem** Product Sections which are assigned individually to the most appropriate volume. Within each of the 55 product sections manufacturers are arranged alphabetically, wherever possible. A complete index of all manufacturers' catalog pages is included in every volume. To locate the catalog pages of a specific manufacturer, refer to this index at the beginning of the white section in any of the three volumes. This index will provide the page numbers you require. In Volume 1, the index begins on page 302, in Volume 2 on page 1274 and in Volume 3, page 2310.

to find manufacturers' addresses, phones and sales offices

YELLOW SECTION


MANUFACTURERS & SALES OFFICES DIRECTORY

ADVANCED HIGH VOLTAGE CO., INC., 8635 Yolanda Ave., Northridge, Cal., 91324, Tel: 213-886-3334; Sls. Mgr: W.S. Williamson .....Pg. 2000
ADVANCED KINETICS, 1231 Victoria St., Costa Mesa, Calif., 92627, Tel: 714-646-7165; Sls. Mgr: R.L. Gradishar
ADVANCED MEMORY SYSTEMS, INC., 1276 Hammerwood Ave., Sunnyvale, Cal, 94086, Tel: 408-734-4330; Sls Mgr: J.D. Larkin

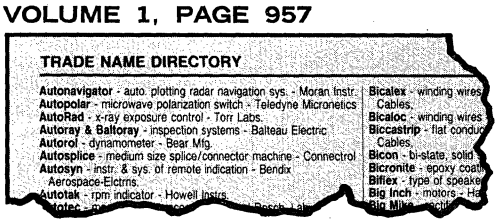
AIRBORN, INC., 2616 Manana Dr., Dallas, Tex., 75220, Tel: 214-357-0274; Sls. Mgr: W.A. Clark .....Pg. 2000
Cal Millbrae, Melvin Sls., 113 Camino Real 697-6922
Fla Maitland, Ellis & Assocs., Box 1261 305-645-1101
MassHaverhill, L-K Assocs., 359 Main St 617-373-1313
WashBellevue, B Waddell, 10211 N.E. 31st 822-0211
AIRCO SINGAPORE (PTE.) LTD., 31 International Rd., Jurong Ind'l Estate Singapore 22, Plt. Mgr: S.L. Foster
ARCO SPEER CARBON-GRAPHITE, CA... PRODS., DEPT. 800 Theres... Tel:

A.L.A. INDS., INC., 99 Calvert St., H... Tel: 914-835-0400; Sls. Mgr: P. Me...
Ill Chicago, K. Maisel Sls., 19 W...
NJ Riverton, B. Given Assoc., Box...
NJ Wayne, H. Kagan Assoc., 18...
NY Brockport, G. Gay, Inc., Box...
NY Fulton, C. D. Truax, Box 11...
NY New York, L. Ackerman, 150...
Ohio Dayton, W. J. Brauer, Box...
Ohio Wickliffe, W. J. Brauer, Bo...
Pa Pittsburgh, W. J. Brauer,
ALADDIN CONTROLS, Div... Murfreesboro Rd., Nashv... 615-242-3411; TWX 615... Bassler
ALADDIN ELCTRNS., 701 Murf... Tenn., 37210, Tel: 615-242...

More than 6,000 manufacturers of electronic components, materials, instruments, assemblies, systems and key services are listed in the Yellow Section. An identical Yellow Section appears in each of the three volumes of **eem**, listing addresses, phone numbers and sales managers' names. TWX numbers are also included where available. **Boldface** listings indicate that detailed information on the manufacturers' products is cataloged in the White Section of **eem. Boldface** listings also indicate that local sales offices or representatives are listed for that manufacturer.

to find trade name sources

VOLUME 1, PAGE 957


TRADE NAME DIRECTORY

Autonavigator - auto. plotting radar navigation sys. - Moran Instr.
Autopolar - microwave polarization switch - Teledyne Micronetics
AutoRad - x-ray exposure control - Torr Labs.
Autoray & Baltoray - inspection systems - Balteau Electric
Autorol - dynamometer - Bear Mfg.
Autosplice - medium size splice/connector machine - Connectrol
Autosyn - instr. & sys. of remote indication - Bendix Aerospace-Elctrns.
Autotak - rpm indicator - Howell Instrs.
Notes: ... Resch...
Bicalex - winding wires Cables.
Bicaloc - winding wires
Biccastrip - flat conduc Cables.
Bicon - bi-state, solid
Biconite - epoxy coat
Biflex - type of speake
Big Inch - motors - Ha
Big Mike - ...ch...

If you know only the trade name, brand name or trade mark of a product, you can locate it in **eem** by using the **Trade Name Directory.** This appears only in Volume 1, beginning on page 957 of the White Section. These pages can be identified by a vertical black band along the outside edge.

if you require additional assistance

contact the Editorial Department, United Technical Publications, Inc., 645 Stewart Ave., Garden City, N.Y. 11530, or phone (516) 248-9700.

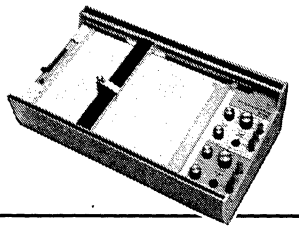
PLOTAMATIC X-Y RECORDERS

SERIES 700 LOW-COST 8½" × 11" RECORDERS WITH PAD/LOAD®

The Series 700 recorders, while low in cost, still meet or exceed the performance specifications of many higher-priced recorders.

The new "PAD/LOAD"® paper feed system operates three times faster than those available on conventional single sheet machines. A 50-sheet pad of paper is loaded into the recorder, and as each page is consumed, the operator simply tears off the used sheet, exposing a new sheet.

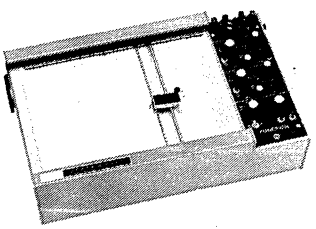
All Series 700 PLOTAMATICS have • I/C circuitry • no mechanical or photo choppers • clean fibre-tip pens • electronic overdrive protection • operate from 50–400 Hz power • buffered feedback potentiometers for noise immunity ± 0.2% F.S. accuracy • 17 in./sec, slew speed • differential guarded inputs with 140 dB CMR • no servo gain adjustments.



MODEL NO. Standard	MODEL NO. Metric	APPLICATION	INPUT RANGES	TIME BASE	OPTIONS	PRICE FOB SNA	DELIVERY
705		dedicated	1 range: 100 mV/in.*	Option 1	2, 3, 4, 5	$750	Stock to 45 days
	705M	dedicated	1 range: 40 mV/cm*	Option 1	2, 3, 4, 5	$750	
715		general purpose	5 ranges: 1 mV/in. to 10 V/in.	Option 1	2, 3, 4	$880	Stock to 30 days
	715M	general purpose	5 ranges: 0.5 mV/cm to 5.0 V/cm	Option 1	2, 3, 4	$880	

SERIES 600 HIGH PERFORMANCE 8½" × 11" RECORDERS

Series 600 PLOTAMATICS offer the convenience of • higher speeds (20 in./sec slewing) • up to 1000 sec. built-in time base • sixteen selectable ranges with 1/2/5/10 scaling • choice of capillary or fibre-tip pens • differential-pressure paper hold-down • front-panel-selected potentiometric input • ± 0.2% F.S. accuracy • 0.5 mV/in. maximum sensitivity.

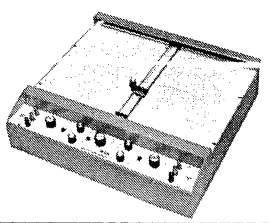


MODEL NO. Standard	MODEL NO. Metric	APPLICATION	INPUT RANGES	TIME BASE	OPTIONS	PRICE FOB SNA	DELIVERY
600		general purpose	0.5 mV/in. to 50 V/in.	0.01 to 1.0 in./sec.	3, 4, 6, 7, 9	$1675	Stock to 45 days
	600M	general purpose	0.2 mV/cm to 20 V/cm	20 to 0.1 sec/cm	3, 4, 6, 7, 9	$1675	
610		w/o time base	0.5 mV/in. to 50 V/in.	Option 1	3, 4, 6, 7, 9	$1475	Stock to 60 days
	610M	w/o time base	0.2 mV/cm to 20 V/cm	Option 1	3, 4, 6, 7, 9	$1475	

SERIES 800 LOW-COST 11" × 17" RECORDERS

The Series 800 low-cost recorders meet or exceed the performance specifications of many higher-priced units.

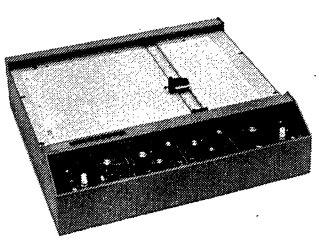
All Series 800 PLOTAMATICS have • I/C circuitry • no mechanical or photo choppers • fibre-tip or optional capillary pens • electronic overdrive protection • differential-pressure paper hold-down • buffered feedback potentiometers for noise immunity • ± 0.2% F.S. accuracy • 30 in./sec slew speed • differential, guarded inputs with 140 dB CMR • no servo gain adjustments.



MODEL NO. Standard	MODEL NO. Metric	APPLICATION	INPUT RANGES	TIME BASE	OPTIONS	PRICE FOB SNA	DELIVERY
805		dedicated	1 range: 100 mV/cm*	Option 1	2, 3, 4, 5, 8, 9	$850	Stock to 45 days
	805M	dedicated	1 range: 40 mV/cm*	Option 1	2, 3, 4, 5, 8, 9	$850	
815		general purpose	5 ranges: 1 mV/in. to 10 V/in.	Option 1	2, 3, 4, 8, 9	$980	Stock to 30 days
	815M	general purpose	5 ranges: 0.5 mV/cm to 5.0 V/cm	Option 1	2, 3, 4, 8, 9	$980	

SERIES 800A HIGH PERFORMANCE 11" × 17" RECORDERS

Series 800A PLOTAMATICS offer the convenience of • 20 in./sec. slewing • up to 1500 sec. built-in time base with automatic reset • sixteen selectable ranges with 1/2/5/10 scaling • choice of capillary or fibre-tip pens • differential-pressure paper hold-down • front-panel selected potentiometric input • ± 0.15 F.S. accuracy • 0.5mV/inch maximum sensitivity.



MODEL NO. Standard	MODEL NO. Metric	APPLICATION	INPUT RANGES	TIME BASE	OPTIONS	PRICE FOB SNA	DELIVERY
800A		general purpose	0.5 mV/in. to 50 V/in.	8 ranges 0.01 to 2 in./sec.	3, 4, 9	$1975	Stock to 30 days
	800AM	general purpose	0.2 mV/cm to 20 V/cm	8 ranges 0.02 to 4 cm/sec	3, 4, 9	$1975	
810A		high performance w/o time base	0.5 mV/in. to 50 V/in.	Option 1	3, 4, 9	$1795	Stock to 45 days
	810AM	w/o time base	0.2 mV/cm to 20 V/cm	Option 1	3, 4, 9	$1795	

*20% internal range adjustment. Some other ranges available on special order.

OPTIONS (Generally Available Only at Time of Initial Order)

1. Model 7T Plug-In Time Base Generator.
2. Locking Knobs (Series 700 & 800 Only)
3. Rack Mount
4. Special Paint
5. Electric Pen-Lift (for Models 705 & 805 Only)
6. Rear X and Y Input Connectors (Series 600 Only)
7. Remote Pen-Lift Control (Series 600 only)
8. Modification for Operation from 400 Hz Power (Series 800 Only)
9. Retransmitting Potentiometers (All Models except Series 700)

For additional information on X-Y Recorder options accessories, and supplies, contact our local sales representative.

Prices and delivery subject to change without notice.

BOLT BERANEK AND NEWMAN INC
DATA EQUIPMENT DIVISION
1762 McGaw Avenue • Santa Ana, California 92705 • Phone: (714) 546-5300

BRUSH DIRECT WRITING RECORDERS

produce written records of highest trace-clarity, crispness, uniformity and accuracy.

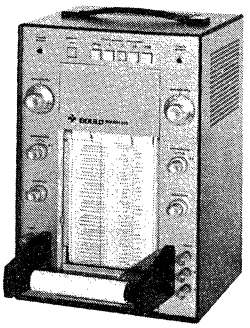
Here . . . from a single source . . . is a complete selection of versatile, general purpose and high-performance direct writing recorders. There's a choice of 1, 2, 3, 4, 6 and 8 analog channels (plus event markers).

The Brush Metrisite® precision servo penmotors and patented non-contact feedback system provides 99½% linearity and a true rectilinear trace.

The famous Brush patented pressurized-ink writing system is standard on all but the 816 Recorder. Pressurized ink-writing puts ink *into* the paper not onto it. There's no smudge, no smear, no puddling.

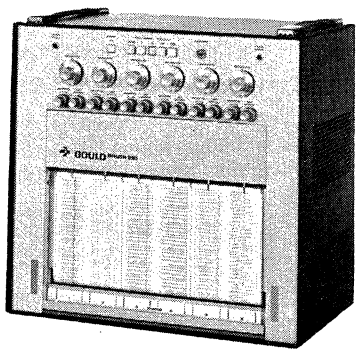
All electronics are solid-state. They are compatible with the wide variety of Brush signal conditioners. Most models are available in both portable and rack mounted versions. *Look to Brush for the optimum answer in direct writing recorders. Their performance is a matter of record.*

Brush General Purpose Recorders have versatility and ruggedness to handle a wide variety of recording tasks.



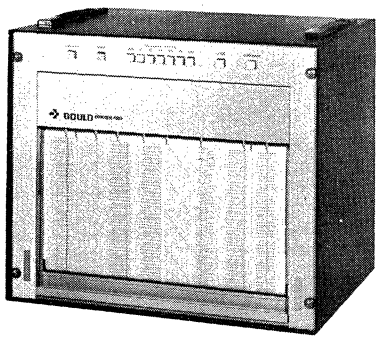
BRUSH 220
2-channel

A versatile, rugged, accurate recorder that's easy to operate and able to withstand inexperienced operator abuse. It only weighs 25 lbs. and comes with built-in preamps with a measurement range from 1 mV per division to 500V full scale. 4 pushbutton selected chart speeds from 1 to 125mm/sec. 2-40mm channels, 2 event markers. Frequency response is 40Hz f.s. Bulletin 942-1.



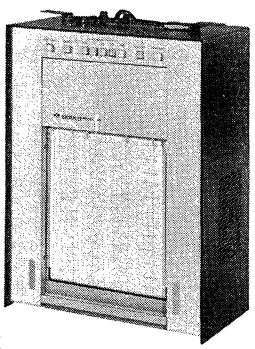
BRUSH 260
6-channel

This rugged recorder will handle the great majority of recording tasks with high precision and maximum operator convenience. Built-in preamps provide a measurement range from 1mV per division to 500V full scale, 6-40mm channels and 4 event markers. Frequency response 40Hz f.s. 8 pushbutton selected chart speeds from 1mm/sec. to 125mm/min. Portable, rack or mobile cart mounted. Bulletin 942-2.



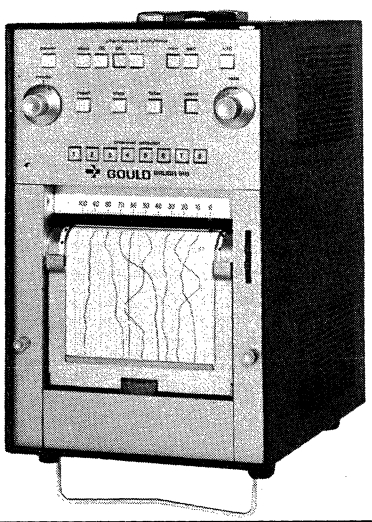
BRUSH 480
8-channel

One of our newest. This system was built for those who needed a general purpose recorder suited for a wide range of applications. 8—40mm channels and 2 event markers. Frequency response 40Hz f.s. Sensitivity ±2.5V f.s., fixed (100mV/div.) 12 pushbutton chart speeds from 0.05 to 200mm/sec. Portable or rack mounted. Bulletin 934-18.



BRUSH 440
4-channel

Designed for maximum versatility at low cost per channel. It's rugged and performs with exceptional reliability in laboratory or field application. 4—40mm channels and 2 event markers. Frequency response 40Hz, f.s. Sensitivity ±2.5V. Pushbutton selected 8 chart speeds from 1mm/sec. to 125mm/min. Portable, or 440 comes in a mobile console. Also available with 2-40mm and 1-80mm channel. Bulletin 934-19.

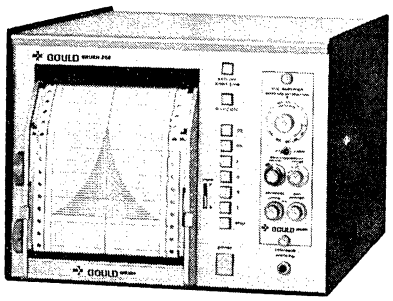


BRUSH 816
8-channel
hi-speed
multipoint

This recorder scans and displays up to 8 channels of data adjustable from 2 seconds per point to 16 points per second. Ideal for measuring temperature, pressure and other slow changing variables. Sensitivity ±2.5V. Frequency response: to 1Hz f.s., flat to 35Hz at useable amplitudes. 3 modes of operation. Multipoint, intensified, continuous. Felt tip capillary writing. 12 pushbutton selected chart speeds from 0.02 in/min. to 1 in/sec. Portable and rack mounted models. Bulletin 944-1.

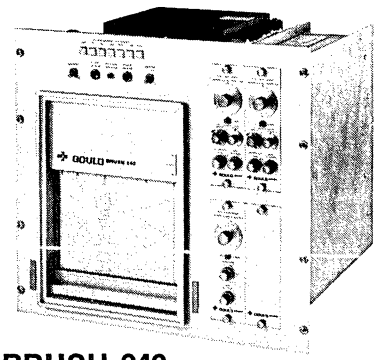
BRUSH HIGH PERFORMANCE RECORDERS

full scale response as high as 55 Hz with maximum resolution and clarity. Ideally suited for those precise and sensitive recording jobs which require the greatest accuracy obtainable.



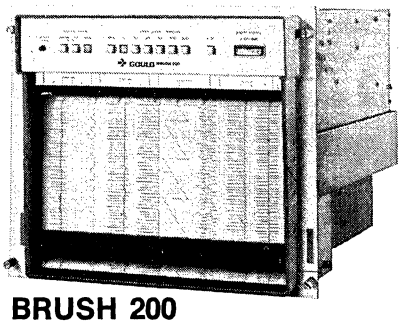
BRUSH 250
single channel

Fastest, most versatile strip-chart recorder anywhere. Frequency response is flat ±2% f.s. from d-c to 10Hz on a full 4½" span. Useful response to 100Hz. Accepts all Brush plug-in preamps. Sensitivity ±2.5V f.s. Detachable chart paper magazine, 12 pushbutton selectable chart speeds from 5 in/sec. to 1/10 of an inch/min. (or 8 days of continuous recording.) Portable or rack mounted. Bulletin 936-1.



BRUSH 240
4-channel

This recorder was designed for applications where versatility, maximum resolution and precision are required. Modular design permits use of interchangeable preamps. Rack, cabinet or cart mounted. Frequency response to 55Hz on 40mm and 35Hz on 80mm channels. 2 event markers. 12 pushbutton chart speeds from 0.05 to 200mm/sec. Sensitivity ±2.5V. Bulletin 934-16.

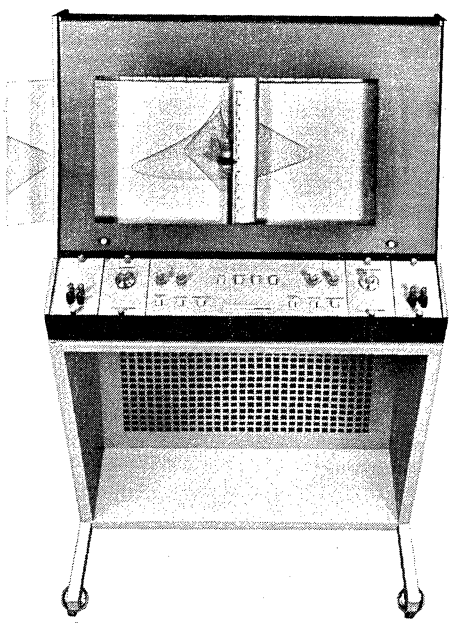


BRUSH 200
8-channel

The world's standard for high performance direct writing recorders. The Brush 200 can be tailored to your specific requirements through a broad range of modular sub-systems. There is a choice of rack or roll around cabinets with vertical or horizontal oscillographs and a wide range of pen-motor and 80 and 40mm channel width combinations. 2 event markers. Frequency response 55Hz f.s. Useable response to 200Hz. 12 pushbutton chart speeds from 0.05 to 200mm/sec. The Brush 200's record for dependability and accuracy is unmatched. Bulletin 934-7.

BRUSH 280
2-channel

Permits analysis of precise recorded data with accuracy and resolution never before possible in medium-frequency recorder. Double width 80mm channels and 2 event markers. 35Hz response f.s. Built-in preamps provide a measurement range from 0.5mV/div. to 500V f.s. 12 pushbutton selectable chart speeds from 0.05 to 200mm/sec. Portable or cart mounted. Bulletin 934-21.



BRUSH 1000
high performance X-Y plotter

Pressurized fluid writing permits skip-free, smooth writing at speeds to 100 inches/sec. Ultra fast response produced by high torque servo motors 1750 in/sec² in X and 2750 in/sec² in Y directions. Non-contact feedback system insures pen positioning of 99¾% linearity. Maintenance free operation. No slidewires. 10x15" writing area and a 100' chart roll. Ink cartridge good for 41 miles of trace. Pen needs no priming and it writes dry. Sensitivity 5mV/div. utilizes plug-in preamps. Must be seen in operation—it's in a class by itself. Bulletin 943-1.

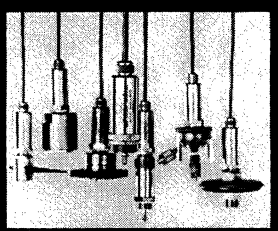
Contact your nearest Brush Sales Engineer or Representative for further information and pricing on instruments featured and our complete line of signal conditioners and accessories. Or contact Brush Division, Gould Inc., 3631 Perkins Avenue, Cleveland. Ohio 44114.

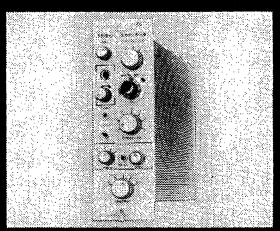
GOULD BRUSH

From Honeywell: Nine ways to make data do what you want it to

Whether your problem is transducing data, conditioning a signal . . . readout or recording, Honeywell has the experience, the instruments, the complete data acquisition systems you need for a better solution.

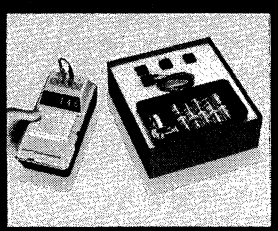
Statham Transducers
Need someone to assume single source responsibility for your measurement problems? Honeywell has the Statham family of general purpose strain gage transducers . . . a line so complete, we can help you measure virtually any parameter.

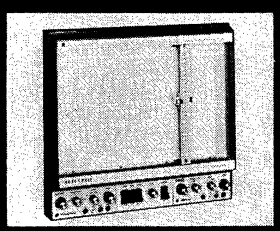




Signal Conditioning
Our complete line of signal conditioning devices, includes everything from strain gage control units to attenuators and amplifiers; gives you interface between transducer and measuring, monitoring or recording instruments.

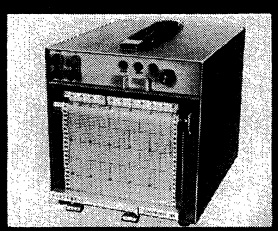
Digitest 500
The Digitest 500 is the world's smallest digital multimeter. And, yet, it gives you five functions and 17 ranges to choose from. Plus, it provides five times the accuracy of the conventional VOM!

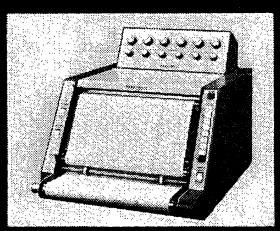




X-Y Graphic Recorders
Make direct recordings of transducer outputs with respect to time or other independent variables.

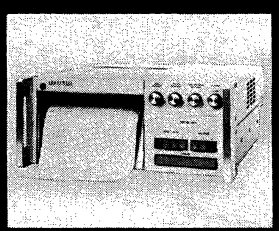
Strip Chart Recorders
For highly accurate measurement and recording of long-term transducer outputs – 1 or 2 channel.

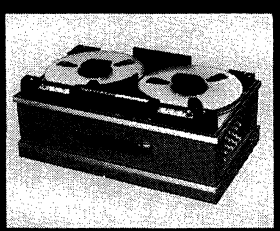




Ink Writing Oscillographic Recorders
Record up to eight channels simultaneously for simplified correlation.

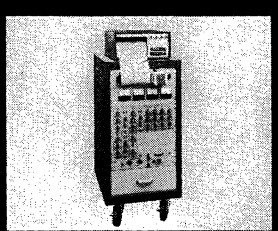
Light Beam Oscillographic Recorders
Multiple channel recording of signals requiring higher frequency response.





Magnetic Tape Recorders
A permanent record available for repeated analysis, remote display and/or control functions.

And complete systems
If your need is for a complete data acquisition system . . . incorporating single or multiple data channels . . . Honeywell can supply this as well, completely installed and ready to go on-line.



For additional information about these products, contact: Honeywell, Test Instruments Division, P. O. Box 5227, Denver, Colorado 80217.

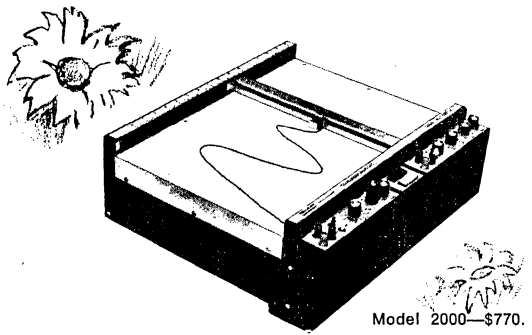
Honeywell

Omnigraphic® Plotters Continue to Offer More Features, Less Cost

MODEL 2000 SERIES

Feature for feature, model for model—
a superior X-Y with unmatched flexibility:

- ☐ Both 8½″ x 11″ and 11″ x 17″ charts
- ☐ A choice of 12 interchangeable modules from $25. to $420.
- ☐ English/Metric scaling switch
- ☐ Vacuum paper hold down
- ☐ 20 in/sec. speed (30 in/sec. available)
- ☐ ± .2% overall accuracy with ±0.1% repeatability
- ☐ Electric pen lift
- ☐ Disposable non-drying pens



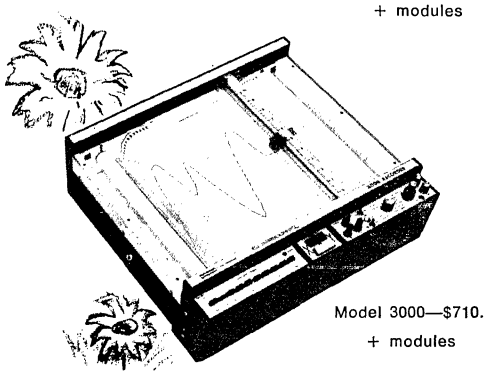
Model 2000—$770.
+ modules

MODEL 3000 SERIES

Strip Chart recording with multi speeds
and wide range of input functions:

- ☐ Paper size: 10″ (25cm) x 100′
- ☐ Nine pushbutton selectable speeds from .05 to 20 in./min.
- ☐ Nine interchangeable Y axis modules
- ☐ Positive paper feed or roll take-up
- ☐ Rack, panel or bench mounting
- ☐ Electric pen lift ☐ Event marker

Also available: 2 pen Strip Chart, model 2-3300-52, $1205. + Y1 & Y2 modules. Strip Chart with full scale Integration, model 2-3300-52-13 $1680 + Y axis module



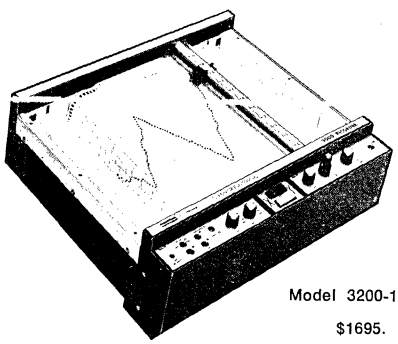
Model 3000—$710.
+ modules

POINT PLOTTER

Point plotter designed for use with pulse height analyzers, digital oscilloscopes. DVM's, counters or scanners. Simply plug in and you get:

- ☐ Plot rate 10/sec. @ 20 points/inch
- ☐ Four Step resolution from 0.025″ to 0.10″
- ☐ High accuracy of ±0.2% with ±0.1% repeatability
- ☐ Fibre Tip Pen in choice of colors
- ☐ Plots 400 channels in 27 seconds
- ☐ Plugs into the following Pulse Height Analyzers with only a cable change:

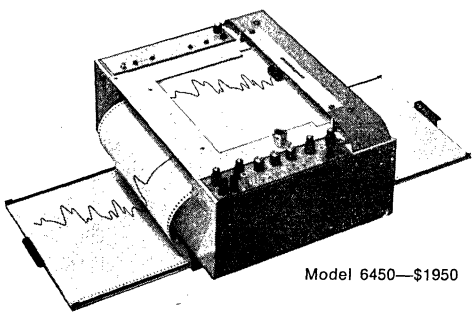
Fabri-Tec	**Intertechnique**	**Laben**	**Northern Scientific**	
Nuclear Data	**Packard**	**RCL-RIDL**	**TMC**	**Victoreen**



Model 3200-16-17
$1695.

X-Y Plotting is now more convenient with
the Omnigraphic® 6450 because it has all the
advantages of conventional X-Y's, yet offers:

- ☐ Z-fold paper eliminates hand loading of individual charts
- ☐ Automatic index or reversal of chart on command—local or remote.
- ☐ Slewing speed 20 in/sec. on Y (pen) axis and 15 in/sec. on X (paper) axis.
- ☐ 18 calibrated DC voltage ranges (continuously variable between ranges).
- ☐ Input impedence 1 megohm, all ranges fixed and variable
- ☐ Accuracy ± 0.2% of full scale, repeatability ± 0.1%
- ☐ 11″ x 17″ recording surface
- ☐ Pen control local or remote
- ☐ Front panel switch for automatic English/Metric scaling
- ☐ Ask about 2 pen model 6452 @ $2720.



Model 6450—$1950

OEM DISCOUNTS AVAILABLE

Full line of COMPLOT® Digital Plotting Systems for online, offline and remote time sharing. Ask for COMPLOT® brochure.

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Division of Envirotech Corporation
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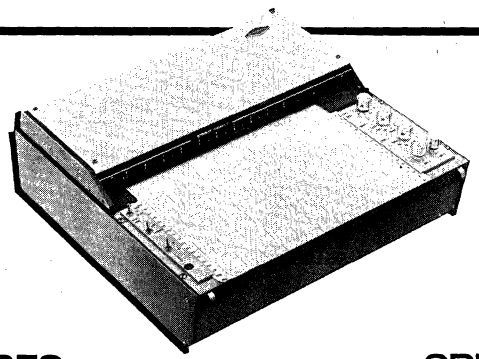
(415) 968-9710 • TWX 910-379-6972

STRIP CHART RECORDERS

LABORATORY SERIES, FLAT BED MODELS



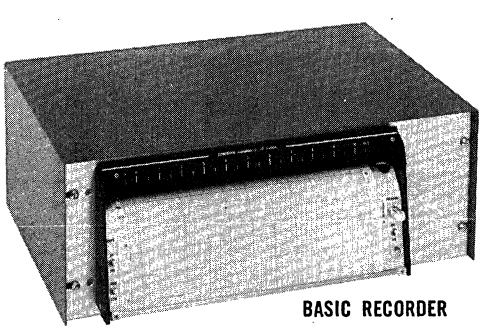
FEATURES

- **Small size / Lightweight**
- **Easy and convenient to operate**
- **Rugged, reliable, all solid state construction**
- **Ink loads quickly from the front**
- **500 K ohm minimum input impedance**
- **Multi-Speed / Multi-Range**
- **Complete line of useful accessories**
- **Pen lifter, lifts all pens off paper**
- **Instant "drop-in" chart loading**

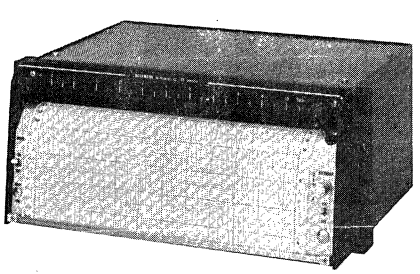
SPECIFICATIONS

Accuracy:	0.3% of full scale
Response:	20 in/sec (½ sec full scale) pen speed
Input Resistance:	500 K ohms (minimum)
Input Circuit:	Single-ended floating. May be floated up to 150 VDC above chassis potential
Filter Switch:	"On-Off" (a 150 mfd capacitive filter)
Electrical Span:	6-range system (1 mv to 500 mv) Plug-in Amplifier Circuit (each channel)
Multiple Range:	7-position range selector switch: zero or "shorted recorder input for recorder zero adjustment:" 1 mv, 5 mv, 10 mv, 50 mv, 100 mv and 500 mv (all mv ranges have a constant 500 K ohms input impedance)
Multiple Chart Speeds:	10 speeds: 10 in/min to ½ in/hr in 10 switch-selectable speeds: ½, 1, 2½, 5, 10 in/min and ½, 1, 2½, 5, 10 in/hr 5 speeds: ½ to 10 in/min in 5 switch-selectable speeds: ½, 1, 2½, 5, 10 in/min.
Power Requirement:	105-125 VAC, 60 Hz. SC Model: 30 VA; DC Model: 55 VA
Writing Surface:	8" x 11"
Chart Width:	12 in. overall (11 in. calibrated)
Recorder Platen:	Solid stainless steel (prevent ink stains)
Size:	5 in. high x 15 in. deep x 16 in. wide
Net Weight:	22 lbs.

RACK MOUNT SERIES

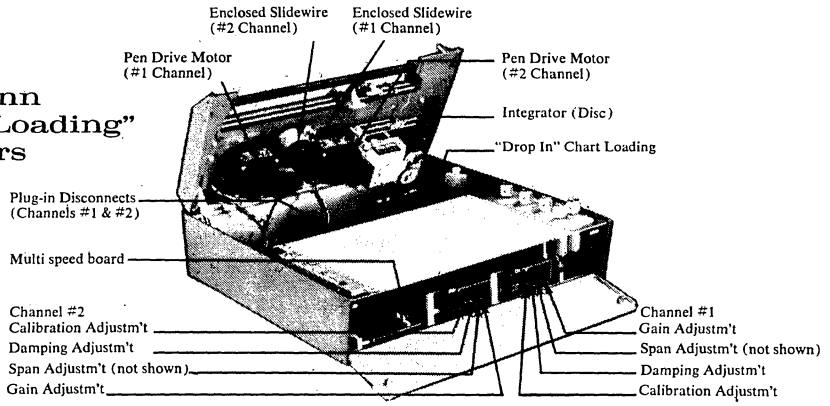


BASIC RECORDER



BENCH CABINET RECORDER

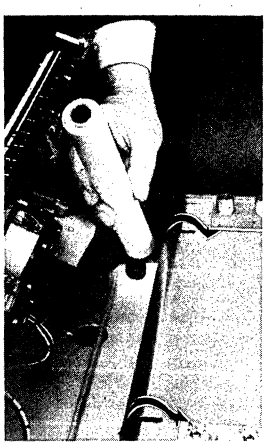
Dohrmann "Instant Loading" Recorders



MODELS AVAILABLE

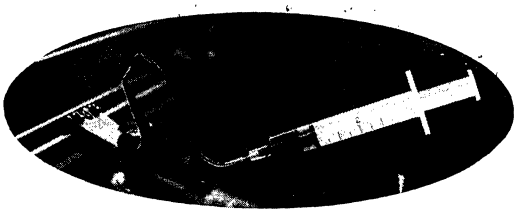
Single Channel Model Number	Dual Channel Model Number	Chart Width Over-All	Chart Width Calibrated
SC-1200*	DC-1200*	12 Inches	11 Inches

All recorders 5 inches high and 15 inches deep x 16 inches wide. *See price list for complete model number.



"Drop-In" Chart-Loading

Unique with the Dohrmann Recorder is the drop-in chart-loading system. The chart is dropped into the cradles which support the ends of the chart roll, then pulled across the forward "free-running" clutch-actuated drive sprockets . . . no tedious threading of chart paper is involved. Modern paper edge guides maintain the chart paper in a flat plane on the stainless steel writing table of the recorder with no obstruction of the recording.



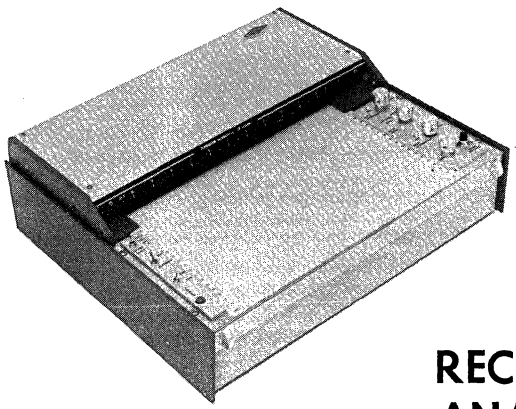
Fast "Long-Term" Inking — No Ink Spillage

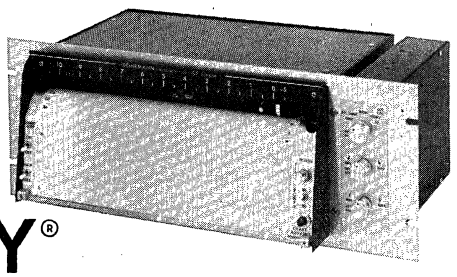
A special capillary pen system has been developed by Dohrmann to provide: (A) continuous writing at high speed; (B) no ink spillage when pen is driven off scale (against end stops); (C) large ink reservoir capacity; (D) easy ink-loading system. Using the ink syringe supplied with the recorder makes rapid, clean ink-loading possible and eliminates the "inverse meniscus" problem associated with wire pen cleaners. The pen can be primed easily by the hydraulic action of the syringe. Gone forever is the ink "mess" associated with loading the recorder pen.

Model	Description	Price
	LABORATORY — FLAT BED SERIES	
SC-1200R	Flat bed model, single channel, HORIZONTAL chart platen, six voltage spans (1, 5, 10, 50, 100 and 500 mV); five chart speeds (0.5, 1.0, 2.5, 5.0, and 10 in/min). RIGHT hand zero.	$ 980.00
SC-1200L	Same as SC-1200R above, with LEFT hand zero.	980.00
DC-1200R	Dual channel. Identical to SC-1200R, but provides 2 independent pen traces from 2 independent signal sources. Separate controls for each channel. RIGHT hand zero.	1580.00
DC-1200L	Same as DC-1200R above with LEFT hand zero.	1580.00
R-300	Simplified version of SC-1200R. Features fixed, SINGLE SPAN input range of 1 mV and **two** speed chart drive (½ and 1 in/min). RIGHT hand zero.	880.00
R-400	Dual channel version of R-300 above.	1480.00
	RACK MOUNT (BENCH CABINET) SERIES	
RSC-1200R	Rack mount model, single channel, VERTICAL chart platen. Identical in specifications and performance to SC-1200R above. RIGHT hand zero.	980.00
RSC-1200L	Same as RSC-1200R above with LEFT hand zero.	980.00
RDC-1200R	Dual channel. Identical to RSC-1200R, but provides 2 independent pen traces from 2 independent signal sources. Separate controls for each channel. RIGHT hand zero.	1580.00
RDC-1200L	Same as RDC-1200R above with LEFT hand zero.	1580.00
R-100	Simplified version of RSC-1200R. Features fixed, SINGLE SPAN input range of 1 mV and **two** speed chart drive (½ and 1 in/min). RIGHT hand zero.	880.00
R-200	Dual channel version of R-100 above.	1480.00
	OPTIONS	
Z	10 SPEED CHART DRIVE switch — selectable chart speeds: 0.5, 1.0, 2.0, 2.5, 5.0 and 10 in/hr. Factory installed. (Not available on R-100, 200, 300, 400).	100.00
A	DISC INTEGRATOR — factory installed on right hand side of recorder. One channel only.	795.00
B	BENCH CABINET for RSC/RDC recorders.	100.00
C	BUCKING VOLTAGE — continuously adjustable voltage source. Positive or negative (1.3 V maximum).	60.00
E	EVENT MARKER — integral with trace, remotely located, manually operated. Supplied with 4 feet of cord.	45.00
Q	VARIABLE ATTENUATOR — continuously adjustable, X1 to X1000, for attachment to recorder input terminals.	60.00

DOHRMANN
ENVIROTECH

DOHRMANN
Division of Envirotech Corporation
1062 LINDA VISTA AVENUE, MOUNTAIN VIEW, CALIFORNIA 94040
(415) 968-9710 • TWX 910-379-6972





S-Y®

RECORDING FOR MULTI-CHANNEL ANALYZER APPLICATION

S-Y recording performs the plotting functions of an X-Y BETTER. The stepwise chart advance is synchronized with the memory scan, providing independent channel readout.

FEATURES

- **Out-performs X-Y Plotters**
- **Interlocks with All Multichannel Analyzers**
- **No Chart Length Limitation**
- **Completely Eliminates X-axis Point Plotting**

DESCRIPTION

The operational sequence of the S-Y is as follows:

As the analyzer advances to a new channel, the recorder pen traces the signal level for that channel while simultaneously inhibiting the chart advance. When the pen ceases to move, the chart drive circuit receives an advance signal from the analyzer and moves the paper **one** STEP, providing a plateau level for that particular channel.

The analyzer then proceeds to the next channel, repeating the procedure. The resulting histogram plot is very easy to interpret. The staircase plot eliminates searching for individual channels and tedious point plotting.

SPECIFICATIONS — DOHRMANN S-Y RECORDER

S-AXIS

Step Distance:	Three standard chart step options: 10 and 20 steps per inch 20 and 40 steps per inch
Repeatability:	0.1%, no accumulative error
Plot Rate:	750 points per minute
Chart Advance:	Automatically inhibited until recorder reaches balance. Manual overide
Compatibility:	Interface cabling to operate with all multichannel analyzers.

Y-AXIS

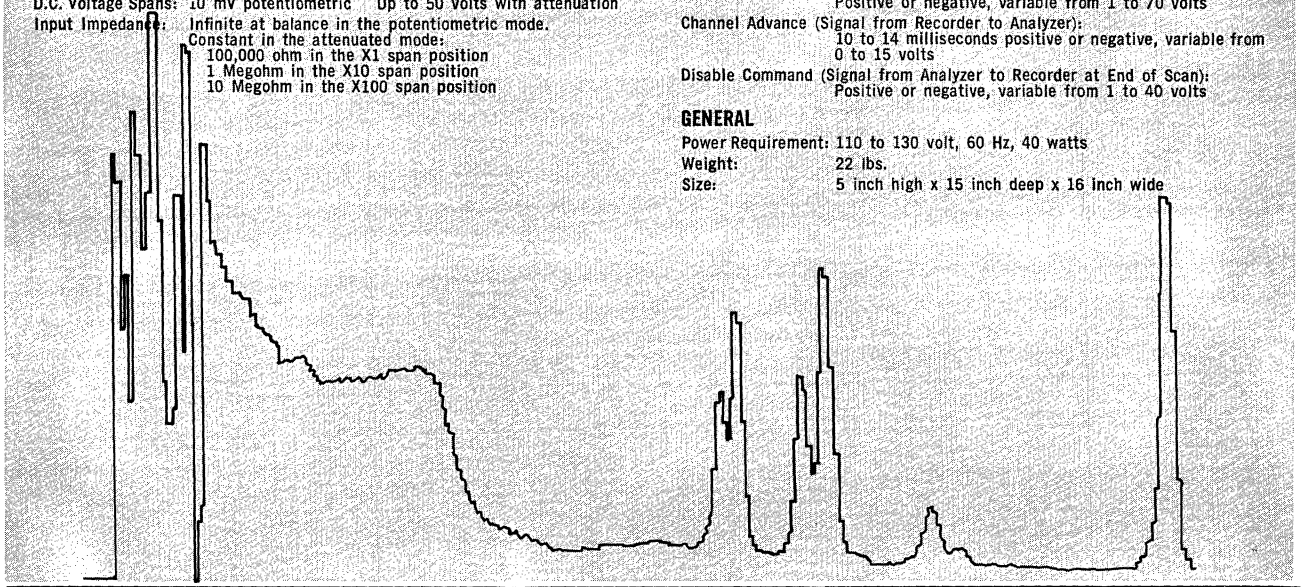
Input:	D.C. voltages
D.C. Voltage Spans:	10 mV potentiometric Up to 50 volts with attenuation
Input Impedance:	Infinite at balance in the potentiometric mode. Constant in the attenuated mode: 100,000 ohm in the X1 span position 1 Megohm in the X10 span position 10 Megohm in the X100 span position
Accuracy:	±0.15% of span
Purpose:	0.25 seconds for full scale deflection
Zero Adjustment:	±100% of span
Input Circuit:	Single ended floating. Accepts signals 200 volts D.C. above chassis ground
Damping:	Adjustable from underdamped to overdamped
Voltage Reference:	Zener diode regulated supply of 100 mV and 1 volt
Chart and Scale:	11 inch calibrated width. Graduated from −5 to 105 in 10 divisions per inch (Chart 704 204)

INTERFACE (RECORDER-ANALYZER)

Plot Gate (Enable-Disable Signal from Analyzer to Recorder):	Positive or negative, variable from 1 to 70 volts
Channel Advance (Signal from Recorder to Analyzer):	10 to 14 milliseconds positive or negative, variable from 0 to 15 volts
Disable Command (Signal from Analyzer to Recorder at End of Scan):	Positive or negative, variable from 1 to 40 volts

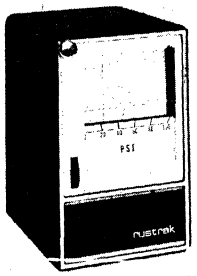
GENERAL

Power Requirement:	110 to 130 volt, 60 Hz, 40 watts
Weight:	22 lbs.
Size:	5 inch high x 15 inch deep x 16 inch wide



rustrak

miniature chart recorders



2162

Pressure Recorder.

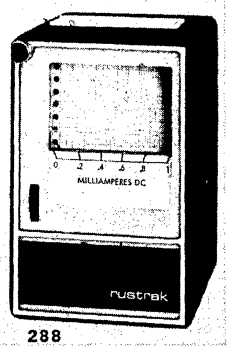
Single channel pressure recording of most liquids and gases using a C-type Bourdon tube. Standard ranges 0-15, 0-30, 0-50, 0-100, 0-200, 0-300 and 0-500 psi. Many special offset ranges available.

from $ 125.00

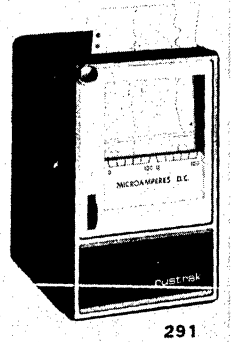
Single Channel DC Recorder.

Basic recorder in the Rustrak line. Ranges from 0-10 microamperes to 0-5 amperes DC; 0-10 millivolts to 0-500 VDC. Multipliers and shunts available. Chart speeds 1/32" to 480" per hour. Many available options, features and accessories. AC models also available.

from $ 99.50



288



291

Dual Channel DC Recorder

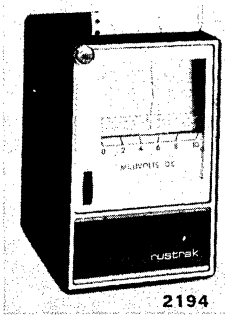
Same as basic Model 288 except dual channel with two galvanometers. Available in combinations of current and voltage or different ranges each channel. Usable chart width, 1" per channel. AC models also available.

from $ 143.50

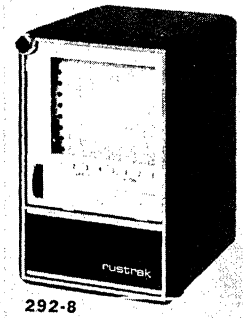
One Microampere DC Recorder.

Solid state with full-scale sensitivity of 1 microampere, range of 0 to 10 millivolts DC and input impedance of 10,000 ohms. For use as temperature bridge and strain gage readout or as a recorder accessory for laboratory and process instruments.

$ 180.00



2194

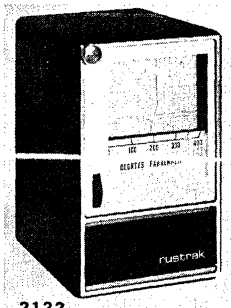


292-8

Event Recorders, Models 292-4, 292-8, & 392-16.

Four or eight channels. Records worktime, productivity of machines and personnel; provides data for time study, cost analysis, security control. Chart speeds to 50 inches per minute with definition of up to 16 events per second.

from $ 109.00

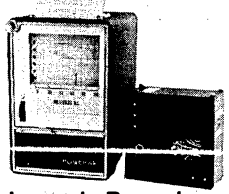


2122

Temperature Recorders.

Wide variety of temperature recorders using thermocouples, thermistors or nickel wire sensors. Ranges from −100° F. to +2400° F. and custom spans as narrow as 25° F. Also available in °C, and in single or dual channels.

from $ 150.00



400

Potentiometric Recorder.

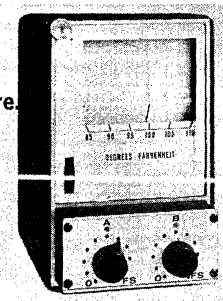
100 mV direct writing recorder offers 1 megohm input impedance and solid-state amplifier. Series of plug-in modules available for increased sensitivity to 1 mV full-scale. Other plug-ins with cold junction compensation and for special applications.

$ 239.00

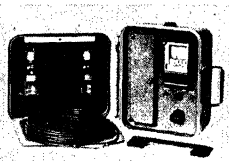
Recording-Controller Feature.

ON-OFF solid state controller feature available as option on most Rustrak recorders. Controls up to 5 amps resistive load at 30 VDC or 115 VAC. Set points continuously adjustable over entire chart range. Option price added to cost of companion recorder. Not available separately.

from $ 95.00



2133/F204AB

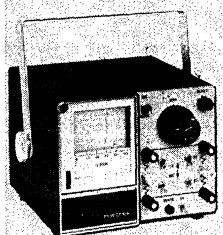


192

Dissolved Oxygen/Temperature Recorder.

Simultaneously records dissolved oxygen and temperature. Temp. range, 0 to 40° C. Operates unattended for about four weeks from two inexpensive batteries. Chart speed regulation, ±0.5%. For surveys in water pollution control programs.

$ 585.00

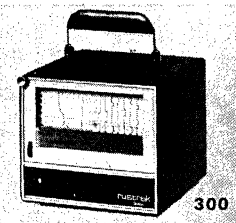


2195

Strain Gage Recorder.

Records resistance changes of gages used for measuring strain, stress, displacement, load, torque, or any transducer using strain gage sensing elements for static display. Maximum sensitivity: 500 micro-inches/inch. Self-contained instrument with regulated supply.

from $ 425.00



300

Series 300: Recorders

Available in many configurations combining functions of most other recorders. Event markers, controller feature, time-sharing also available. Case size is 6-5/8" W, 6-1/2" D, 5-5/8" H. Accuracy ±2% of full scale. Useable chart width, 2-5/16" per channel on basic recorder, 1" per channel on four channel model.

from $ 264.00

Dependable miniature instruments for permanently recording power, temperature, pressure, strain, events or virtually any parameter that can be converted into an electrical signal. • Inkless, dry writing, rectilinear recording with wide range of sensitivities, writing and chart speeds. • Operate as chart tear-off or reroll. Quick, easy chart review and rewind. Sliding access window. • Most units about 5-5/8" H, 3-5/8" W, 4-1/8" D. Weight about 3-1/2 lbs. • Rugged die-cast aluminum case in epoxy suede-like charcoal gray finish. • Accuracy ±2% of full scale. Response time 0.8 sec. to 1.0 sec. Useable chart widths: single channel—2-5/16", dual channel—1" each.

SEND FOR CATALOG. rustrak PRICES SUBJECT TO CHANGE

THE MINIATURE RECORDER PEOPLE

RUSTRAK Instrument Div. • GULTON Industries Inc. Manchester, New Hampshire 03103. (603) 623-3591

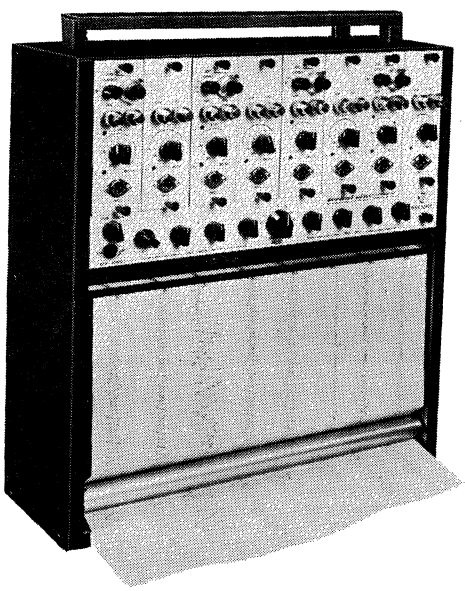
techni-rite RECORDERS

High speed, direct writing recorders and monitoring and controlling systems for industrial, military, aerospace and medical applications.

LOW COST LINEUP OF HIGH SPEED ANALOG RECORDERS

PORTABLE 8-CHANNEL

- Only 17½" Wide x 19" High x 6" Deep
- Weighs Just 65 Pounds
- Inkless Rectilinear Presentation
- 4 to 5 Millisecond Rise Time
- Rugged Construction for Lab or Field
- Other Plug-In Signal Conditioners:
  1 mv/div
  50 uv/div
  Stress, Strain, Transducer
  Temperature, Thermocouple



ONLY $3,995

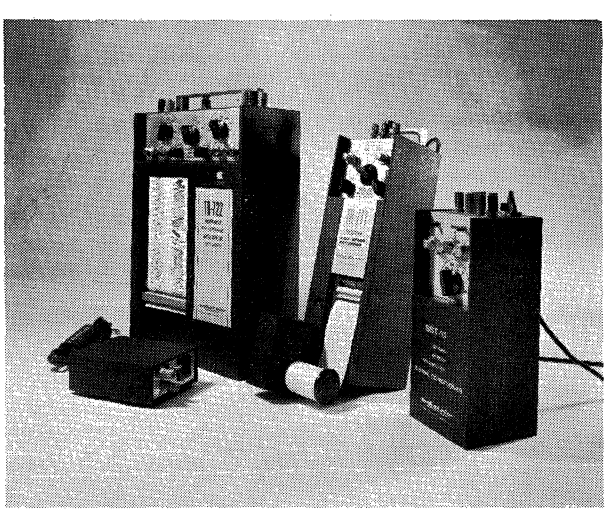
A complete system with 10 mv/div Signal Conditioners

PORTABLE 1-CHANNEL

ONLY $595

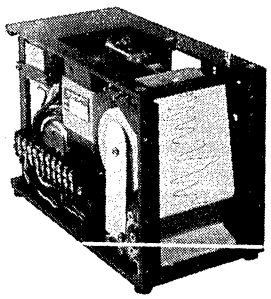
PORTABLE 2-CHANNEL

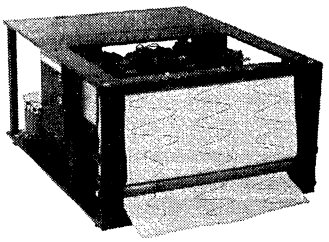
ONLY $1,395

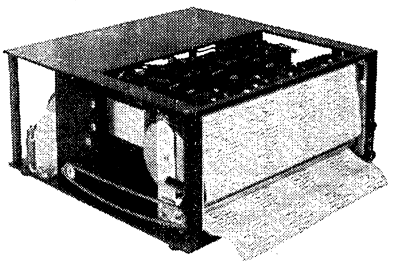


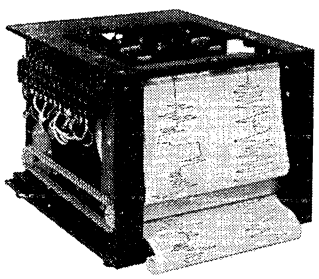
- DC to 125 Hz Frequency Response
- Inkless, True Rectilinear Coordinates
- Electric Chart Speed Selection
- Compact and Portable
- Rugged Construction for Lab or Field
- Complete Range of Accessories and Special Purpose Preamplifiers

O.E.M. RECORDER BUILDING BLOCKS
Pen Motors, Amplifier and Chart Drives







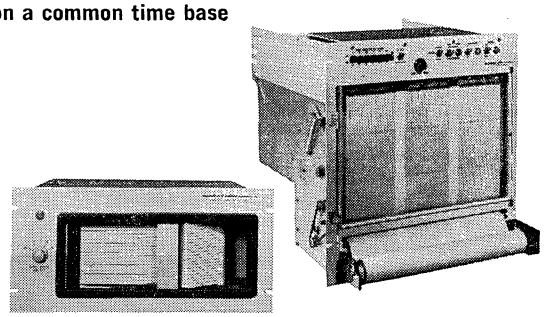


1-2-3-4 and 8-CHANNEL

- Amplifier Inside Pen Motor
- Stylus Limiters Inside Pen Motor
- Choice of Chart Drive
- Inkless Rectilinear Recording
- Extreme Compactness — only 5½" high
- Simple Chart Loading
- Meets AHA Specifications

20-40-60 CHANNEL EVENT RECORDERS

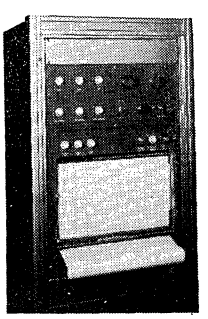
for monitoring "ON-OFF," "GO-NO-GO" data continuously on a common time base

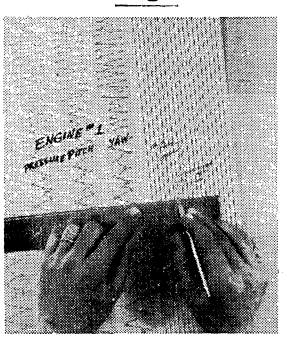


- 3 Millisecond Response (There are none faster!)
- Continuous, Deflection Type, Inkless Writing
- Accepts Switch Closure Signals or External Voltages
- Variable Chart Speed Selection
- Portable or Panel Mounted

Exclusive ANA-VENT 2-IN-1 RECORDERS

combine Analog and Event data on a single chart





- Simplifies Data Interpretation
- Minimizes Analysis Error
- Saves Time, Space and Money

Eight basic models available — combinations ranging from 8 channels of analog data with 10 channels of event data to 1 channel of analog with 64 channels of event.

WRITE, PHONE OR TWX FOR CATALOG AND ON-THE-SPOT DEMONSTRATION!

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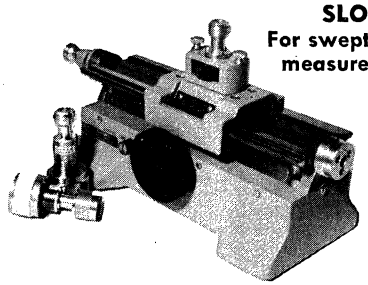
RF INSTRUMENTS and COMPONENTS

SLOTTED LINES

For swept and point-by-point measurements



TYPE 3300

Residual SWR
< 1.02 to 10 GHz
< 1.03 to 18 GHz
With MIL-C-39012 Type N Laboratory Standard Connectors

with interchangeable precision reducers and tunable detector probes

The type 3300 7mm Slotted Line has the following additional features:

- Rated frequency range: 1.2 to 18 GHz
- Rated error in detected signal ±1.005
- Available with a wide variety of interchangeable precision reducers for measurements in many transmission line sizes and connector types without an intermediate adapter which tends to increase the residual SWR of the measuring system. For example, reducers to Type OSM jack or plug result in a system residual SWR of under 1.06 to 18 GHz.

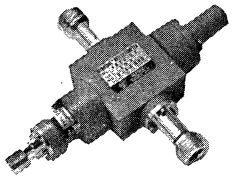
Partial Listing of Output Connectors Available for Alford Slotted Lines

Type N, TNC, BNC, MICON 1001 and 1002, Sealectro 50-0 series, TPS, OSM TM , GM , GR874B , C, SC, HN, 3⅛ EIA, 1⅝ EIA, ⅞ EIA, LT, LC, GR900 , Precifix A , Amphenol APC-7 Other connectors available on request.

Summary of ALFORD Slotted Lines

Frequency Range (MHz)	Line Size	Type
2000-36,000	3.5mm	3501-04
1200-18,000	7mm	3300
600-12,400	.4 inch	2288A-1
300-8500	14mm	2382-2
150-8500	14mm	2382-4
100-4500	1 inch	2181A-6
75-3000	1.5 inch	1026C-8
37.5-3000	1.5 inch	1026C-16

HYBRIDGE® REFLECTOMETERS



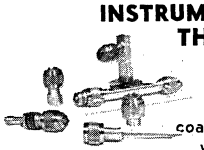
A precision, broadband RF bridge with an integral reference termination. Available with fixed measuring connectors or interchangeable precision reducers; either way ALFORD Hybridges offer low residual SWR (directivity) with ALL connector types.

FREQUENCY RANGE (GHz)	ALFORD CA-45 PLUG RESIDUAL SWR OR DIRECTIVITY	TYPE	AMPHENOL APC-7 RESIDUAL SWR OR DIRECTIVITY	TYPE	R&S PRECIFIX A RESIDUAL SWR OR DIRECTIVITY	TYPE
0.2- 1.1	1.03 (36DB)	4803	1.03 (36DB)	4668-57	1.03 (36DB)	4668-54
1.0- 3.2	1.03 (36DB)	4804	1.03 (36DB)	4669-57	1.03 (36DB)	4669-54
2.0- 4.2	1.03 (36DB)	4805	1.03 (36DB)	4670-57	1.03 (36DB)	4670-54
2.6- 5.2	1.03 (36DB)	8367	1.03 (36DB)	8367-57	1.03 (36DB)	8367-54
3.7- 8.0	1.04 (34DB)	4806	1.045 (33DB)	4671-57	1.045 (33DB)	4671-54
5.0-10.0	1.04 (34DB)	4807	1.045 (33DB)	4672-57	1.045 (33DB)	4672-54
5.0-12.4	1.045 (33DB)	4809	1.05 (32DB)	4809-57	1.05 (32DB)	4809-54
7.0-12.4	1.04 (34DB) *	4808	1.045 (33DB) *	4673-57	1.045 (33DB) *	4673-54
12.4-18	1.06 (30.5DB)	4810	1.07 (29.5DB)	4820-57	1.07 (29.5DB)	4820-54

FREQUENCY RANGE (GHz)	TYPE OSM RESIDUAL SWR OR DIRECTIVITY	TYPE NUMBER JACK	TYPE NUMBER PLUG	TYPE N RESIDUAL SWR OR DIRECTIVITY	TYPE NUMBER JACK	TYPE NUMBER PLUG
0.2- 1-1	1.05 (32DB)	4668-35	4668-36	1.03 (36DB)	4668-01	4668-02
1.0- 3.2	1.05 (32DB)	4669-35	4669-36	1.03 (36DB)	4669-01	4669-02
2.0- 4.2	1.05 (32DB)	4670-35	4670-36	1.03 (36DB)	4670-01	4670-02
2.6- 5.2	1.05 (32DB)	8367-35	8367-36	1.03 (36DB)	8367-01	8367-02
3.7- 8.0	1.065 (30DB)	4671-35	4671-36	1.055 (31.5DB)	4671-01	4670-02
5.0-10.0	1.07 (29.5DB)	4672-35	4672-36	1.06 (31DB)	4672-01	4672-02
5.0-12.4	1.075 (28.5DB)	4809-35	4809-36	1.065 (30DB)	4809-01	4809-02
7.0-12.4	1.07 (29.5DB) *	4673-35	4673-36	1.06 (31DB)	4673-01	4673-02
12.4-18	1.10 (26.5DB) *	4820-35	4820-36	1.085 (27.5DB) *	4820-01	4820-02

**Tentative Specifications*

INSTRUMENTS AND COMPONENTS FOR THE 3.5mm STANDARD LINE SIZE



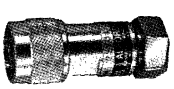
A wide selection of components are available with the precision sexless ALFORD 3.5AC connector for use up to 36 GHz in both coax and stripline. These are ideal for experimental work, especially at the higher frequencies when a great deal of accuracy and repeatability is required.

- 3510 Sliding Termination
- 3511 Fixed Termination
- Launchers to Stripline
- 3528 Connectors with SWR under 1.085 per pair to 26.5 Ghz
- EasyMatch® Tuners to 26.5 GHz

HYBRIDS

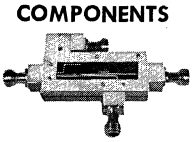
- Inherently broad band with rated isolations over 40dB, substantially independent of frequency.
- Available ranges from 20 MHz to 10,500 MHz.
- High peak power, high CW power and pressurized models available.
- Models available to environmental specifications of MIL-STD-810A.

PRECISION RF TERMINATIONS AND CALIBRATED MISMATCHES



- Fixed and sliding terminations from DC to 36 GHz
- Wide variety of rigid and flexible coaxial transmission line sizes from 6⅛" EIA to subminiature
- Also available in specially compensated bands

STRIPLINE COMPONENTS



- Broadband directional couplers, power dividers, combiners, and launchers.
- Miniature, lightweight, and low priced.
- Available in most connector types.

AUTOMATIC PLOTTERS

for measurement of Phase shift, Attenuation (or Gain) and RF Impedance

- Automatically measure and plot phase shift, insertion loss or gain, and rf impedance as continuous functions of frequency.
- For impedance, accurately measure SWR's as low as 1.01 when observed on 1.2 expanded Smith chart.
- Continuous frequency coverage from 0.025 to 7500 MHz with interchangeable sets of rf components.

OTHER AMCI PRODUCTS

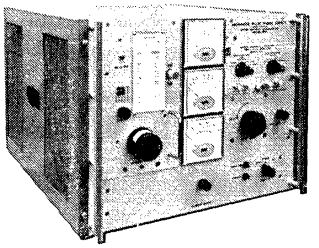
- Detector-Mixers
- Variable Attenuators
- Matching Tees
- Baluns
- Power Dividers
- Temperature-compensated Resonant Cavities
- Low-pass Filters
- Multiplexers
- Diplexers
- Directional FM Broadcast Antennas
- Vestigial Sideband Filters
- VOR Antennas
- Coaxial Switches
- Tracking Antenna Feed Assemblies
- Dipoles
- Automatic SWR Meters
- Adjustable Matching Networks
- TV Broadcast Antennas (directional and omni-directional)
- Balance Mixers
- Line Stretchers
- Impedance Standards

ALFORD® MANUFACTURING COMPANY
120 Cross St., Winchester (Greater Boston), Mass. 01890

Telephone: 617-729-8050 TWX: 710-348-1063 Cable Address: AMCIBOS

HIGH POWER SIGNAL SOURCES AND OSCILLATORS

PULSE SIGNAL SOURCES



MODEL PH40K

the highest pulse power available in a single generator

Covering the range from 150 to 6100 MHz, tuneable plug-in oscillator heads provide minimum powers as high as 15 KW at S-band. Specially designed cavities available for power requirements up to 40 KW. Pulses are continuously variable in width from 0.4 to 25 μs and in repetition rate from 10 to 10,000 pps. Available also in pulse modulator configuration.

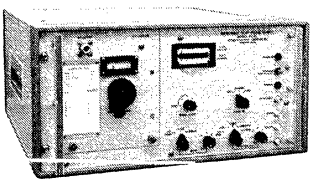
Frequency (MHz)	P_{min} (KW)
150 to 500	10
500 to 1000	15
1000 to 2000	10
2000 to 3000	10
3000 to 6100	0.5

MODEL PG5K

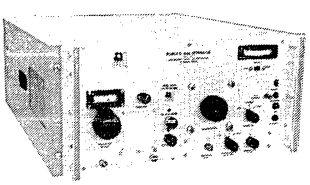
wide range, medium power unit

With a maximum power of 5 KW, the Model PG5K covers 150 to 6100 MHz with plug-in heads. Pulses are continuously variable in width from 0.3 to 50 μs and in repetition rate from 20 to 25,000 pps.

Frequency (MHz)	P_{min} (KW)
150 to 2000	5
2000 to 3000	4
4000 to 6100	0.2



CW SIGNAL SOURCES



MODEL C203

the highest CW power available in a single instrument

Covering the range from 190 to 6100 MHz with plug-in heads, the Model C203 provides full power modulation at 0.5 duty cycle with internal 1000 Hz square wave generator or from an external pulse source.

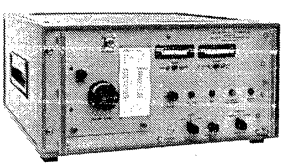
Frequency (MHz)	P_{min} (W)
190 to 500	100
500 to 1000	75
1000 to 2000	50
2000 to 3000	15
3000 to 6100	0.5

MODEL C201

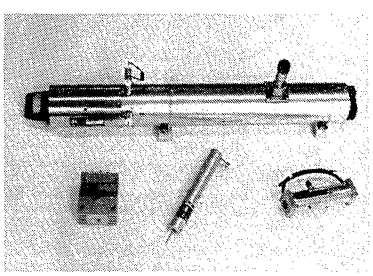
economical, medium power CW unit

Tuneable plug-in oscillator heads cover the range from 150 to 6100 MHz. Internal 1000 Hz square wave modulation. External pulse modulation. Excellent frequency stability.

Frequency (MHz)	P_{min} (W)
150 to 500	60
500 to 1000	50
1000 to 1900	25
1900 to 2700	10
2700 to 6100	1



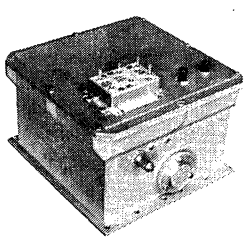
CAVITY OSCILLATORS



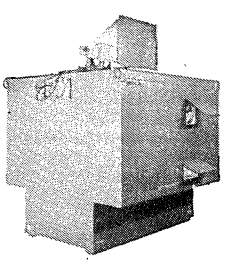
Standard models for CW or pulse applications in a variety of configurations cover selected frequency bands from 150 to 6100 MHz. Some special designs that have become standard:

Model 405	40 KW peak power, UHF.
Model 505	Conduction-cooled, high power, C-band.
Model 428	Wide tuning, CW for local oscillator applications.
Model 498	High power, duty cycle, and stability; wide pulse.

CUSTOM PRODUCTS



The same high performance and reliability characteristics that distinguish our standard models are also evident in the custom product designed to your specifications. In single units or production quantities. Our extensive experience covers the spectrum from the smallest high-performance cavity to large transmitter systems in environmentally controlled transportable shelters. If your requirements are for high power and stability, take it from a reliable source, contact



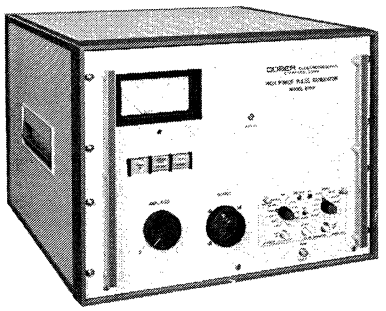
APPLIED MICROWAVE LABORATORY INC.

Andover Street, Andover, Massachusetts 01810 • Tel.: (617) 475-8500 • TWX: (710) 347-0337

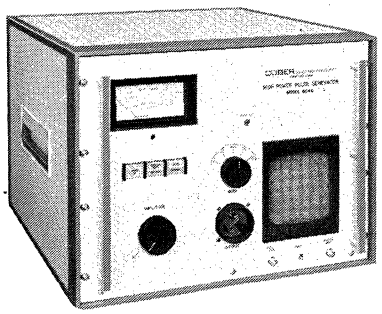
COBER

HIGH POWER

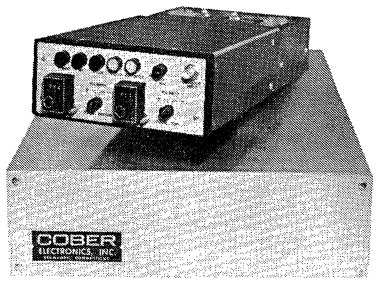
PULSE GENERATORS
PULSE MODULATORS
D.C. POWER SUPPLIES



Model 605P provides 24Kw pulses, 2200 volts at 11 amps. Pulse width is 50 nanoseconds to 10 milliseconds, rep rate 1 shot to 1MHz, with rise time of 20 nanoseconds. It drives microwave tubes, Gunn Diodes, and optic modulators, and is a versatile lab instrument.



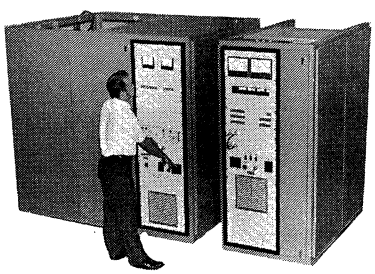
Model 604A pulses to 1500 volts at 6 amps. Pulse width can be varied from 50 nanoseconds to D.C. Output is selectable positive or negative and can float at 5Kv.



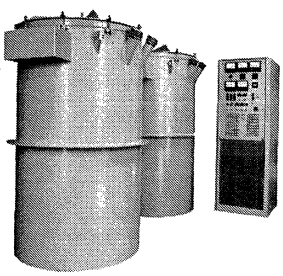
Model 502 Universal Grid Pulser has built-in bias supply. Regulated pulse top and pulse bottom can be adjusted anywhere from —1000V to +1000V. Controls are isolated to 50Kv. When installed with your D.C. power supply and TWT, it makes a high power grid pulsed microwave system.

PULSE GENERATORS

Cober's line of pulse generators is characterized by their pulse fidelity and flexibility. They are all at high power with rise times measured in nanoseconds, rep rates from single shot up to 1MHz, and pulse widths going to D.C. Some models contain built-in regulated bias supplies and high voltage isolation to allow convenient use as a microwave tube grid pulser.



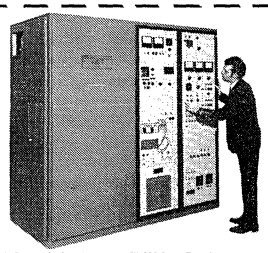
Model 1625 Series Modulator has output of 25KV at 10 amperes. Operates at pulse durations of up to 4 seconds at 50% duty cycle. Drives particle accelerator R.F. Amplifiers.



Model 1674 Klystron Modulator generates 150KV pulses at 110 amperes. Includes Cober ST-77 electronic crowbar for fast-acting protection for klystron. Used in advanced radar systems.

PULSE MODULATORS

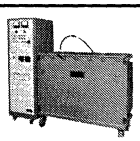
Cober's line of pulse modulators includes units to drive every high power pulsed microwave tube. Power levels range from a few kilowatts to over 100 megawatts. In addition to standard modulators, we specialize in the generation of state-of-the-art nanosecond rise times and high rep rates with short pulses to long pulses of thousands of microseconds. Full MIL-SPEC, solid state modulators are supplied for systems use, and soft tube and hard tube units are furnished for laboratories and particle accelerator facilities.



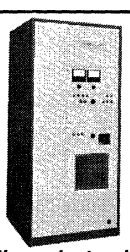
Model 1643 High Power T.W.T. Test Set permits operation of T.W.T.'s in CW, Grid Pulse, Cathode Pulse and Mod-anode pulse modes.

MICROWAVE TUBE TEST EQUIPMENT

Cober is recognized as the leading supplier of high power microwave tube test facilities. Included are highly regulated power supplies, modulators, T.U.T. chambers and protective circuitry for load, personnel and equipment. Models are manufactured to age and test T.W.T.'s, B.W.O.'s, CFA's, magnetrons as well as triodes and tetrodes.



Model BF-100-320 is rated at 100KV, 320Ma. Unit is all solid state, has reversible polarity and is frequently used to drive high power lasers.



Model 1631 has output of 12KV at 1 ampere. It is electronically regulated to reduce ripple and noise to 10 millivolts.

DC POWER SUPPLIES

Laboratory and MIL-SPEC DC Supplies over 5Kw and at voltages between 5KV and 1,000KV are manufactured. Standard Cober electromechanical or electronic regulator modules can be incorporated in our laboratory supplies to furnish regulation and ripple to 0.001%. Our systems engineering group designs full MIL-SPEC units and provides all integration and software to satisfy government requirements.

COBER PRODUCT CONCEPT

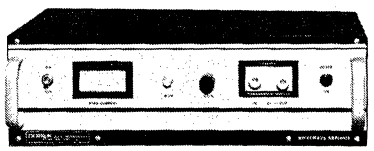
The products shown on these pages are representative of Cober's very broad line. They have, in common, a concept of standard packaged modules and designs which make it as easy and as economical for our customers to buy units to their own specifications as it is for them to buy our standard units. If your problem is in the area of high power electronics, won't you please send it to me!

The High-Power People

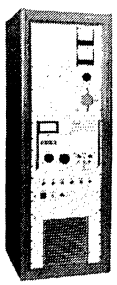
COBER ELECTRONICS, INC.

7 GLEASON AVE. • STAMFORD CONN. 06902 • (203) 327-0003

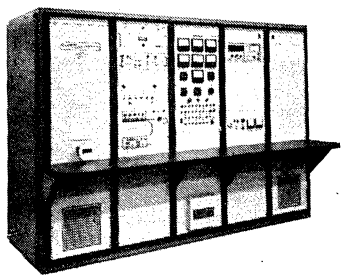
COBER
HIGH POWER MICROWAVE PRODUCTS & SYSTEMS



Series LMA, TWT Laboratory Microwave Amplifiers — supplied at powers of 1, 10, or 20 watts in octaves covering 1 through 18GHz with regulated solid state power supplies.



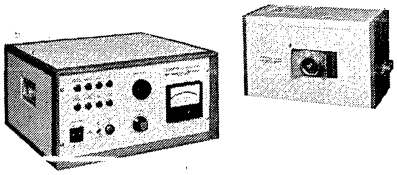
Series K 1Kw Pulsed Broadband TWT Amplifier. Covers 1 through 12.4GHz with optional plug in heads for changing frequency octaves.



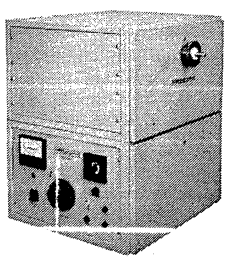
Model 1662, 100Kw peak S-Band R.F. Source for testing high power microwave components. Capable of continuous operation into short circuit.

LABORATORY MICROWAVE AMPLIFIERS

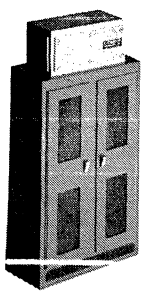
Cober is certainly the expert when it comes to experience with the broadest range of microwave tubes. Packaged broadband TWT amplifiers are available covering 1GHz through 18GHz at power levels from 1 watt to greater than 100 kilowatts. 1, 10, and 20 watt amplifiers are available from stock at prices that start lower than $2,000.00.



Model MP 2.5 Industrial Microwave Generator delivers more than 2Kw at 2450MHz and is the most versatile instrument available for laboratory studies involving microwave power.



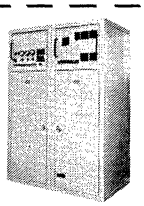
Model L 2 Microwave Generator operates at 915MHz and delivers 2Kw for applications studies and on line processing.



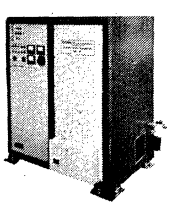
Model SF 2.5 Microwave Film Dryer processes 220 feet per minute of 35MM movie film with vast improvements in cost, noise, floor space and quality.

INDUSTRIAL MICROWAVE HEATING

Cober supplies products and systems for industrial heating in the frequencies of 915MHz and 2450MHz. At 915MHz, standard products are available delivering 2Kw and 25Kw; and at 2450MHz, standard units are supplied at 2.5Kw, 5Kw, and 30Kw. Complete processes are provided on a contract basis with powers going up into the hundreds of kilowatts.



Model 5964-C6 used for HPA subsystem in Intelsat earth stations. Final T.W.T. or klystron provides up to 8Kw output in "C" Band.



Model 1462 is X-Band Transmitter in airborne, high resolution radar. Final pulsed klystron amplifier generates 100Kw peak at 9.0 to 9.6GHz.

MICROWAVE COMMUNICATIONS

Cober's transmitters and power amplifiers are supplied in models from a few watts up to tens of kilowatts over the UHF to microwave spectrum. They provide reliable operation in troposcatter and satellite communications systems as well as PCM communications and radar.

COBER CAPABILITY

More than 20 years of successful experience is at work for our customers. We take pride in each program and have the type of organization that responds in depth. Our program managers have full documentation and software support and give the quick response that is required today. We are proud to have been nominated for the last three years as "Small Business of the Year."

The High-Power People

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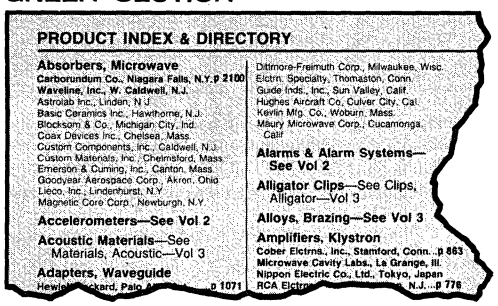
How to use eem

to find manufacturers of a specific product

GREEN SECTION


PRODUCT INDEX & DIRECTORY

Absorbers, Microwave
Carborundum Co., Niagara Falls, N.Y.p 2100
Waveline, Inc., W. Caldwell, N.J.
Astrolab Inc., Lindan, N.J.
Basic Ceramics Inc., Hawthorne, N.J.
Blocksom & Co., Michigan City, Ind.
Coax Devices Inc., Chelsea, Mass.
Custom Components, Inc., Caldwell, N.J.
Custom Materials, Inc., Chelmsford, Mass.
Emerson & Cuming, Inc., Canton, Mass.
Goodyear Aerospace Corp., Akron, Ohio
Lieco, Inc., Lindenhurst, N.Y.
Magnetic Core Corp., Newburgh, N.Y.

Accelerometers—See Vol 2

Acoustic Materials—See Materials, Acoustic—Vol 3

Adapters, Waveguide
Hewlett-Packard, Palo A... p 1071
Dittmore-Freimuth Corp., Milwaukee, Wisc.
Elctrn. Specialty, Thomaston, Conn.
Guide Inds., Inc., Sun Valley, Calif.
Hughes Aircraft Co, Culver City, Cal.
Kevlin Mfg. Co., Woburn, Mass.
Maury Microwave Corp., Cucamonga, Calif.

Alarms & Alarm Systems—See Vol 2

Alligator Clips—See Clips, Alligator—Vol 3

Alloys, Brazing—See Vol 3

Amplifiers, Klystron
Cober Elctrns., Inc., Stamford, Conn...p 863
Microwave Cavity Labs., La Grange, Ill.
Nippon Electric Co., Ltd., Tokyo, Japan
RCA Elctrn... N.J....p 776

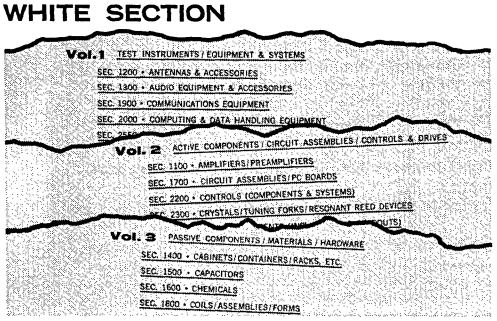
Each of the three volumes of **eem** contains a Product Index and Directory, the Green Section. This Index is a complete alphabetical listing of products. If the product you are looking for appears in the particular volume you are consulting, the green pages will provide a complete list of manufacturers who make that product. If the product is included in another volume of **eem**, the Index will provide a cross reference, directing you to the correct volume.

Boldface listings under product headings indicate that the listed manufacturer has products cataloged in **eem. Boldface** listings with page numbers indicate that this manufacturer's catalog pages include detailed data on the product indicated in the product heading.

Similar products are grouped together. For example, the many kinds of meters are listed in this manner: "Meters, Ampere," "Meters, Capacitance," "Meters, Flux" etc. To help you locate the prime product heading, there are hundreds of cross references, e.g. "Voltmeters — See Meters, Volt."

to find manufacturers' catalog information

WHITE SECTION


Vol. 1 TEST INSTRUMENTS / EQUIPMENT & SYSTEMS
SEC. 1200 • ANTENNAS & ACCESSORIES
SEC. 1300 • AUDIO EQUIPMENT & ACCESSORIES
SEC. 1900 • COMMUNICATIONS EQUIPMENT
SEC. 2000 • COMPUTING & DATA HANDLING EQUIPMENT
SEC. 2500 •
Vol. 2 ACTIVE COMPONENTS / CIRCUIT ASSEMBLIES / CONTROLS & DRIVES
SEC. 1100 • AMPLIFIERS/PREAMPLIFIERS
SEC. 1700 • CIRCUIT ASSEMBLIES/PC BOARDS
SEC. 2200 • CONTROLS (COMPONENTS & SYSTEMS)
SEC. 2300 • CRYSTALS/TUNING FORKS/RESONANT REED DEVICES
SEC. 2400 • [illegible] OUTS)
Vol. 3 PASSIVE COMPONENTS / MATERIALS / HARDWARE
SEC. 1400 • CABINETS/CONTAINERS/RACKS, ETC.
SEC. 1500 • CAPACITORS
SEC. 1600 • CHEMICALS
SEC. 1800 • COILS/ASSEMBLIES/FORMS

Catalog pages in **eem** are divided into three volumes based on very broad product groupings. These are:

Volume 1 — Test Instruments / Equipment and Systems

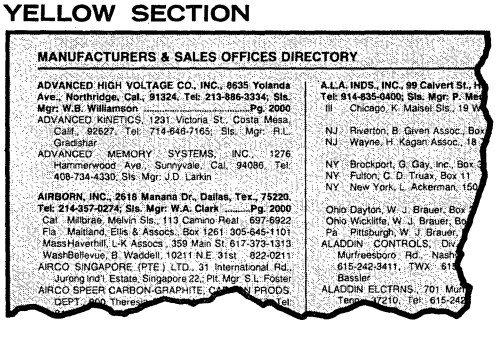
Volume 2 — Active Components / Circuit Assemblies / Controls and Drives

Volume 3 — Passive Components / Materials / Hardware

These volumes are further divided into 55 **eem** Product Sections which are assigned individually to the most appropriate volume. Within each of the 55 product sections manufacturers are arranged alphabetically, wherever possible. A complete index of all manufacturers' catalog pages is included in every volume. To locate the catalog pages of a specific manufacturer, refer to this index at the beginning of the white section in any of the three volumes. This index will provide the page numbers you require. In Volume 1, the index begins on page 302, in Volume 2 on page 1274 and in Volume 3, page 2310.

to find manufacturers' addresses, phones and sales offices

YELLOW SECTION


MANUFACTURERS & SALES OFFICES DIRECTORY

ADVANCED HIGH VOLTAGE CO., INC., 8635 Yolanda Ave., Northridge, Cal., 91324. Tel: 213-886-3334; Sls. Mgr: W.B. Williamson .....Pg. 2000
ADVANCED KINETICS, 1231 Victoria St., Costa Mesa, Calif., 92627. Tel: 714-646-7165; Sls. Mgr: R.L. Gradshar
ADVANCED MEMORY SYSTEMS, INC., 1276 Hammerwood Ave., Sunnyvale, Cal., 94086. Tel: 408-734-4330; Sls. Mgr: J.D. Larkin

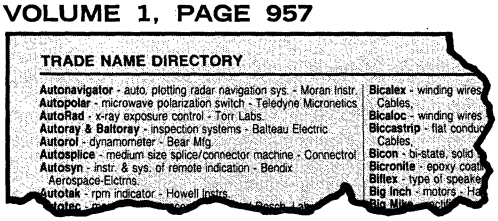
AIRBORN, INC., 2618 Manana Dr., Dallas, Tex., 75220. Tel: 214-357-0274; Sls. Mgr: W.A. Clark .....Pg. 2000
Cal.: Millbrae, Melvin Sls., 113 Camino Real 697-6922
Fla.: Maitland, Ellis & Assocs., Box 1261 305-645-1101
Mass: Haverhill, L-K Assocs., 359 Main St. 617-373-1313
Wash: Bellevue, B. Waddell, 10211 N.E. 31st 822-0211
AIRCO SINGAPORE (PTE.) LTD., 31 International Rd., Jurong Ind'l. Estate, Singapore 22,; Plt. Mgr. S.L. Foster
AIRCO SPEER CARBON-GRAPHITE, CA[illegible] PRODS. DEPT., 900 Theresia[illegible] Tel:

A.L.A. INDS., INC., 99 Calvert St., H[illegible] Tel: 914-835-0400; Sls. Mgr: P. Mas[illegible]
Ill.: Chicago, K. Maisel Sls., 19 W[illegible]
NJ.: Riverton, B. Given Assoc., Box[illegible]
NJ.: Wayne, H. Kagan Assoc., 18[illegible]
NY.: Brockport, G. Gay, Inc., Box[illegible]
NY.: Fulton, C. D. Truax, Box 11
NY.: New York, L. Ackerman, 150[illegible]
Ohio: Dayton, W. J. Brauer, Box[illegible]
Ohio: Wickliffe, W. J. Brauer, Bo[illegible]
Pa.: Pittsburgh, W. J. Brauer,
ALADDIN CONTROLS, Div. Murfreesboro Rd., Nash[illegible] 615-242-3411, TWX: 615[illegible] Bassler
ALADDIN ELCTRNS., 701 Mur[illegible] Tenn. 37210, Tel: 615-242[illegible]

More than 6,000 manufacturers of electronic components, materials, instruments, assemblies, systems and key services are listed in the Yellow Section. An identical Yellow Section appears in each of the three volumes of **eem,** listing addresses, phone numbers and sales managers' names. TWX numbers are also included where available. **Boldface** listings indicate that detailed information on the manufacturers' products is cataloged in the White Section of **eem. Boldface** listings also indicate that local sales offices or representatives are listed for that manufacturer.

to find trade name sources

VOLUME 1, PAGE 957


TRADE NAME DIRECTORY

Autonavigator - auto. plotting radar navigation sys. - Moran Instr.
Autopolar - microwave polarization switch - Teledyne Microneitics
AutoRad - x-ray exposure control - Torr Labs.
Autoray & Baltoray - inspection systems - Balteau Electric
Autorol - dynamometer - Bear Mfg.
Autosplice - medium size splice/connector machine - Connectrol
Autosyn - instr. & sys. of remote indication - Bendix Aerospace-Elctrns.
Autotak - rpm indicator - Howell Instrs.
[illegible]
Bicalex - winding wires, Cables,
Bicaloc - winding wires
Biccastrip - flat conduc[illegible] Cables,
Bicon - bi-state, solid
Bicronite - epoxy coati[illegible]
Biflex - type of speake[illegible]
Big Inch - motors - He[illegible]
Big Mike - [illegible]

If you know only the trade name, brand name or trade mark of a product, you can locate it in **eem** by using the **Trade Name Directory.** This appears only in Volume 1, beginning on page 957 of the White Section. These pages can be identified by a vertical black band along the outside edge.

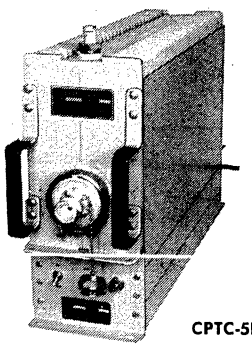
if you require additional assistance

contact the Editorial Department, United Technical Publications, Inc., 645 Stewart Ave., Garden City, N.Y. 11530, or phone (516) 248-9700.

DUMMY LOADS

Electro IMPULSE, INC.

CPTC SERIES



CPTC-5K

- 5,000 to 100,000 watts average power
- Frequency range to 10 GHz
- Completely self-contained, requiring only a power line connection
- Nominal input impedance is 50 ohms — other available.

These units are fully self-contained, incorporating an oil-filled termination, an oil to air heat exchanger and circulating system.

Pressure, flow and temperature interlocks insure complete protection for both transmitter and termination.**

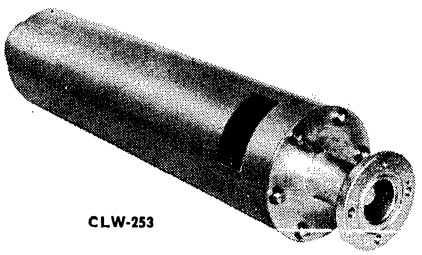
Although 50 ohms is the standard input impedance for this series, impedances of 72, 300 or 600 ohms can be supplied. Please specify all requirements when ordering.

** On most units.

Model	*Frequency Range MHz	Suggested Connector Choice Available	Total Average Power Watts	VSWR Maximum
CPTC-5K	DC-1000	1⅝	5,000	1.15
CPTC-10K	DC-1000	3⅛	10,000	1.15
CPTC-20K	DC-1000	3⅛	20,000	1.15
CPTC-30K	DC-1000	3⅛	30,000	1.15
CPTC-50K	DC-1000	6⅛	50,000	1.15
CPTC-100K	DC-1000	6⅛	100,000	1.15

*Ranges to 10 GHz can be supplied.

CLW SERIES WATER COOLED



CLW-253

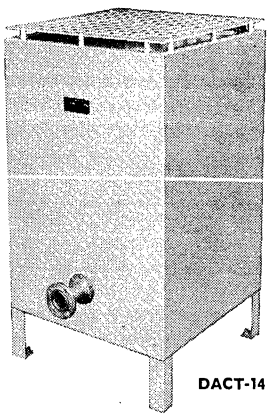
- **ECONOMICAL** — Use only tap water to absorb heat dissipated by resistive elements
- **COMPACT** — Smaller and lighter than Oil-Filled Terminations with corresponding power ratings
- **HIGH OVERLOAD CAPACITY** — Resistive element is practically indestructible
- Cooling Units can be supplied for closed system operation
- Available in three frequency ranges to 1 GHz*
- Nominal impedance is 50 ohms. Other impedances available
- Specify connector type desired when ordering
- Use with Tap Water Calorimeter

Model	Max. Power Watts	Frequency Range	VSWR**
CLW-14	10,000	DC-1GHz	1.25
CLW-253	25,000	DC-1GHz	1.25
CLW-54	50,000	DC-1GHz	1.25
CLW-15	100,000	DC-1GHz	1.25
CLW-25	200,000	DC-1GHz	1.25

* DC-32MHz, DC-110MHz, DC-1GHz.
** Values for DC-1GHz range. Lower for other ranges.

DACT SERIES CONVECTION COOLED

UNIQUE 25-MONTH WARRANTY!



DACT-14

ABSOLUTELY NO MAINTENANCE!

NO POWER REQUIREMENT!

Power Ratings Available:
3,000, 5,000, 10,000, 15,000 20,000 watts.

VSWR:
1.1:1.

Frequency Range:
Standard to 30 MHz — Models available to 55 MHz.

Impedance:
50 ohms standard. 72, 300, 600 ohms available.

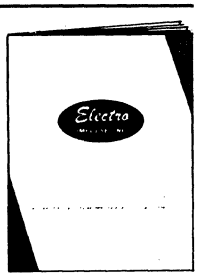
Maximum Ambient Temperature:
52°C. No minimum!

Mounting Orientation:
Non-critical.

UNITS MAY BE PULSED

WRITE FOR CATALOG #704
FOR OTHER ELECTRO IMPULSE PRODUCTS

- CALORIMETERS
- COOLING UNITS
- ATTENUATORS
- BALUNS
- POWER METERS
- WAVEGUIDE LOADS
- COMPLETE LINE OF TERMINATIONS



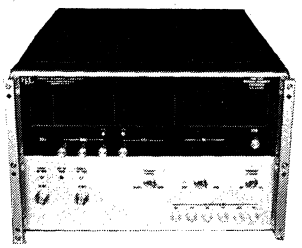
Electro IMPULSE, INC.

SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE

116 CHESTNUT STREET • RED BANK, NEW JERSEY 07701
TELEPHONE: 201 - 741-0404 • TWX No. 710-722-5767

SEE OUR OTHER PRODUCTS ON PAGES 450, 2784

Ultimate satellite terminal L.O.



FEL 700B Microwave Synthesizer

ULTRA-LOW PHASE NOISE

The 700B exceeds the most stringent satellite communications system noise requirements — from L through X band. Output signals can be internally down-converted to provide frequencies from DC through UHF with excellent phase noise and spurious performance.

COMPACT "ONE BOX" L.O. SYSTEM

Minimize your system costs and risks by specifying the 700B Microwave Synthesizer. The 700B does not require the frequency multiplication or up-conversion normally required when using HF or VHF frequency synthesizers. Compact size allows many 700B L.O.'s to be stacked in one standard rack.

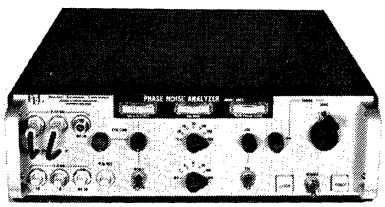
SYSTEM DESIGNED

The 700B is now being used in systems requiring compliance with RFI specifications as demanding as MIL-STD-461. The 700B has been ruggedly designed to meet all the shock, vibration and temperature requirements normally required for terminal environments. The synthesizer will tie directly into your programming logic—without necessity for interface logic converters.

LOWEST COST SYSTEM

Since one basic unit can provide all your L.O. requirements, DC through microwave, multiple usage factor enables considerable cost savings. Allow us to reduce your system cost with a fixed price for your complete L.O. requirements.

Ultimate in phase measurement

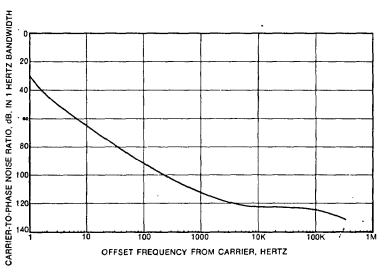


FEL 800B 1-12.4 GHz Phase Noise Analyzer

PLOTS SSB PHASE NOISE DIRECTLY

Tracking loop design allows phase noise measurements within 0.75 Hz of the carrier. SSB Phase Noise Density plots can be made directly using a wave analyzer and recorder.

TYPICAL MEASUREMENT COMPARING TWO S BAND CRYSTAL CONTROLLED SOURCES



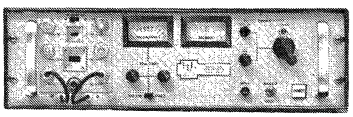
MORE FEATURES

The FEL 800B is a Phase Tracking Demodulator which displays phase noise in loop bandwidths adjustable from 5 Hz to 500 Hz and video bandwidths from 300 Hz to 300 kHz over a frequency range of 1 GHz to 12.4 GHz. Readout is directly in degrees of phase noise. The internal reference oscillator and mixer provides a noise floor of −110 dB/Hz at S Band. Using an external crystal oscillator above 90 MHz allows measurements to −125 dB/Hz.

Low price: $3,450 f.o.b.

Farmingdale, N.J.

Extraordinary stability



FEL 130A 1-40 GHz Continuously Tunable Synchronizer

STABLE

FEL series 130A synchronizers phase-lock any voltage tunable microwave signal source to its internal precision crystal oscillator. The signal source under lock assumes the inherent stability of the crystal oscillator. Frequency stability is 1 part in 10^8/sec, or 1 part in 10^7/day!

APPLICABLE

Now it is economically feasible to upgrade the stability and resolution of almost any commercially available sweep generator — with little or no generator modification. Wide range of applications includes use with an oscillator source in the research lab, on the production line, or rack mounted for tactical environments . . . to provide an extremely stable signal for microwave frequency standards, doppler systems, MTI techniques, radio astronomy receivers, and parametric amplifier pumps.

FLEXIBLE

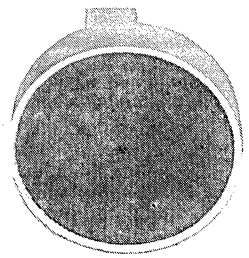
Continuously tunable from 1 GHz to 40 GHz, the 130A series is also available in shorter ranges with add-on range capabilities. All solid-state and completely self-contained, the unit may be rack or cabinet mounted. Power consumption is low—less than 60 watts.

DELIVERABLE

From current production.

Complete microwave
from components to systems.

Spiral antennas

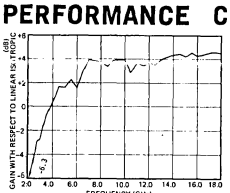


FEL SMK 2018 2-18 GHz Spiral Antenna

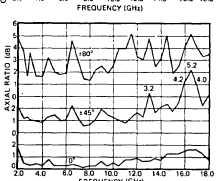
2-18 GHz PLUS SUPERIOR PERFORMANCE, ADVANCED CONSTRUCTION

Now you can specify a single spiral with a frequency range of 2-18 GHz — S, C, X and Ku bands. With essentially constant impedance and circularly polarized performance; excellent gain across the entire bandwidth; and excellent axial ratios and pattern control. Compact, lightweight and rugged, the SMK 2018's unique design protects it from moisture, foreign material and tampering.

PERFORMANCE CURVES



GAIN VS. FREQUENCY

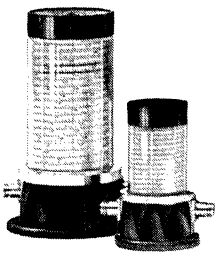


AXIAL RATIO VS. FREQUENCY

SIGNIFICANT APPLICATIONS

ECM, ECCM systems; flush mounted, high performance aircraft antenna elements; EMC and RFI measurements; direction-finding antenna systems; telemetry systems; laboratory source for antenna measurements; elements for broadband circularly-polarized arrays; feeds for paraboidal reflectors; plus many other significant applications.

Twice the frequency range



FEL WDA 940 & WDA 3712 Direct-Reading Precision Frequency Meters

TWO DO THE WORK OF FOUR OR FIVE

Instead of using up to five frequency meters to cover the range from 960 MHz to 12,400 MHz, use only two WDA's. WDA 940 covers 960-4,200 MHz region; WDA 3712, 3,700-12,400 MHz. Readout is direct in MHz.

ABSOLUTE ACCURACY, RUGGED CONSTRUCTION

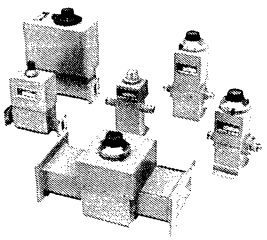
Designed using temperature-stable, high-Q resonator. Tuning mechanisms feature precision lead screws, loaded to eliminate backlash and ensure resetability. Clearly legible incremental calibration of an extended spiral scale housed within a transparent drum achieves high resolution. Resonance is defined by a sharply defined dip. Special alloys, invar and temperature compensated construction assure smooth operation and minimum wear over extended periods of time.

BROADLY APPLICABLE, ECONOMICAL

Use for measuring cw, am, fm or pm microwave signals. Ideal for frequency measurement of microwave transmitters, microwave receivers, local oscillators and signal generators.

Price of either type: $525

Custom engineered products



(Tunable Bandpass Filter Group)

Extensive and sophisticated engineering and manufacturing capabilities make Frequency Engineering Laboratories an ideal supplier of custom engineered microwave components, instruments, antennas, sub-systems or complete microwave systems. Your inquiries are invited for:

- Frequency Sources, Frequency Monitors and Custom Microwave Instrumentation
- Antennas: Airborne Spiral, Conical, Parabolic, etc.
- Airborne Interdigital Filters
- Tunable Bandpass and Band Reject Filters
- Special Wavemeters with Direct, Micrometer or Tape Readout
- Diplexers and Multiplexers
- Reference Cavities, Pre-selector Mixers, Discriminators, Converters

Specification sheets for these and other FEL products are available by writing or calling:

capability

HARVARD

FREQUENCY ENGINEERING LABORATORIES
a division of Harvard Industries, Inc.
Farmingdale, N.J. 07727
(201) 938-9221 / TWX (201) 938-2456

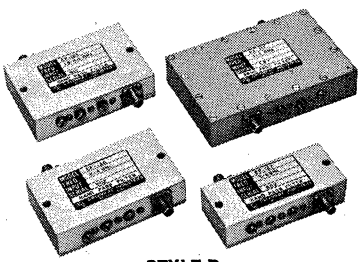
BAND PASS FILTERS

HF, VHF, UHF, & MICROWAVE

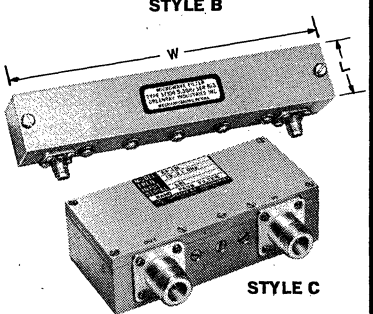
HUNDREDS OF STOCK DESIGNS

STYLE A

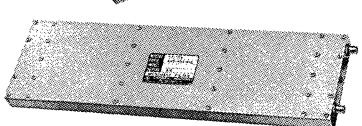
STYLE A-1



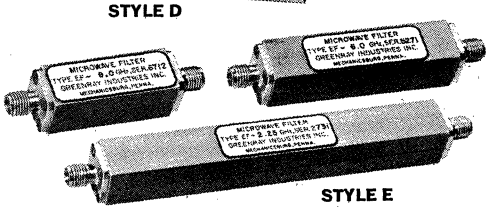
STYLE B



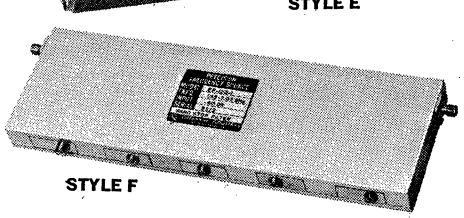
STYLE C



STYLE D



STYLE E



STYLE F

* Specify exact center frequency when ordering			Rejection Band Attenuation & Frequency						
			Below Passband		Above Passband				
Frequency Range	Bandwidth (Min.)	Insertion loss	Frequency	Attenuation (Min.)	Frequency	Attenuation (Min.)	Dimensions (in.) max. W L H	Model	Price
5- 25 MHz*	2%	3 dB	f_o— 6%	45 dB	f_o+ 6%	45 dB	4 x 2 x 1½	EF-140-1	$195.00
25-100 MHz*	2%	3 dB	f_o— 6%	45 dB	f_o+ 6%	45 dB	4 x 2 x 1½	EF-140-2	195.00
100-500 MHz*	2%	3 dB	f_o— 6%	45 dB	f_o+ 6%	45 dB	4 x 2 x 1½ STYLE A	EF-140-3	195.00
.5-1 GHz*	2%	2 dB	f_o— 6%	60 dB	f_o+ 6%	60 dB	5 x 4 x 1	EF-141-1	$245.00
1-2 GHz*	2%	1 dB	f_o— 6%	60 dB	f_o+ 6%	60 dB	5 x 2½ x 1	EF-141-2	245.00
2-3 GHz*	2%	1 dB	f_o— 6%	60 dB	f_o+ 6%	60 dB	5 x 2 x 1	EF-141-3	245.00
3-4 GHz*	2%	1 dB	f_o— 6%	60 dB	f_o+ 6%	60 dB	5 x 1½ x 1	EF-141-4	245.00
5-6 GHz*	2%	1 dB	f_o— 6%	60 dB	f_o+ 6%	60 dB	5 x 1½ x 1	EF-141-5	245.00
6-8 GHz*	2%	1 dB	f_o— 6%	60 dB	f_o+ 6%	60 dB	5 x 1¼ x 1 STYLE C	EF-141-6	245.00
5- 25 MHz*	17%	3 dB	f_o—30%	45 dB	f_o+25%	45 dB	3¼ x 2⅛ x 1	EF-149-1	$195.00
25- 50 MHz*	10%	3 dB	f_o—25%	45 dB	f_o+25%	45 dB	5 x 3 x 1	EF-149-2	195.00
50-200 MHz*	10%	2.5 dB	f_o—25%	45 dB	f_o+25%	45 dB	5 x 3 x 1	EF-149-3	195.00
200-500 MHz*	10%	2.5 dB	f_o—25%	45 dB	f_o+25%	45 dB	5 x 3 x 1 STYLE A-1	EF-149-4	195.00
.5-1 GHz*	10%	1.5 dB	f_o—25%	60 dB	f_o+25%	60 dB	5 x 4 x 1	EF-142-1	$245.00
1-2 GHz*	10%	1 dB	f_o—25%	60 dB	f_o+25%	60 dB	5 x 2½ x 1	EF-142-2	245.00
2-3 GHz*	10%	1 dB	f_o—25%	60 dB	f_o+25%	60 dB	5 x 2½ x 1	EF-142-3	245.00
3-4.5 GHz*	10%	1 dB	f_o—25%	60 dB	f_o+25%	60 dB	5 x 2 x 1	EF-142-4	245.00
4.5-6 GHz*	10%	1 dB	f_o—25%	60 dB	f_o+25%	60 dB	5 x 1½ x 1	EF-142-5	245.00
6-8 GHz*	10%	1 dB	f_o—25%	60 dB	f_o+25%	60 dB	5 x 1½ x 1 STYLE C	EF-142-6	245.00
50-100 MHz	Octave	3 dB	< 35 MHz	45 dB	> 130 MHz	45 dB	4½ x 2 x 1¼	EF-116-1	$235.00
100-200 MHz	Octave	3 dB	< 70 MHz	45 dB	> 260 MHz	45 dB	4½ x 2 x 1¼	EF-116-2	235.00
200-400 MHz	Octave	2.5 dB	< 140 MHz	45 dB	> 490 MHz	45 dB	4½ x 2 x 1¼	EF-116-3	235.00
300-600 MHz	Octave	2.5 dB	< 210 MHz	45 dB	> 750 MHz	45 dB	4½ x 2 x 1¼ STYLE A	EF-116-4	235.00
.5-1 GHz	Octave	2 dB	< .35 GHz	50 dB	> 1.3 GHz	45 dB	5 x 4½ x 1	EF-117-1	$295.00
1-2 GHz	Octave	2 dB	< 0.7 GHz	50 dB	> 2.4 GHz	45 dB	4 x 2½ x 1	EF-117-2	295.00
1.5-3 GHz	Octave	2 dB	< 1.0 GHz	50 dB	> 3.8 GHz	45 dB	4 x 2½ x 1	EF-117-3	295.00
2-4 GHz	Octave	2 dB	< 1.4 GHz	50 dB	> 4.7 GHz	45 dB	4 x 2½ x 1	EF-117-4	295.00
4-6 GHz	Octave	2 dB	< 3.2 GHz	50 dB	> 6.7 GHz	45 dB	4 x 2 x 1	EF-117-5	295.00
6-8 GHz	Octave	2 dB	< 5.0 GHz	50 dB	> 8.7 GHz	45 dB	4 x 1½ x 1	EF-117-6	295.00
4-8 GHz	Octave	2 dB	< 3.2 GHz	50 dB	> 8.9 GHz	45 dB	4 x 1½ x 1 STYLE B	EF-117-7	295.00
.2-.6 GHz*	½%	3 dB	f_o— 3%	60 dB	f_o+ 3%	60 dB	10.5 x 3 x .7	EF-106-1	$325.00
.6-1.0 GHz*	½%	3 dB	f_o— 3%	60 dB	f_o+ 3%	60 dB	8.0 x 3 x .7	EF-106-2	$325.00
1.0-2.0 GHz*	½%	3 dB	f_o— 3%	60 dB	f_o+ 3%	60 dB	5 x 3 x .7 STYLE D	EF-106-3	$325.00

SPECIAL DESIGN MICROWAVE FILTERS

Frequency Range	Type	Model	Price
.5-6 GHz	Multioctave Bandpass Filter	Model EF-143	On request
2-6 GHz	Miniature 5 Pole 10% BW Microstrip Bandpass Filter	Model EF-144 (STYLE E)	On request
.5-6 GHz	Bandstop 5 Pole Notch Filter	Model EF-120-1 (STYLE F)	On request
.5-3.5 GHz	Directional ½% BW Bandpass Filter	Model EF-145	On request
.5-3.5 GHz	Diplexer and Multiplexers	Model EF-146	On request
.5-3.5 GHz	Integrated Component (Filter, Directional Coupler—Isolator)	Model EB-117	On request

Greenray Industries, Inc.

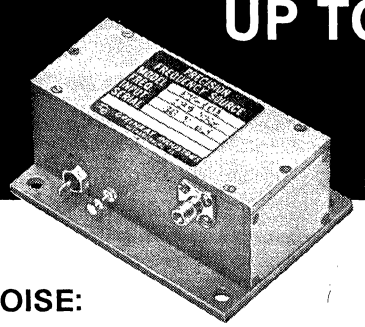
840 West Church Road, Mechanicsburg, Pa. Phone — (Area Code 717) 766-0223

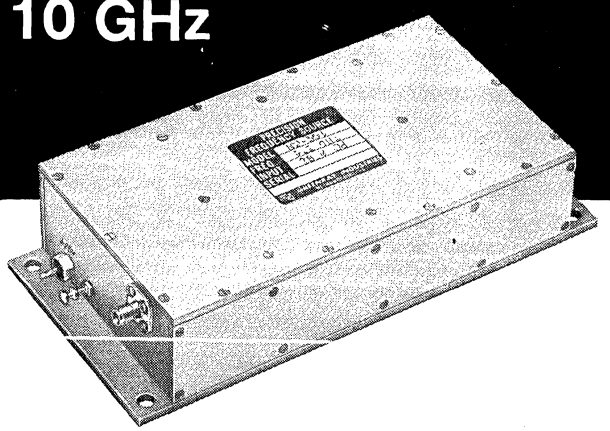
MICROWAVE FREQUENCY SOURCES

CRYSTAL CONTROLLED (±.00075%)

UP TO 10 GHz

5 milliwatts or 100 milliwatts





VERY LOW NOISE:

- Achieved by using straight multiplication.
- Only one step recovery diode is used (on units with output frequency above 1 GHz.)
- Noise producing phase locking is not used.

MICROWAVE OSCILLATOR SPECIFICATIONS

- Fixed frequency output: Manufactured to your exact requirements.
- Stability: ± .00075% over temperature range.
- Temperature range: 0 to 50°C.
- Power Output: 100 mW minimum, or, 5 mW as specified.
- Spurious levels (non-harmonically related): 60 dB down.
- Harmonics and sub-harmonics: 26 dB down minimum.
- Input: 28V dc regulated, ± 1 V.
- FM jitter: Less than ± 2 x 10^{-9}/10 milliseconds.
- Output connectors: OSM style.
- All units have mechanical frequency adjustment for aging.

MODEL	FREQUENCY RANGE	OUTPUT	SIZE (L. W. H.)*	PRICE
EY-101A	1 MHz to 125 MHz	100 mW	1 1/2" x 3 3/8" x 2"	$ 675.00
EY-102A	125. 01 MHz to 500 MHz	100 mW	3" x 3 3/8" x 2"	990.00
EY-103A	500. 01 MHz to 1 GHz	100 mW	4 1/2" x 3 3/8" x 2"	1190.00
EY-104A	1.0 + GHz to 2.5 GHz	100 mW	4 1/2" x 3 3/8" x 2"	1690.00
EY-105A	2.5 + GHz to 4 GHz	100 mW	4 1/2" x 3 3/8" x 2"	2190.00
EY-106A	4.0 + GHz to 5 GHz	100 mW	4 1/2" x 3 3/8" x 2"	2550.00
EY-107A	5.0 + GHz to 7.2 GHz	100 mW	6 3/4" x 3 3/8" x 2"	3190.00
EY-108A	7.2 + GHz to 8.6 GHz	100 mW	6 3/4" x 3 3/8" x 2"	3550.00
EY-109A	8.6 + GHz to 10.0 GHz	100 mW	6 3/4" x 3 3/8" x 2"	3850.00
EY-115A	1 MHz to 125 MHz	5 mW	1 1/2" x 3 3/8" x 2"	345.00
EY-116A	125.01 MHz to 500 MHz	5 mW	1 1/2" x 3 3/8" x 2"	445.00
EY-117A	500.01 MHz to 1 GHz	5 mW	3" x 3 3/8" x 2"	645.00
EY-118A	1.0 + GHz to 2.5 GHz	5 mW	3" x 3 3/8" x 2"	745.00
EY-119A	2.5 + GHz to 4 GHz	5 mW	3" x 3 3/8" x 2"	890.00
EY-120A	4.0 + GHz to 5 GHz	5 mW	3" x 3 3/8" x 2"	945.00
EY-121A	5.0 + GHz to 7.2 GHz	5 mW	5 1/4" x 3 3/8" x 2"	1290.00
EY-122A	7.2 + GHz to 8.6 GHz	5 mW	5 1/4" x 3 3/8" x 2"	1445.00
EY-123A	8.6 + GHz to 10.0 GHz	5 mW	5 1/4" x 3 3/8" x 2"	1690.00

*Height is maximum dimension. Add 1" to length to include mounting flange.

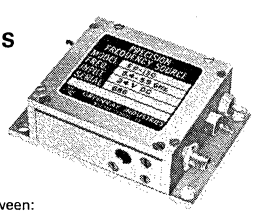
OPTIONS AVAILABLE:

1. Voltage controlled
   ± . 1% frequency deviation,
   5% linearity, $400.00 additional.
2. Temperature compensated
   ± . 0001% frequency stability
   (no oven), $400.00 additional
3. Frequency standard
   ± 2 x 10^{-8} frequency stability
   (with oven), $550.00 additional.
4. Multiple channel
   2 to 20 channels over 10%
   bandwidth. CALL US !!!

WE DESIGN TO ANY SPECS WITHIN THE "STATE-OF-THE -ART". CALL US.

VOLTAGE CONTROLLED MICROWAVE OSCILLATORS

1.6 to 6.0 GHz - Model EP-150 (L-C Type)



- All voltage controlled oscillators are tunable under a minimum of ± 5% of the center frequency you specify when ordering.
- Voltage tuning is accomplished by applying an external voltage between 0V and + 20V d c.
- All harmonics down 20 dB or greater.
- Output power level: 5 Milliwatts minimum.
- Input voltage: 24V d c.
- Temperature range: 10°C to 45°C.
- Output OSM style connectors (50 ohms).
- Approximate size: 2" x 2.8" x 1".
- Center frequency adjustment, mechanically tunable in excess of ± 1% around the center frequency.

- Price for 1 - 3 units - center frequency between:

1.6 and 3.7 GHz	550.00 each
3.701 to 4 GHz	750.00 each
4.01 to 4.5 GHz	990.00 each
4.51 to 5 GHz	1090.00 each
5.01 to 5.5 GHz	1190.00 each
5.51 to 6 GHz	1290.00 each

SEND FOR OUR COMPLETE MICROWAVE CATALOG.

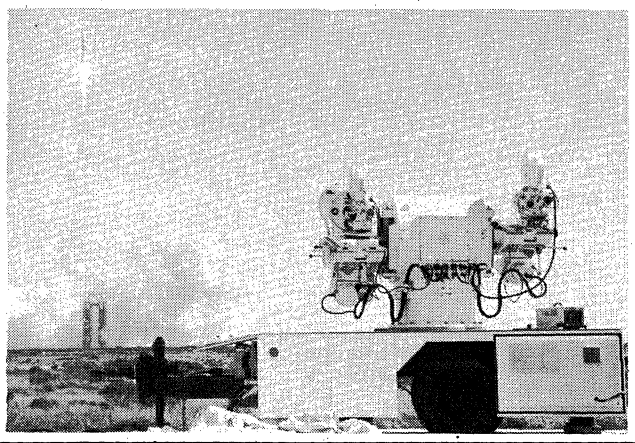
Greenray Industries, Inc.

840 West Church Road, Mechanicsburg, Pa. GRI Phone — (Area Code 717) 766-0223

GEO SPACE SYSTEMS, INC.

RANGE INSTRUMENTATION EQUIPMENT – PRECISION PEDESTALS

COMPLETE TRACKING SYSTEMS



MOBILE OPTICAL TRACKING SYSTEM

The Mobile Optical Tracking System is a precision, high load capacity, servo controlled position pedestal, mobilized for usage in rugged terrain. It can be controlled locally from the pedestal, or from its mobile control van—or a permanent site—located up to 12 miles from the pedestal.

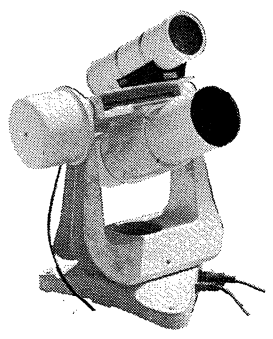
The pedestal is controlled by infrared or TV edge track auto-track systems, or by manual joystick control. The control system features auto-override to allow momentary selection of manual mode, and a coast function allowing the pedestal to continue at the established rate for a minimum of 10 seconds should the target be lost.

Versatility is the key to the control system design. Operational switches allow the operator to select a variety of tracking modes, change system bandwidth, or introduce special functions for ease of tracking and improved accuracy.

The system requires only two hours site installation and collimation time. Two men are necessary for calibration and set-up, but normal system operation is a one-man job. Position accuracy is 2 arc seconds (static) and 0.003 mr/mr/sec (dynamic). Its angular displacement is 345° azimuth, −10° to 90° elevation. Stable tracking rates in the speed range of 5 arc sec/sec to 70 deg/sec may be obtained. Camera platforms are capable of accepting cameras weighing 500 pounds with a maximum load capacity of 1480 pounds symmetrical and balanced. Balancing of the load requires no counterweights, utilizing crank controlled weight displacement for balancing.

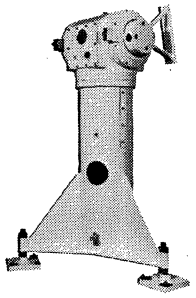
The flexible capabilities of MOTS allows many system variations, making it easily adaptable to the user's specific requirements.

PEDESTALS AND TRACKING EQUIPMENT



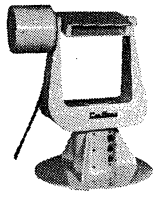
SERVO CONTROLLED INSTRUMENT POSITIONER

This positioner is a rugged, lightweight unit capable of remote control, auto-track, and pre-programming. Handling a symmetrical load of up to 75 lbs., it utilizes dc servo control in a closed loop system.



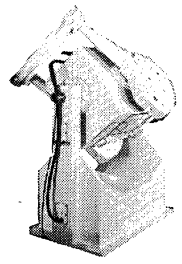
PRECISION SERVO CONTROLLED PEDESTAL

This instrument positioning system features continuous azimuth travel with ±100° elevation, is capable of mounting symmetrical loads up to 200 pounds, and has a positioning accuracy (static) of ±.1°. Along with the solid state servo controller, the complete system can be pre-programmed, operated in a pre-position select or auto-track mode.



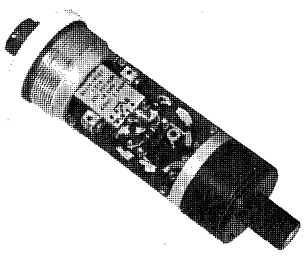
AZIMUTH/ELEVATION POSITIONER

The GSS Model 8175 Azimuth/Elevation Positioner is a lightweight, precision positioning unit capable of remote, manual or autotrack control. The versatile mounting arrangement permits balanced loads of up to 75 pounds with a rated velocity of 30 degrees/second and an acceleration of 30 degrees/second and an acceleration of 30°/sec². Elevation travel is −10 degrees to 190 degrees. Azimuth travel is limited by cable wrap up, or approximately ±180 degrees. Drive power is supplied by a dual-channel, complimentary transistor servo-amplifier.



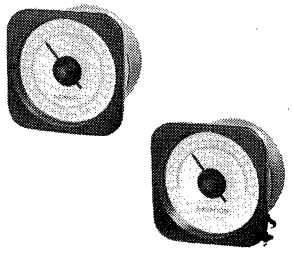
XY PEDESTAL POSITIONER

The XY Pedestal positioning system is a high rigidity antenna positioner capable of maximum sky coverage including target fly-over. A unique X-shaft cam reduces "key hole" around support pillows to a minimum. Instrument loads of up to 1200 pounds can be positioned to .1° static accuracy. The tracking unit rate is 10° per second with a dynamic error of .3° maximum. The maximum acceleration is 35° per sec².



SUN SENSOR AND CONTROL

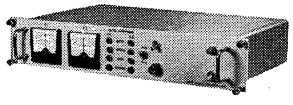
The SS-101 furnishes switch contact closures when an intense light source passes through the field of view. The unit is fully compatible with any electrically driven sun shutter equipment and its light sensitivity threshold is adjustable.



SERVO/SYNCHRO DRIVEN REMOTE AZIMUTH AND ELEVATION INDICATORS

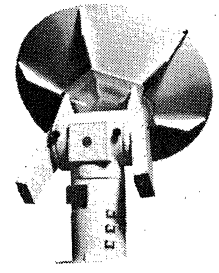
These indicators display remote angular or linear position, or any other calibrated quantity that can be represented by shaft rotation or linear displacement.

A wide variety of dial calibrations, colors, mounting arrangements and synchro ratios can be provided.



AUTO-TRACK INTEGRATION EQUIPMENTS

These solid state units will couple an angle-error sensing device to an elevation-over-azimuth positioning pedestal to achieve a completely automatic tracking system. They also allow addition of a remote manual control (joystick) to the system, provide a provision for automatic switchover to null detector tracking, and allow retention of existing means of pedestal control.



AUTOMATIC TELEMETRY TRACKING SYSTEMS

These systems have been designed using the GSS precision servo controlled pedestal. A variety of antennae from conical scanning telemetry types to helix and cross dipole arrays can be mounted on and positioned by the servo driven pedestal. Antenna polarization can be selectable from remote control. Automatic tracking rates to 30 deg/sec are obtainable.

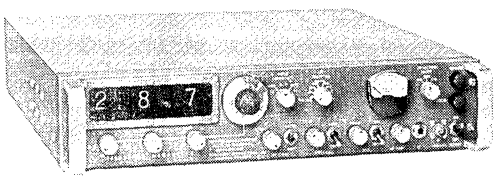
Design excellence and trouble-free performance are recognized attributes of the Geo Space Systems' servo positioned pedestal equipment that has been developed and manufactured for a number of critical national test range applications.

A staff of professional design engineers and consultants and an experienced field engineering team are maintained to offer a full range of expert services to prospective users.

GEO SPACE SYSTEMS, INC.
4715 GEORGE ROAD, P. O. BOX 23117
TAMPA, FLORIDA 33622
PHONE: 813/884-0492

LORCH COMMUNICATION EQUIPMENT AND ACCESSORIES • RF COMPONENTS

WIDE DYNAMIC RANGE RECEIVER
Model HR-240 - 2 to 32 MHz



A sensitive, wide dynamic range receiver with locally or remotely controlled all-electronic tuning. All front panel knobs and switches, including frequency tuning may be controlled locally or by remote program.

Frequency Range	2 to 32 MHz
Tuning Time	5.0 milliseconds
Dynamic Range	over 100 db
Spurious Response Rejection (including Image and IF)	over 100 db
Sensitivity (3 KHz Bandwidth)	−133 dbm
Gain Variation vs. Frequency (2 to 32 MHz)	±1 db
Reception Modes	AM, USB, LSB, and CW
Size	17″ W x 21″ D x 5¼″ H

DOUBLE BALANCED FET MIXER
Model FC-351

A double balanced FET mixer with extremely low intermodulation distortion, high power handling capability and excellent isolation between all ports.

Frequency Range, all ports	0.2 to 100 MHz
Conversion Loss and Noise Figure	9 db max.
Two Tone Intermodulation Ratio (3rd and 5th Order) Two RF tones, each 0 dbm	80 db
Compression Level (2 db compression)	+30 dbm
Dynamic Range	155 db
Isolation	To 50 db
DC Power Required	None

WIDE BAND DOUBLE BALANCED MIXERS

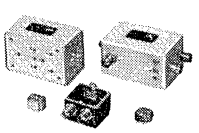
Low intermodulation and spurious products

Frequency Range	From 10 KHz to 12.4 GHz
Conversion Loss	As low as 5 db
Isolation	To 85 db
Two Tone Intermodulation Ratio, Third Order Two tones, −30 dbm	To 130 db
Dynamic Range	To 145 db
Temperature Range	−65°C to +125°C

Hermetically Sealed

Standard Pin Packages, TO-5 Can, Connector Versions, Custom Packaging, High power versions of mixers and product detectors available on special order.

WIDE BAND ELECTRONIC SWITCHES



RF Frequency Range	1 to 200 MHz
Switching Frequency Range	DC to 50 MHz
RF Input Level for 2 db Compression	To +23 dbm
Insertion Loss, ON Condition	To 1 db
Insertion Loss, OFF Condition	To 70 db
Temperature Range	−65°C to +125°C

Hermetically Sealed

Standard Pin Packages, Connector Versions, Custom Packaging

WIDE BAND HYBRID JUNCTIONS and POWER SPLITTERS

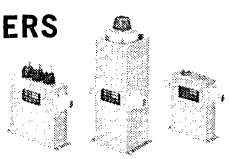
2, 3, 4, 5, 6, 8 and MULTIWAY

Frequency Ranges	From 10 KHz to 12.4 GHz
VSWR	1.2 to 1
Isolation	To 35 db
Phase Balance	±1°
Amplitude Balance	0.1 db
Temperature Range	−65°C to +125°C
Input Power	To 50 watts

Hermetically Sealed

TO-5 Can, Standard Pin Packages, Connector Versions, Custom Packaging

MICROWAVE FILTERS



Low Pass Filters	From 100 KHz to 12.0 GHz (Low power and high power).
Band Pass Filters	From 10% to octave bandwidth. Frequencies from 100 KHz to 6.5 GHz.
Preselectors Coaxial & Waveguide	Tuning range 15% (nominal). 3 db bandwidth: from 0.5% to 1.2%. Fixed tuned, individually tuned, or gang tuned. From 800 MHz to 16.2 GHz.
Diplexers	From 0.5% to 1.2% (3 db bandwidth), fixed tuned. Frequencies from 100 KHz to 6.0 GHz.

WIDE BAND RF AMPLIFIERS, SERIES AM-320

Frequency Range	0.1 to 500 MHz
Noise Figure	To 3 db
Power Output for 2 db Compression	To +30 dbm
Third Order Intercept	To +45 dbm
Temperature Range	−20 to +50°C

Normally available as connector versions, these high performance amplifiers may be ordered as hermetically sealed pin packages.

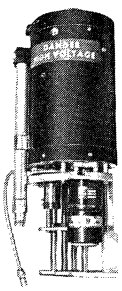
FET LINEAR ATTENUATORS, FREQUENCY MULTIPLIERS, RF TRANSFORMERS, DIRECTIONAL COUPLERS

LORCH ELECTRONICS CORP.
105 Cedar Lane, Englewood, N. J. 07631 • 201-569-8282 • TWX: 710-991-9718

MICROWAVE CAVITY LABORATORIES

DIVISION OF KMS INDUSTRIES, INC.

CW • PULSE CAVITIES • RF POWER AMPLIFIER • OSCILLATOR SYSTEMS • TEST EQUIPMENT • SOLID STATE COMPONENTS • FILTERS • DIPLEXERS • MULTIPLEXERS



HIGH POWER, RF TETRODE PULSE, CW CAVITIES

Up to 250 KW Output (Pulse Service)

- Tunable from 40-1350 MHz over entire range on most units.
- Input VSWR, 2:1 or better.
- No neutralizing.
- Gang tuning available.
- Servo tuned models available.*
- Input and output coupling matched
- Temperature stable.
- Optimum cooling.
- MIL Spec design.

MODEL	FREQ. RANGE MHz	OPERATION	POWER OUTPUT	SERVICE
11023	40-200	Class B	1.0 KW	CW Amp.
11022	230	Class C	15 KW Peak	Pulse Amp.
11024	40-200	Class B	0.1 KW	CW Amp.
11050	150	Class C	30 KW	Pulse Osc.
11051	150	Class C	125 KW	Pulse Amp.
11014	200-400	Class B lin.	1.0 KW	CW Amp.
11006	225-400	Class B lin.	.12 KW	CW Amp.
11009*	225-400	Class C	1.2 KW Peak	Pulse Amp.
11010*	225-400	Class B lin.	.12 KW	CW Amp.
11018	280-315	Class B	1.0 KW	CW Amp.
11029	360-480	Class B	.15 KW	CW Amp.
11030	360-480	Class B	1.5 KW	CW Amp.
11056	375	Class B	0.1 KW	CW Amp.
11057	375	Class B	1.4 KW	CW Amp.
11001	400-450	Class B lin.	2.5 KW	CW Amp.
11031	400-800	Class C	15 KW	Pulse Amp.
11019	400-800	Class B lin.	1.0 KW	CW Amp.
11004	410-460	Class C	14 KW	Pulse Amp.
11005	410-460	Class C	2.5 KW	Pulse Osc.
11205	420	Class C	35 KW	Pulse Osc.
11046	800-1000	Class B	1.0 KW	CW Amp.
11011	1250-1350	Class C	10 KW Peak	Pulse Amp.

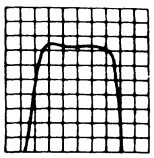
MCL CUSTOM CAPABILITIES

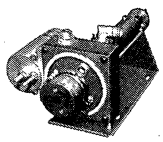
Any of the components or systems advertised on these pages can be modified for your individual requirements.

Write for our complete catalog covering standard and custom engineered products, including cavities, solid state components, diplexers, high-low-band-pass and bandstop filters, switches, mixers, power samplers, detectors and attenuators.

BROAD BAND AMPLIFIER CAVITIES

Give maximum utilization of the gain-bandwidth product, VHF through S-Band. Bandwidths more than double those of ordinary cavities. Flat-top response for easy cascading, with minimum reduction in overall system bandwidth. Eliminate mechanical tuning in many uses. Excellent phase stability, linearity. Compact.

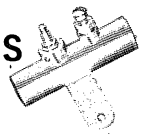




Model	Freq. MHz	Gain db	Bandwidth-db pts	Power Output
3029*	216	10	4.0 MHz @ 3.0 db	300 watts
3031*	216	10	4.0 MHz @ 3.0 db	3.0 kilowatts
3021*	420	10	20 MHz @ 3.0 db	5.0 kilowatts
3022*	420	23	20 MHz @ 3.0 db	200 watts
2041†	425	9.0, nom.	47 MHz @ 3.0 db	60 watts
3012*	425	8.0	50 MHz @ 1.0 db	2.5 kilowatts
3014*	425	26	50 MHz @ 1.0 db	400 watts
11026*	425	6.0	50 MHz @ 1.0 db	10 kilowatts
11033*	430.5	7.0	33 MHz @ 1.0 db	8.0 kilowatts
3045*	470	19	100 MHz @ 3.0 db	20 watts
3017*	476	12	8.0 MHz @ 3.0 db	15 watts
3023*	476	12	8.0 MHz @ 3.0 db	250 watts
3044B*	512	20	75 MHz @ 1.0 d	2.5 kilowatts
3042*	1025-1150	7.0	120 MHz @ 3.0 db	1.5 kilowatts
3046*	1545	23	20 MHz @ 3.0 db	100 watts
3047*	1545	13	20 MHz @ 3.0 db	2.0 kilowatts
3015†	1800	10	30 MHz @ 1.0 db	22 watts
3028†	2000	10	30 MHz @ 3.0 db	20 watts
1009†	2101.8	16	12 MHz @ 3.0 db	400 milliwatts
3020†	2101.8	11, min.	15 MHz @ 3.0 db	15 watts
3006B†	2106	7.0	10 MHz @ 3.0 db	10 watts
3040†	2250	9.0, min.	4.0 MHz @ 3.0 db	22 watts
1010†	2282.5	10	15 MHz @ 3.0 db	50 milliwatts
3005*	2846-2866	9.0	26 MHz @ 3.0 db	500 watts

*Pulse Operation †CW Operation

"MINI-CAV" OSCILLATOR, AMPLIFIER, TRIPLER CAVITIES



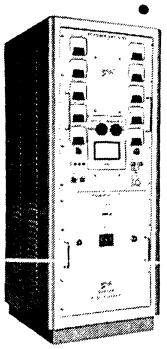
Meet rigid demands for reliability, small size and light weight in airborne and similar equipment.

MODEL	FREQ. GHz	POWER OUTPUT	SIZE DIA.	SIZE LENGTH	WEIGHT (APPROX.)
9010*	.988-1.012	3.5 KW min.	1½"	4½"	1 lb.
9012*	2.84-3.18	10 W peak min.	1"	6 3/16"	12 oz.
9013*	4.82-5.22	5.0W peak	1"	6 3/16"	14 oz.
9017*	.960-1.06	2.5 KW peak min.	1½"	5 1/16"	2 lbs.
9019*	2.84-3.00	10 W peak	1"	6 3/16"	12 oz.
9022B*	5.40	15 W	5/8"	2 3/32"	3 oz.
9023*	9.0	3.0 W min.	1 1/16"	2 3/16"	4 oz.
8207†	.940-.980	6KW peak	1½"	5 5/16"	20 oz.
9009A†	4.30	1.0 KW min.	1 3/8"	3 5/16"	12 oz.
9018†	4.30	.25 KW peak	1"	2 3/32"	5 oz.
7009**	1.23-1.37	1.0 W min.	1½"	10½"	1½ lbs.
9015**	4.30	2.0 MW	5/8"	2 5/8"	3 oz.
1004††	1.80-2.00	25 MW min.	1¼"	3"	12 oz.
1005††	1.075-1.10	1.0W	1 9/32"	2"	12 oz.
5015***	2.12-2.35 output .7083-.7833 input	150 MW min.	1½"	7"	2 lbs.

*Grid Pulsed Oscillators †Plate Pulsed Oscillators **CW Oscillators ††CW Amplifiers ***CW Tripler

HIGH POWER, RF ADD-ON AMPLIFIER SYSTEMS

- ***40-18,000 MHz Coverage***
- ***100 WATTS to 2.5 KW***
- ***CW or Pulse Operation***

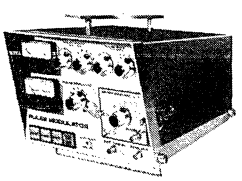


An exclusive MCL advancement which affords quick, economical modernization of older installations. Replaces multi-unit lashups with neat, standard 19" rack-mounted, high power amplifier systems. Complete with power supply, cooling source, sequential circuitry, fusing and protective interlock.

SERIES 10299B HIGH POWER PULSE MODULATOR

- **Three adjustable output plug-in heads:**
  0-1.5 KV @ 6.0 amperes, peak
  0-3.0 KV @ 3.0 amperes, peak
  0-6.0 KV @ 1.5 amperes, peak
  (Heads with other voltage and current ratings with power levels up to 100 watts average available on special order.)
- **Peak output voltage** adjustable with front panel meter, accurate to 3.0% of full scale, from 100 pulses per second up.
- **Duty Cycle** adjustable .001 to .01, with front panel meter, accuracy 3.0% of full scale. With adjustable overload cut-off.
- **Pulse Characteristics:**
  Width: adjustable 0.5 to 10 microseconds
  Droop: 10% max. at 10 microseconds pulse width
  Overshoot: 15% max. at rated output

Output	Rise Time	Fall Time
0-1.5 KV	170 NS	200 NS
0-3.0 KV	170 NS	200 NS
0-6.0 KV	400 NS	400 NS



ADDITIONAL FEATURES, SPECIFICATIONS

- Positive or Negative output polarity
- Internal or External triggering (external: + 2.0 v/ 75 ohms)
- Built-in floating, 6.3 VAC 3.0 ampere filament supply for external tubes and tube cavity combinations.
- Input Power, 115 VAC, 50/60 HZ, 300 watts.
- Dimensions: 14" x 8½" x 11"
- Weight: 34 lbs.

KLYSTRON AMPLIFIER SYSTEMS

High Gain, High Efficiency
Or Broad Band Tuning Modes

Model	Tube Type	Freq. MHz	Power Output	Max. Gain Tuned		Max. B.W. Tuned	
				Gain db.	BW MHz	Gain db.	BW MHz
10282	4K3SJ	1700-2400	1.0 KW	47-45	4.0-6.0	—	—
10283	4K3SL	1700-2400	1.0 KW	41-38	9.0-12	38.3	13-14
10284	4K3SK	2400-2700	1.0 KW	43-42	10-15	—	—
10285	4K3SN	2850-3050	1.0 KW	45	7.0	—	—
10276	VA888	4400-5000	1.0 KW	51	6.0-8.0	41	13-19
10233	VA834B	4400-5000	1.0 KW	51	5.5-7.5	41	11-17
10277	VA834D	5500-5850	1.0 KW	51	5.5-7.5	41	11-17
10278	VA861	5900-6400	1.0 KW	58	7.0-8.0	48	11
10286	VA866	7100-8500	1.0 KW	59	12	50	20
10287	VA930	15000-18000	0.5 KW	50	12	40	20

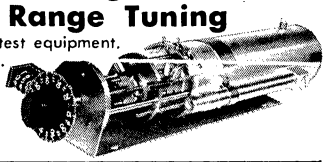
CW AMPLIFIER SYSTEMS

Model	Freq. Range MHz	Power Output	Gain db.	Bandwidth at 3.0 db.
10270-11043	40-200	1.0 KW	13	1.0 MHz
10270-11044	200-400	1.0 KW	13	5.0 MHz
10270-11045	400-800	1.0 KW	13	6.0 MHz
10270-11046	800-1000	1.0 KW	12	4.0 MHz
10017	400-450	2.5 KW	13	6.0 MHz
10358-10359	10-50	200 W	13	2.5 MHz
10358-10363	50-200	200 W	13	2.5 MHz
10358-10364	200-500	200 W	13	2.5 MHz
10358-10365	500-1000	100 W	12	2.5 MHz
10416	1600-1650	300 W	30	8.0 MHz

SERIES "E" RF TRIODE OSCILLATORS, AMPLIFIERS

150-4000 MHz Coverage With Extended Range Tuning

Use as system components or test equipment.
Modified to your requirements.



PULSED OSCILLATORS

Available from stock

Model Number	Frequency MHz	Min Power Output KW	Model Number	Frequency MHz	Min. Power Output KW
8038	150-300	1.5	8019	600-1200	1.0
8021	200-400	1.5	8028	1000-1500	1.0
8026	250-500	1.5	8029	1450-2000	1.0
8018	300-600	1.5	8027	2000-3000	1.0
8022	400-800	1.5	8030	3000-4000	1.0
8024	500-1000	1.5			

AMPLIFIERS

Model Number	Frequency MHz	Power Output
2026	200-550	80 W
2027	550-1215	50 W
2028	1215-2500	40 W

CW OSCILLATORS

Model Number	Frequency MHz	Power Output	Model Number	Frequency MHz	Power Output
6035	10-50	50W	6046	900-1150	50W
6036	50-200	50W	6044	1420-1520	30W
6037	200-500	50W	6045	1450-1500	40W
6038	500-1000	50W	6026	1420-1600	25W
6039	500-1000	100W	6025	2000-2500	20W

MODEL 15009 CW SIGNAL GENERATORS

A versatile test instrument utilizing plug-in triode cavity oscillators. Available as a complete rack-mounted signal source with built-in power supply. Separate rack mountable storage shelf for plug-in heads available as an option. Frequency range covered by interchangeable, plug-in cavity heads listed below.

Plug-in Head No.	Frequency MHz	Power Output
6027	10-50	50W
6028	50-200	50W
6029	200-500	50W
6030	500-1000	50W

Model 15009 excellent choice to drive 10358 200 watt CW Amplifier

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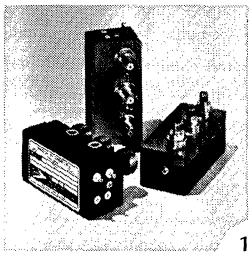
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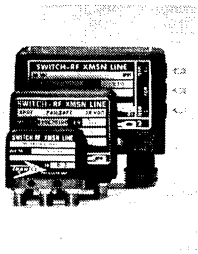
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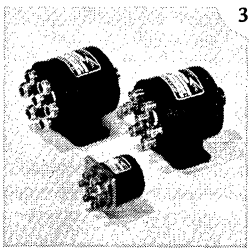
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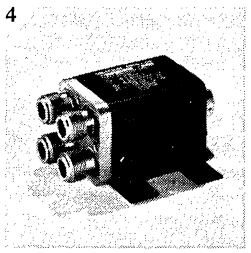
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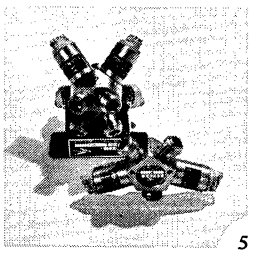
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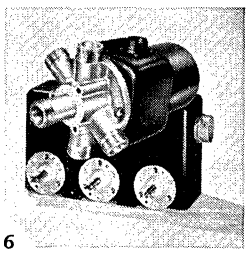
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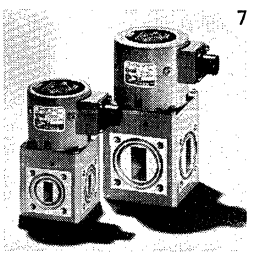
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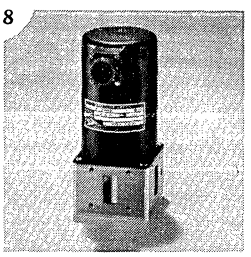
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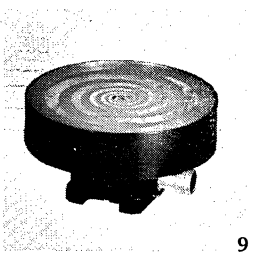
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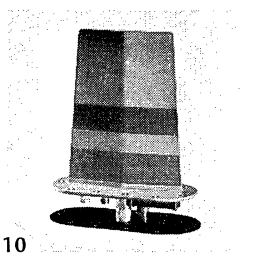
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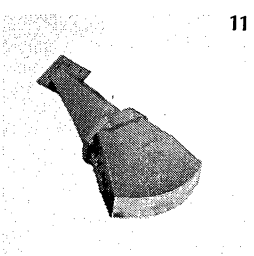
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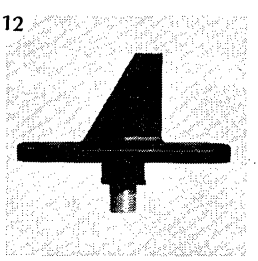
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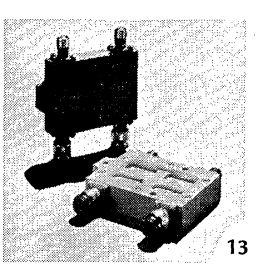
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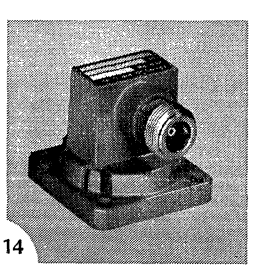
14

1. **TYPE-J**, SPDT coaxial switch, up to 12.4 GHz, fail-safe or latching, DC or AC, connectors: N, TNC, BNC, or SMA; 4 oz., 1-1/4" x 3-3/4" x 1" + connector dim. Suitable for commercial applications, yet meets performance, environmental and life requirements for military applications. Switch features totally new, direct-acting actuator.

2. **TYPE-D** family of SPDT switches, I to r (optimized for connector type size): DO for OSM, DT for TNC, and D for Type-N. DO is 0-18 GHz; others 0-12.4 GHz. All available latching or fail-safe and 28 VDC or 115 VAC.

3. **TYPE-M, MT, and MO** are 3 to 6 position coaxial switches. Type-M has "N" connectors, Type-MT has "TNC" connectors; both operate up to 12.4 GHz. Type-MO has "SMA" connectors and operates up to 18 GHz.

4. **TYPE-H**, a family of Transfer switches...sizes optimized for different R.F. connector sizes: H for Type-N, HT for TNC, and HO for SMA. HO is 0-18 GHz others 0-12.4 GHz. All available latching or fail-safe.

5. **TYPE-Y & A**, designed to meet the requirement for a small, light weight, coaxial switch with good R.F. performance up to 11 GHz and million cycle reliability. Two or four independent solenoids are normally open or normally closed.

6. **TYPE-TK, TL & Q**, coaxial switches for larger coaxial cables and connectors LC, LT, and 7/8"...also larger sizes 1-5/8" ect. Transco has a full line of coaxial switches of all sizes...rugged, reliable...SPDT or multi-position.

7. **TYPE-GR**, new state-of-the-art waveguide switch series, 9 different waveguide sizes, WR-62 to WR-284. Utilizes unique TRANSACTOR actuator...smaller and more reliable than other switch actuator designs.

8. **TYPE-GV**, family of 3 port (SPDT) switch/power dividers in WR-62, 90, 102, 112. Unique design (1) switches under full power and eliminates need for transmitter interlock, and (2) functions as 5-position power divider.

9. **ANTENNA, P/N 9C16600**, high power, multioctave, planar spiral, uses a planar logarithmic element bonded to a low loss heat conducting dielectric, HCI (Heat Conducting Insulation). Frequency: 2 to 10 GHz.

10. **TYPE T-11**, UHF/L-Band, aerodynamically shaped...qualified for Mach 2-3 aircraft. Radiation pattern omnidirectional for both frequencies. Improved horizon coverage, feed connector types optional, supplied with or without test probes.

11. **ECM TRANSMITTING AIRBORNE ANTENNAS**, circularly polarized, asymmetrical patterns, high power. Transco has designed and manufactured a wide variety of airborne antennas for many aircraft and applications...antenna lab instrumented thru Ka-Band, patterns ranges, anechoic chamber.

12. **TYPE T-25**, all metal, blade type, monopole antenna for Mach 3 operation. Antenna is unique in design in that the radiating blade is self supporting with no dielectric in the air-stream above the mounting surface.

13. **QUADRATURE HYBRID**, P/N 410C16500 3 dB multioctave power divider, -65 to +250° F, over 10 g's vibration, high or low power, can connect 2 antennas to 2 transmitters or receivers simultaneously.

14. **TRANSITION**, P/N 41C00100, is a coax to waveguide transition: WR-102 to Type-N. A low loss dielectric compound in the connector allows a power rating 3-1/2 to 4 times greater than if a teflon dielectric were used...over 500 watts average power. Specials designed to meet your requirements.

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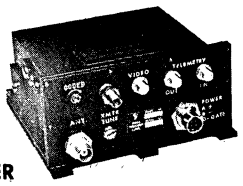
PRECISION LABORATORIES, INC.

C-BAND RADAR TRANSPONDER

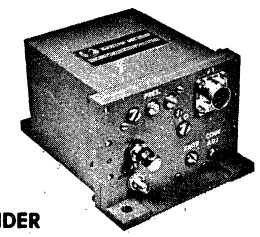
MODEL 302C-2 Freq: 5.4-5.9 GHz: **Receiver Type:** Superhet with sensitivity of - 70 dbm; **Transmitter Type:** Magnetron wity 400 w min. peak power output; **Input Power:** 22 to 32 VDC; **Size:** 43 cu. in.; **Weight:** 43 oz.; **Temp:** - 35°to + 75° C; **Altitude:** 230,000 ft.; **Humidity:** 100%; **Shock:** 125 g in any direction, 3 shocks in opposite directions along each axis for 6 μ sec each; **Acceleration:** 125 g applied along any axis for 3 minutes; **RFI:** Per MIL-I-26600. **Vibration:** sinusoidal, 5 to 25 Hz 0.4 in. DA and 15 g 15 to 2500 Hz.



S-BAND RADAR TRANSPONDER

MODEL 312S

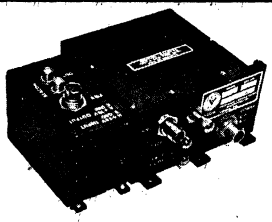
Freq: 2775 - 3000 MHz; **Receiver Type:** Superhet with sensitivity of -70 dbm; **Transmitter Type:** Triode cavity with 300 w min. peak power output; **Input Power:** 22 to 32 VDC; **Size:** 50 cu. in.; **Weight:** 47 oz.; **Temp:** -55° to +75° C; **Altitude:** 230,000 ft.; **Humidity:** 100% **Shock:** 125 g in any direction, 3 shocks in opposite directions along each axis for 6 μ sec each; **Acceleration:** 125 g applied along any axis for 3 minutes; **RFI:** Per MIL-I-26600; **Vibration:** sinusoidal, 5 to 25 Hz, 0.4 in. DA and 15 g 15 to 2500 Hz.



C-BAND RADAR TRANSPONDER

MODEL 321C

Freq: 5400-5900 MHz; **Receiver Type:** Superhet with sensitivity of - 70 dbm, 100% firing; **Transmitter Type:** Triode cavity with 300 w min. peak power outputs; **Input Power:** 24 to 32 VDC, 45 w; **Size:** 38 cu. in.; **Weight:** 44 oz.; **Temp:** -37° to +75° C.; **Altitude:** 230,000 ft.; **Acceleration:** 125 g; **Shock:** 125 g; **Vibration:** Sine, 5 to 25 Hz, 0.4 DA 25 to 2500 Hz, 15 g. **RFI:** Per MIL-I-26600.



TELESPONDER TELEMETRY SYSTEM

MODEL 603C is used in missile, satellite, drone, target and aircraft application as an enchancement device and telemetry system for a C-band tracking radar. The Model 603C telemetry system is designed to work in conjunction with Vega Models 202CD, 302CD transponders. The 603C telemetry system is comprised of two separate units: the Model 706-7 Seven Channel Telemetry Airborne Encoder and the Model 707-7A Seven Channel Telemetry Ground Demodulator. The 706-7 airborne unit is mated with the desired transponder whereas the 707-7A ground unit is mated with an appropriate C-band tracking radar, Model 706-7. **Encoder specs include: Telemetry Input Impedance:** 200,000 ohms min; **Telemetry Input Channels:** 1 to 7, serial or parallel combinations; **Telemetry Input Voltage:** 0.0 V to +5.0 VDC; **Sync Channels:** one; **Sampling Rates per Channel:** 80/sec. (160 prf); **Spacing Between Transponder and Telemetry Reply Pulse:** min. 50 μ sec., max. 137 μ sec.; **Accuracy of Voltage to Time Conversion:** $\pm$ 1% of +5 v.

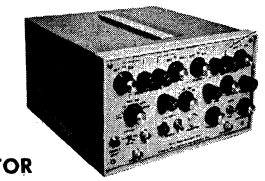
7-CHANNEL TELEMETRY DEMODULATOR

MODEL 707-7A is compatible for use with the FPS-16 and FPQ-6 radars and is an active portion of the ground readout system of the return pulse from a Vega transponder and 706-7A encoder. The demodulator outputs are suitable for readout onto a Model 1508 Minneapolis Honeywell Visicorder or for storage by a digital tape unit. The digital output for recording is a continuous serial binary train using either NRZ-M or NRZ-C format.

X-BAND RADAR TRANSPONDER

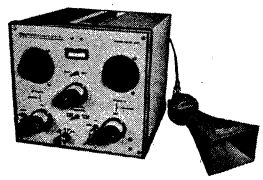
MODEL 319X

Freq: 9100 - 9600 MHz; **Receiver Type:** Superhet with sensitivity of -65 dbm; **Transmitter Type:** Magnetron with 400 w min. peak power output; **Input Power:** 22 to 32 VDC; **Size:** 43 cu. in.; **Weight:** 43 oz.; **RFI:** Per MIL-I-26600; **Humidity:** 100%; **Temp:** -35°to +75°C.



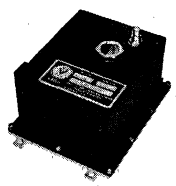
PULSE CODE GENERATOR

MODEL 715 is capable of producing up to five pulses, independently variable in position from 0 to 100 μ sec. Pulse width is variable from .25 μ sec. to 1000 μ sec. in four overlapping ranges. Incorporated is a recovery time feature which allows a coded pulse pair to be delayed from the first pair, up to 1000 μ sec. Any of the five pulses may be used without the presence of any others. **Other specs include:** Repetition rate of 5 pps to 500 KHz; Stability of 2% at 1000 pps; Amplitude of 0.15 v into 50 ohms and 20 v into 1000 ohms; Polarity, neg. or pos.; Rise and fall time of 10 nanosec or less; Delay from .25 μ sec. to 100 μ sec.



C-BAND INTERROSPONDER

MODEL 609C is a C-band transponder test set which is essentially a small radar device used in operationally checking a C-band transponder as it would be normally interrogated by the tracking radar. The unit is also designed to operate with the Vega Model 707-7A Telemetry Demodulator for checking out the Vega Telesponder Telemetry System. The unit provides either single or double pulse interrogation with a code spacing adjustment. The self-contained unit operates on 24 to 30 VDC and/or 115 V, 60 - 400 cps. An internal battery supply with self-contained charging circuit is optional. A waveguide horn antenna is available with the unit or can be user supplied. Checks the following transponder parameters: Receiver Frequency; Receiver Sensitivity; Transmitter Frequency; Transmitter Power Output; Code Spacing. X-Band available.



S-BAND RADAR TRANSPONDER

MODEL 206S

Freq.: 2700 - 2950 MHz; **Receiver Type:** Crystal video with sensitivity of -41 dbm (min.); **Transmitter Type:** Triode cavity with 150 w power output and 300 - 500 w on special order; **Input Power:** 6.9 VDC $\pm$ 10% or 28 VDC $\pm$ 10%, 9 watts quiescent; **Size:** 25.5 cu. in; **Weight:** 26 oz.; **Pressurized:** 15 PSI; **Temp.:** - 20° to +70° C; **Vibration:** 5 to 200 cps at 10 g 3 min. sweep; **Shock:** 100 g all planes, 11 msec duration; **Acceleration:** 80 g in all planes.

Full specifications are available on request and quotations can be made to your requirements and special applications.
All these units are of high environmental specifications for space, aircraft, targets and other uses.

For further details write or phone: **VEGA PRECISION LABORATORIES, INC.**

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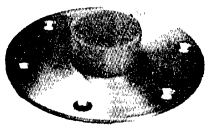
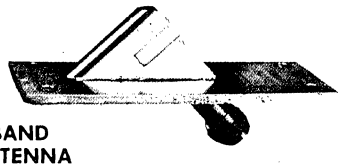


X-BAND ANTENNA
MODEL 835X

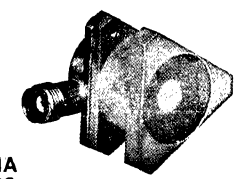
Loop Vee Antenna was developed primarily for aircraft application in association with an X-Band radar transponder. The antenna is a circularly polarized omni-directional antenna enclosed within a fiberglass radome. The antenna is characterized by its compactness and is extremely lightweight while still maintaining the electrical and environmental characteristics required by this type antenna. The height of the radome is approximately one-half inch and the diameter of the radome is approximately one inch. Mounting of the antenna is accomplished via a three-inch diameter mounting plate which also serves as a ground plane for the antenna. A C-Band version (Model 836C) of this antenna is available. **Freq.:** 9.0 - 9.69 GHz; **VSWR:** < 1.5:1; **Beamwidth:** 70° ; **Pol:** circular; **Power:** 1.5 kw peak; **Connector:** TNC; **Weight:** 1.5 oz.

C-BAND ANTENNA
MODEL 845C

Stub Antenna was developed primarily for aircraft application in association with a C-Band radar transponder. The antenna is a vertical polarized omni-directional antenna enclosed within a radome. The antenna is characterized by its compactness and is extremely lightweight while still maintaining the electrical and environmental characteristics required by this type antenna. The height of the radome is approximately three-quarter inch and the diameter of the radome is approximately three-eighth inch. Mounting of the antenna is accomplished via a three-inch diameter mounting plate which also serves as a ground plane for the antenna. **Freq.:** 5.4 - 5.9 GHz; **VSWR:** < 1.5:1; **Beamwidth:** 70°; **Pol:** Vert.; **Power:** 1.5 kw peak; **Connector:** TNC; **Weight:** 1.5 oz.

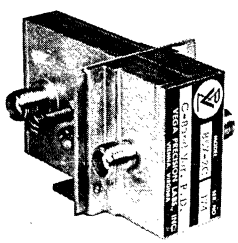


C-BAND ANTENNA
MODEL 801C is a lightweight slotted blade antenna developed as part of a C-Band Radar Transponder System for use on the Nike Apache Vehicle. Linear radiation coverage with minimum aerodynamic drag were key requirements in the design of this antenna. The body of the antenna is constructed of stainless steel which gives excellent reliability in missile environments with no degradation in electrical performance. The antenna may be used as a single element or in multi element arrays depending on the particular application and desired pattern coverage. The companion dividers are Models 853-2C, 854-3C and 855-4C (two-way, three-way and four-way respectively). **Freq.:** 5.4 - 5.9 GHz; **VSWR:** < 2.0:1; **Imp:** 50 ohms; **Pol:** Linear; **Connector:** TNC; **Weight:** < 3.0 oz.; **Power:** 1.0 kw peak.



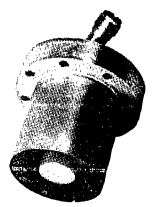
C-BAND ANTENNA
MODEL 820C

Antenna is an optical quartz-loaded, cavity backed helix radiator which produces a right hand circular polarized radiation pattern. The use of quartz material provides for high and low temperature stability with no degradation in electrical performance. Flush mounting is normally used on reentry vehicles with no performance deterioration as a result of reentry heat. Low thermal conductivity of the quartz material controls the heat transfer from the face of the antenna so that very little reentry heat is conducted to the antenna connector. This permits the use of standard mating connectors. Companion power dividers Models 853-2C, 854-3C and 855-4C are used for arraying two, three or four antennas about the missile. **Freq.:** 5.4 - 5.9 GHz; **VSWR:** < 1.5:1; **Pol:** RHC; power 1.5 kw peak; **Gain:** 6.0 db; **Beamwidth:** 130° **Temp.:** 1700° front surface exposure; **Weight:** < 2.0 oz.; **Shock:** 300 g's.

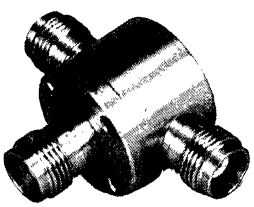


C-BAND POWER DIVIDER

MODEL 857-2C Variable Power Divider was designed to divide the output power of a C-Band Radar Transponder equally between two antenna elements when mounted in airborne vehicles and using unequal lengths of coaxial transmission lines. The design is such that the output power to each leg can be varied from a balanced condition to that of all power in either output leg. With the power divider adjusted to compensate for unequal cable losses, equal power will be radiated by each element of a two element array. The input VSWR is less than 1.3:1 and is tunable over the frequency range of operation. Also available are Models 856-2S (S-Band, 2.7 - 3.0 GHz) and 858-2X (X-Band, 9.1 - 9.6 GHz). **Freq.:** 5.4 - 5.9 GHz; **Insertion Loss:** < 0.5 db; **Power:** 1.0 kw peak; **Size:** 3 1/4" x 2 1/2" x 2"; **Weight:** 12 oz.

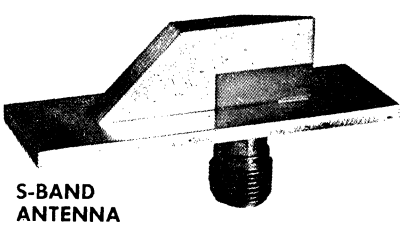


S-BAND ANTENNA
MODEL 815S was developed as part of a lightweight S-Band Antenna System for use in the Nike Tomahawk missile for purpose of transmitting tracking data. The antenna is a cavity backed helix with the helix embedded in quartz which is also used as the dielectric cavity. Mounting is accomplished via a mounting flange which can be adapted to a variety of mounting configurations. Flush mounting is used on reentry vehicles with no performance deterioration as a result of reentry heat. Low thermal conductivity of the quartz allows little of the heat to be conducted to the antenna connector therefore standard mating connectors may be used. A C-Band version of this antenna is also available. **Freq.:** 2.7 - 2.95 GHz; **Pol:** RHC; **Gain:** 7.0 db; **Beamwidth:** 130° nominal; **VSWR:** < 1.5:1; **Temp:** 1000° F, front surface exposure; **Vibration (random):** 48 g. rms; **Shock:** 78 g; **Acceleration:** 100 g.



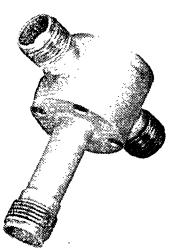
C-BAND POWER DIVIDER

MODEL 853-2C was developed as part of a lightweight C-Band Antenna System which can be installed in any of a large groupe of missiles. Model 853-2C and 855-4C, three-way and four-way respectively, are also available. The body of the power divider is constructed of stainless steel which gives exellent reliability in missile environments. The interior of each power divider consists of an output arm which goes through one or more transformer stages, and then couples with two or more output arms to complete the power division. Each power divider has pre-drilled holes for mounting purposes. **Freq.:** 5.4 - 5.9 GHz; **VSWR:** < 1.3:1; **Imp:** 50 ohms; **Insertion Loss:** < 0.5 db; **Power Div:** ± 0.5 db; **Power:** 1.5 kw peak;; Weight: 853-2C, 2.3 oz.; 854-3C, 2.5 oz.; 855-4C, 2.7 oz.



S-BAND ANTENNA
MODEL 802S

Slotted Blade Antenna was developed for Telemetry and Command functions on the Nike Apache vehicle. The antenna provides linear radiation coverage with minimum aerodynamic drag. The body of the antenna is constructed of stainless steel which gives excellent reliability in missile environments with no degradation in electrical performance. The antenna may be used as a single element or in multi element arrays depending on the particular application and desired pattern coverage. The companion power dividers are Models 850-2S, 851-3S and 852-4S (two-way, three-way and four-way respectively). **Freq.:** 2.2 - 3.3 GHz; **VSWR:** 2.0:1; **Imp:** 50 ohm; **Pol:** Linear; **Power:** 1.0 kw peak; **Connector:** TNC; **Weight:** < 2.0 oz.



S-BAND POWER DIVIDER
MODEL 850-2S was developed as part of a lightweight S-Band Antenna System for use in the Nike Tomahawk missile. Models 851-3S and 852-4S, three-way and four-way respectively, are also available. Tracking coverage may be obtained with two, three or four antennas in operation with the use of the appropriate power divider. The interior of the power divider consists of an input arm which goes through one or more transformer stages, and then couples with two or more output arms to complete the power division. TNC connectors are brazed to the power divider body in which mounting holes are provided. **Freq.:** 2.7 - 2.95 GHz; **VSWR:** < 1.25:1, **Insertion Loss:** < 0.5 db; **Vibration (random):** 48 g rms; **Shocks:** 78 g; **Acceleration:** 100 g; **Weight:** 850-25, 2.2 oz.; 851-3S, 2.4 oz.; 852-4S, 2.7 oz.

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OEM POWER MODULES "OFF-THE-SHELF" SPECIALS

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If there is one thing our years of experience in the power supply industry has taught us — it is versatility. An example is our new M Series OEM power modules. Besides a wide input range suitable for international use, this line has efficiencies as high as 80% and may be operated interchangeably from both AC and DC power sources. It was also designed to fit into small spaces, providing nearly 2 watts per cubic inch.

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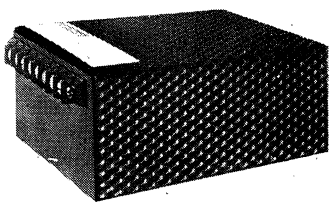


FEATURES

- WIDE INPUT FOR INTERNATIONAL USE
- AC AND DC INPUT
- 80% EFFICIENCIES
- MAX. WATTS/CU. IN.

SPECIFICATIONS

INPUT VOLTAGE RANGE
AC—90 to 150 VRMS, 45 Hz to 1 kHz
DC—90 to 240 VDC

LINE REGULATION
M —0.5% for 10% line change
M1—0.1% for 10% line change
M2—0.01% for 10% line change

LOAD REGULATION
M —4.0% ½ load to full load
M1—1.0% ½ load to full load
M2—0.2% no load to full load

RIPPLE
M —0.5% RMS/2% peak to peak
M1—0.2% RMS/1% peak to peak
M2—0.005% or 1 mv RMS (wig)/ 0.1% or 30 mv pk to pk (wig)

TEMPERATURE RANGE
Operating: −20°C to +71°C base plate
Storage: −40°C to +85°C ambient

TEMPERATURE COEFFICIENT
M —0.03%/°C
M1—0.015%/°C
M2—0.0015%/°C

SHORT CIRCUIT PROTECTION
Fully protected against short circuits of any duration — auto recovery

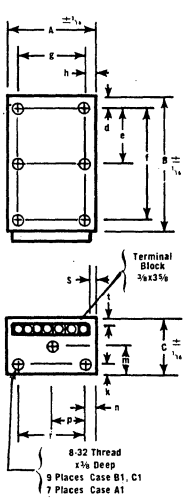
Output Voltage Adjust. Range	M SERIES Output Current (Amps)	M SERIES Model No.	M SERIES Case Size No.	M1 SERIES Output Current (Amps)	M1 SERIES Model No.	M1 SERIES Case Size No.	M2 SERIES Output Current (Amps)	M2 SERIES Model No.	M2 SERIES Case Size No.
4.7- 5.3	5	M-5-5	A1	3.5	M1-5-3.5	A1	2.5	M2-5-2.5	A1
4.7- 5.3	10	M-5-10	B1	7.5	M1-5-7.5	B1	5	M2-5-5	B1
4.7- 5.3	20	M-5-20	C1	15	M1-5-15	C1	10	M2-5-10	C1
6.0- 6.6	4	M-6.3-4	A1	3	M1-6.3-3	A1	2.5	M2-6.3-2.5	A1
6.0- 6.6	8	M-6.3-8	B1	6	M1-6.3-6	B1	5	M2-6.3-5	B1
6.0- 6.6	17	M-6.3-17	C1	13	M1-6.3-13	C1	10	M2-6.3-10	C1
11.5-12.5	2	M-12-2	A1	1.5	M1-12-1.5	A1	1.2	M2-12-1.2	A1
11.5-12.5	4	M-12-4	B1	3	M1-12-3	B1	2.5	M2-12-2.5	B1
11.5-12.5	8	M-12-8	C1	6	M1-12-6	C1	5	M2-12-5	C1
14.5-15.5	1.8	M-15-1.8	A1	1.5	M1-15-1.5	A1	1.2	M2-15-1.2	A1
14.5-15.5	3.5	M-15-3.5	B1	2.5	M1-15-2.5	B1	2	M2-15-2	B1
14.5-15.5	7	M-15-7	C1	5	M1-15-5	C1	4	M2-15-4	C1
23-25	1.2	M-24-1.2	A1	1	M1-24-1	A1	0.8	M2-24-0.8	A1
23-25	2	M-24-2	B1	1.8	M1-24-1.8	B1	1.5	M2-24-1.5	B1
23-25	4	M-24-4	C1	3	M1-24-3	C1	2.5	M2-24-2.5	C1
27-29	1	M-28-1	A1	0.8	M1-28-0.8	A1	0.6	M2-28-0.6	A1
27-29	1.8	M-28-1.8	B1	1.5	M1-28-1.5	B1	1.2	M2-28-1.2	B1
27-29	3.5	M-28-3.5	C1	2.5	M1-28-2.5	C1	2	M2-28-2	C1

PRICES

CASE SIZE	1-9 PIECES
A1	$170.00 ea.
B1	200.00
C1	250.00

CONSULT FACTORY FOR:
- Overvoltage protection
- Heat-sink fins for all models
- Hermetic sealing and encapsulation
- Quantity discounts

CASE	A1	B1	C1
A	4	4	4
B	4	6	6
C	1⅞	1⅞	2⅜
d	⅜	⅜	⅜
e	—	2⅝	2⅝
f	3¼	5¼	5¼
g	3¼	3¼	3¼
h	⅜	⅜	⅜
k	½	½	½
m	1	1	1 7/16
n	½	½	½
p	1½	1½	1½
r	3	3	3
s	3/16	3/16	3/16
t	¼	¼	3/16



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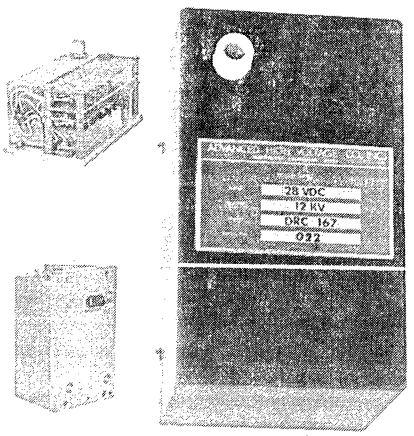
High Voltage Modules for Photomultipliers and CRT'S



features

Line regulation .05% on all models.

Output voltages listed are nominal values. They are adjustable ±10% and can be remotely programmed. Wider adjustment range is optional.

T/C of 100ppm is standard.

Units shown normally have a positive output. Negative output furnished at no extra charge.

The output DC return on all units can be floated within 500 volts of chassis.

All units are short-circuit-proof and can remain shorted indefinitely without damage. They will recover automatically after removal of short.

Operating temperature range is normally −20°C to +65°C but can be increased at nominal cost.

All AC input models will operate from a single phase 117VAC, 50 to 420Hz line.

DC input models use 28VDC. Other input voltages can be supplied.

Units are shielded and have no external magnetic field.

Units are built to best commercial standards and can meet most MIL specs.

DRC Series is built to MIL-E-5400 and MIL-STD-704 and other applicable specs.

DRC Series has a focus voltage output.

The following is only a partial list of models offered by Advanced High Voltage. Write or phone for our complete catalog.

specifications

Output Voltage	Current	Load Regulation	Ripple	Input Voltage	Approximate Dimensions	Model Number
200 V	20 mA	0.1%	0.05%	117 VAC	4.2 x 3.0 x 2.6	ARM 016
400 V	12 mA	0.1%	0.05%	117 VAC	4.2 x 3.0 x 2.6	ARM 026
600 V	8 mA	0.1%	0.05%	117 VAC	4.2 x 3.0 x 2.6	ARM 036
800 V	6 mA	0.1%	0.05%	117 VAC	4.2 x 3.0 x 2.6	ARM 046
1 KV	5 mA	0.1%	0.05%	117 VAC	4.2 x 3.0 x 2.6	ARM 056
1.2 KV	4 mA	0.1%	0.05%	117 VAC	4.2 x 3.0 x 2.6	ARM 066
1.5 KV	3 mA	0.1%	0.05%	117 VAC	4.2 x 3.0 x 2.6	ARM 076
1.8 KV	3 mA	0.1%	0.05%	117 VAC	4.2 x 3.0 x 2.6	ARM 086
2.2 KV	2 mA	0.1%	0.05%	117 VAC	4.2 x 3.0 x 2.6	ARM 096
2.5 KV	2 mA	0.1%	0.05%	117 VAC	4.2 x 3.0 x 2.6	ARM 106
800 V	18 mA	2%	0.05%	28 VDC	3.1 x 2.3 x 2.0	DUM 044
1 KV	15 mA	2%	0.05%	28 VDC	3.1 x 2.3 x 2.0	DUM 054
1.5 KV	10 mA	2%	0.05%	28 VDC	3.1 x 2.3 x 2.0	DUM 064
2.5 KV	6 mA	5%	0.05%	28 VDC	3.8 x 2.7 x 2.4	DUM 074
3.5 KV	4 mA	5%	0.05%	28 VDC	3.8 x 2.7 x 2.4	DUM 084
5 KV	3 mA	5%	0.05%	28 VDC	3.8 x 2.7 x 2.4	DUM 094
7.5 KV	2 mA	8%	0.05%	28 VDC	3.8 x 2.7 x 2.4	DUM 104
10 KV	1.5 mA	8%	0.05%	28 VDC	4.9 x 3.5 x 3.0	DUM 114
12.5 KV	1.2 mA	8%	0.05%	28 VDC	4.9 x 3.5 x 3.0	DUM 124
15 KV	1 mA	10%	0.05%	28 VDC	4.9 x 3.5 x 3.0	DUM 134
18 KV	0.8 mA	10%	0.05%	28 VDC	4.9 x 3.5 x 3.0	DUM 144
22 KV	0.6 mA	10%	0.05%	28 VDC	4.9 x 3.5 x 3.0	DUM 154
800 V	18 mA	0.1%	0.05%	28 VDC	3.1 x 2.3 x 2.0	DRM 105
1 KV	15 mA	0.1%	0.05%	28 VDC	3.1 x 2.3 x 2.0	DRM 115
1.5 KV	10 mA	0.1%	0.05%	28 VDC	3.1 x 2.3 x 2.0	DRM 125
2.5 KV	6 mA	0.1%	0.05%	28 VDC	3.8 x 2.7 x 2.4	DRM 135
3.5 KV	4 mA	0.1%	0.05%	28 VDC	3.8 x 2.7 x 2.4	DRM 145
5 KV	3 mA	0.1%	0.05%	28 VDC	3.8 x 2.7 x 2.4	DRM 155
7.5 KV	2 mA	0.1%	0.05%	28 VDC	3.8 x 2.7 x 2.4	DRM 165
10 KV	1.5 mA	0.1%	0.05%	28 VDC	4.9 x 3.5 x 3.0	DRM 175
12.5 KV	1.2 mA	0.1%	0.05%	28 VDC	4.9 x 3.5 x 3.0	DRM 185
15 KV	1 mA	0.1%	0.05%	28 VDC	4.9 x 3.5 x 3.0	DRM 195
18 KV	0.8 mA	0.1%	0.05%	28 VDC	4.9 x 3.5 x 3.0	DRM 205
22 KV	0.6 mA	0.1%	0.05%	28 VDC	4.9 x 3.5 x 3.0	DRM 215
4 KV	.6 mA	0.1%	0.05%	28 VDC	5.05 x 2.9 x 2.6	DRC 127
5 KV	.6 mA	0.1%	0.05%	28 VDC	5.05 x 2.9 x 2.6	DRC 137
7.5 KV	.4 mA	0.1%	0.05%	28 VDC	5.05 x 2.9 x 2.6	DRC 147
10 KV	.3 mA	0.1%	0.05%	28 VDC	5.05 x 2.9 x 2.6	DRC 157
12 KV	.2 mA	0.1%	0.05%	28 VDC	5.05 x 2.9 x 2.6	DRC 167
15 KV	.2 mA	0.1%	0.05%	28 VDC	5.05 x 2.9 x 2.6	DRC 177
4 KV	3 mA	0.1%	0.05%	117 VAC	4.7 x 4.0 x 2.9	ARA 116
5 KV	3 mA	0.1%	0.05%	117 VAC	4.7 x 4.0 x 2.9	ARA 126
6 KV	2.5 mA	0.1%	0.05%	117 VAC	4.7 x 4.0 x 2.9	ARA 136
8 KV	2 mA	0.1%	0.05%	117 VAC	4.7 x 4.0 x 2.9	ARA 146
10 KV	1.5 mA	0.1%	0.05%	117 VAC	4.7 x 4.0 x 2.9	ARA 156
12 KV	1.2 mA	0.1%	0.05%	117 VAC	4.7 x 4.0 x 2.9	ARA 166
15 KV	1 mA	0.1%	0.05%	117 VAC	4.7 x 4.0 x 2.9	ARA 176
18 KV	0.8 mA	0.1%	0.05%	117 VAC	4.7 x 4.0 x 2.9	ARA 186

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If you don't see it here, write or phone.
We can probably supply what you need.

Advanced High Voltage Co., Inc., also manufactures Dynamic Electronic Loads for testing of High Voltage Sources.

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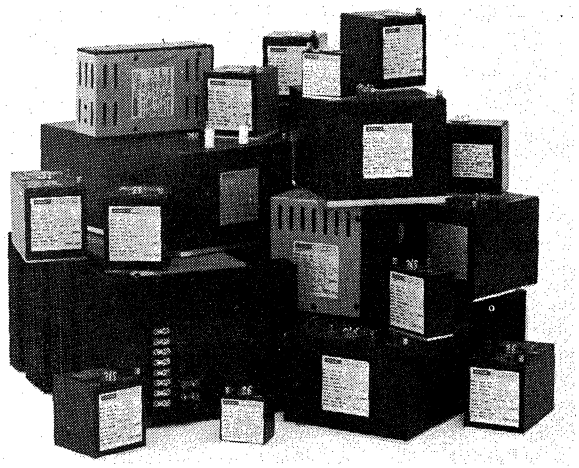
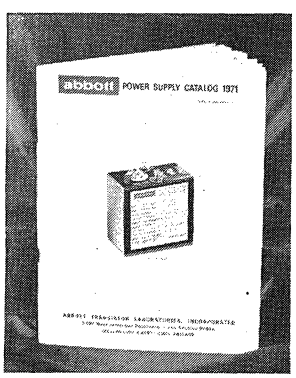
ABBOTT POWER MODULES

The Next 15 Pages List 1800 Regulated Modules with Specifications and Prices



The most complete line of small size MIL-SPEC type power modules available in the industry is fully described in the following 15 pages. The Abbott line of power modules includes output voltages from 3 volts to 3,650 volts DC, output current from 2 milliamperes to 20 amperes and output power from 1 watt to 300 watts. Sizes, weights, regulations and environments are shown for the various input and output powers. Abbott is proud to list three completely new lines of power modules this year: dual-output 400 Hz to DC Models "WW," dual-output DC to DC Models "CC," and a 60 Hz to DC series of high performing compacts designated as the Model "Z." Look through the next 15 pages and you may find the power module you want is a standard Abbott model.



See Abbott's 1971 catalog for complete information on all our products plus additional items such as:

- Quality Control System
- Thermal Data
- Input Currents
- Overvoltage Protectors
- Input Line Filters
- Operating Hints
- Reliability & MTBF
- EMI/RFI
- MIL Spec Environments

To receive your free copy of this comprehensive 72 page Power Supply Catalog, simply call or write Abbott.

TABLE OF CONTENTS

NEXT 15 PAGES

60 HERTZ to:	DC, hi-performing compacts	619
	DC, industrial	620
	DC, hermetically sealed	622
400 HERTZ to:	DC, hi-temp	624
	DC, hi-performance	626
	DC, dual output	627
DC to:	DC, hi-temp	628
	DC, hi-performance	630
	DC, dual output	631
	Sine Wave, 1 ϕ or 3 ϕ	632

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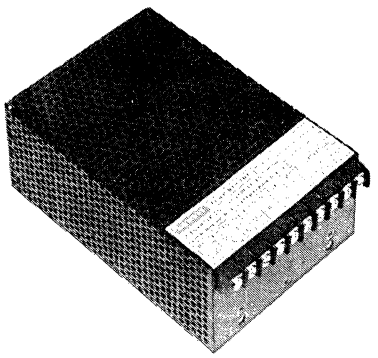
abbott 60 ~ to DC Hi-Performing Compacts



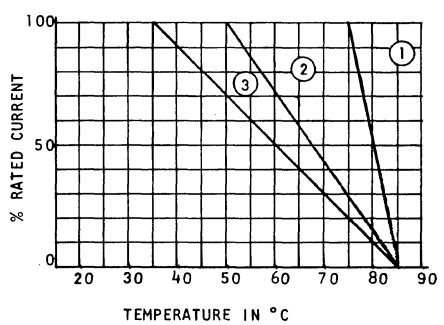
FEATURES

- Compact
- Input Frequency Range 47-440 Hz
- Input Voltage Range 100-132 vac
- Hi-Reliability
- +80°C Operation
- Parallel Operation

Output Voltage Range (vdc)	Rated Output Current* (amps)	Model No.	Price 1-4 pcs.
2.7 - 3.3	10	**Z3T10**	219
3.7 - 4.3	10	**Z4T10**	219
4.7 - 5.3	10	**Z5T10**	219
5.7 - 6.3	9	**Z6T9**	219
6.0 - 6.6	9	**Z6.3T9**	219
9.5 - 10.5	6	**Z10T6**	219
11.5 - 12.5	6	**Z12T6**	219
14.5 - 15.5	4	**Z15T4**	219
17.5 - 18.5	3.5	**Z18T3.5**	219
19 - 21	3	**Z20T3**	219
21 - 23	3	**Z22T3**	219
23 - 25	2.5	**Z24T2.5**	219
27 - 29	2.5	**Z28T2.5**	219
29 - 31	2.5	**Z30T2.5**	219

*See Current vs Temperature Curves below.

CURRENT VS TEMPERATURE CURVES



SPECIFICATIONS

INPUT VOLTAGE RANGE: 100 to 132 VRMS

INPUT FREQUENCY RANGE: 47 to 440 Hz, 1 phase

OUTPUT VOLTAGE AND CURRENT: See specific models listed in table

LINE REGULATION: 0.04% or 5 mv (whichever is greater) for input change of 100 to 132 VRMS with load constant

LOAD REGULATION: 0.1% or 20 mv (whichever is greater) for change from no load to full load with line constant

RIPPLE: 0.02% or 5 mv RMS (whichever is greater); 50 mv peak-to-peak maximum, measured with scope having 1 MHz bandwidth

OUTPUT VOLTAGE ADJUSTMENT: Voltage is continuously adjustable between the limits shown in table by means of an externally accessible screwdriver adjustment potentiometer

ADJUSTMENT RESOLUTION:

Nom. Output Voltage	Resolution
3-16 vdc	35 mv
18-30 vdc	60 mv

ISOLATION VOLTAGE: 500 vdc input to output and input to case — 200 vdc output to case

INSULATION RESISTANCE: 50 megohms minimum between input and output, input and case, and output and case when measured at 50 vdc

TEMPERATURE RANGE: Operating: −20°C to +80°C (see curves below)
Storage: −55°C to +85°C

TEMPERATURE COEFFICIENT: 0.03% per degree centigrade maximum — 0.01% per degree centrigrade typical

SHORT CIRCUIT PROTECTION: Each unit is completely protected against a short circuit of any duration. The output voltage automatically restores to normal when the short is removed

INPUT TRANSIENT PROTECTION: 180 vac for 0.1 second

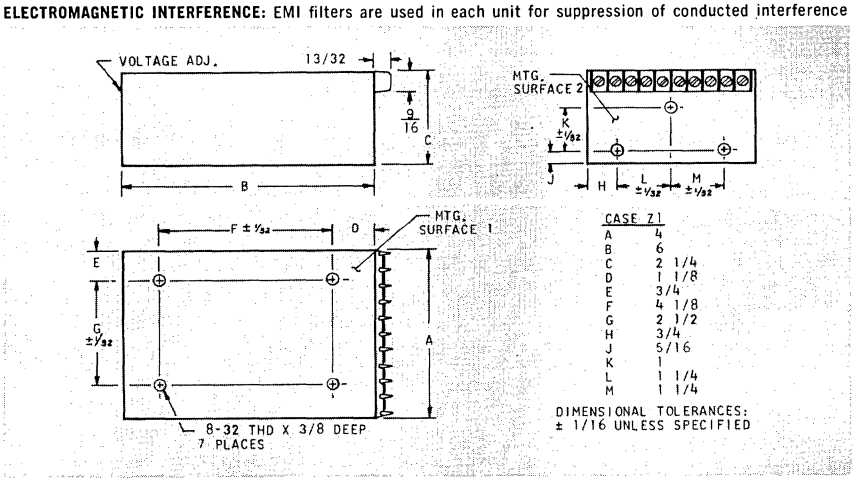
OVERVOLTAGE PROTECTION: Internal circuitry will reduce the output voltage to approximately 1 vdc within 15 microseconds if the output voltage rises 10% or 2 vdc (whichever is greater) above nominal. Available as an optional feature by adding "−1" to the model number and $10.00 to the 1-4 piece price

LOAD TRANSIENT RECOVERY TIME: Output voltage returns to regulation limits within 200 microseconds in response to a step change of 50% in load current. Typical over/undershoot is less than 10% of output voltage

PARALLEL OPERATION: Any number of identical units may be connected in parallel. Output should be derated to 90% of rated current

WEIGHT: 3.0 pounds maximum

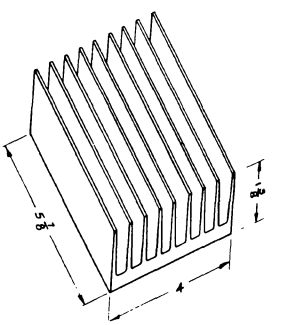
ELECTROMAGNETIC INTERFERENCE: EMI filters are used in each unit for suppression of conducted interference



OUTPUT CURRENT VS TEMPERATURE

1) CONDUCTION COOLING — Mounting Surface 1 should be attached to a heat sink plate or chassis. The percentage of rated output current that may be drawn from any "Z" model at various mounting surface temperatures is indicated by Curve ①. Thus, 100% of the rated output current may be drawn at a **mounting surface temperature** of 75°C.

2) CONVECTION COOLING — A thermal finned radiator, Model TRZ1, may be attached to Mounting Surface 1. Using Mounting Surface 2, install the unit with fins in a vertical position. Curve ② indicates the percentage of rated output current that may be drawn from any "Z" model in this configuration at various **ambient temperatures.** Thus, 100% of the rated current may be drawn at 50°C **ambient temperature.** Model TRZ1, shown at right, adds 1⅜" to Dimension "C." Price is $4.00 each for 1 to 4 pieces.



3) RADIATION COOLING — Units may be installed on Mounting Surface 2 with **no** additional **heat sinking.** The percentage of rated current that may be drawn from any "Z" model at various ambient temperatures is indicated by Curve ③. The ambient temperature should be measured with ¼ inch of Mounting Surface 1 in still air. Thus, 100% of the rated current may be drawn at 35°C **ambient temperature.**

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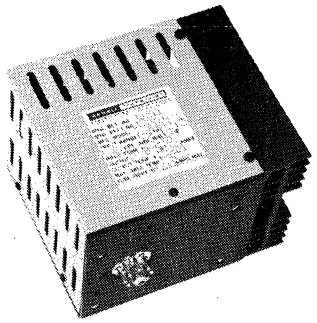

POWER MODULES

features

- −4 to +160°F ambient
- 5 to 100 VDC
- 0.15 to 20 amps
- 0.1% regulation
- All silicon
- High reliability
- Short circuit protection
- Voltage transient protection
- MIL-T-27C transformers used throughout
- For military and industrial applications

DELIVERY IS NORMALLY 12 DAYS

SPECIFICATIONS

INPUT VOLTAGE RANGE
105-125 VRMS

INPUT FREQUENCY RANGE
50-420 Hertz 1 phase

LINE REGULATION
0.1% or 10 mv (whichever is greater) for input change of 105-125 VRMS

LOAD REGULATION
0.1% or 10 mv (whichever is greater) for change from no load to full load

RIPPLE
0.02% or 5 mv RMS (whichever is greater)

OUTPUT VOLTAGE ADJUSTMENT
Voltage is continuously adjustable between the limits shown in table by means of an externally accessible screwdriver adjustment potentiometer

ADJUSTMENT RESOLUTION
30 mv max. for outputs 5 thru 16 VDC; 50 mv max. for outputs 18 thru 50 VDC
70 mv mav for outputs 55 thru 95 VDC

ISOLATION VOLTAGE
300 VDC between output terminals and chassis ground

INSULATION RESISTANCE
50 megohms between output terminals and chassis ground when measured at 50 VDC

POLARITY
Inputs and outputs are isolated; either positive or negative side may be grounded

TEMPERATURE
Operating: −4°F (−20°C) to +160°F (+71°C) without derating, forced air, or heatsinking. Storage: −67 to +185°F

TEMPERATURE COEFFICIENT
0.03% per degree Centigrade

ALTITUDE
10,000 feet above sea level

SHORT CIRCUIT PROTECTION
Each unit is completely protected against an overload or short circuit of any duration. The output voltage automatically restores to normal when the overload is removed

INPUT TRANSIENT PROTECTION
180 VAC for 0.1 sec in accordance with MIL-STD-704A, figure 3, limit 1

LOAD TRANSIENT RECOVERY TIME
Output voltage returns to regulation limits within 75 microseconds after a 50% step change in load current

REMOTE ERROR SENSING
Each unit contains a means by which the regulator circuit monitors the voltage directly at the load using extra "sensing" leads. The resulting circuit action compensates for a DC voltage drop up to 0.5 volts in the load leads.

SERIES OPERATION
Two or more power supplies can be operated in series so that the output voltages of the supplies are additive. Total output voltage is not to exceed 200 VDC

OUTPUT IMPEDANCE
DC to 1K Hz — 0.003 R_L or 0.03 ohms max., whichever is greater.
1K Hz to 10K Hz — 0.008 R_L or 0.08 ohms max., whichever is greater.
10K Hz to 100K Hz — 0.015 R_L or 0.30 ohms max., whichever is greater.
R_L = rated load resistance.

RELIABILITY
The mean time between failure (MTBF) per MIL-HDBK-217 under worst case operating conditions of full output current, max. input voltage, and +160°F ambient is 22,026 hrs. for 20 amp models, increasing to 47,281 hrs. for 0.15 amp models. At +104°F ambient, the MTBF increases to 63,898 hrs. and 141,243 hrs., respectively (Consult factory for complete reports)

MOUNTING
Threaded inserts are provided on two surfaces for versatile mounting of cases A through F

CASE SIZE	A	B	C	D	E	F	G	H	J
width (in.)	1⅞	4½	5¾	7½	8⅜	8¾	8	8	9¾
depth (in.)	4	4	4	4	8	8	12	12	12
height (in.)	6½	5	5	6½	5	5	5	6½	6½

NOTE: Complete dimensional drawings and size charts for each case size are shown in our 1971 catalog.

MODEL DESIGNATION (For Model "R" series only)

For your assistance and understanding, we have included a complete explanation of our model designation for this series of units, using Model **R28S2.5-14** as an example.

R Designates the general series of the power supply.

28 Designates the nominal output voltage of the unit.

S Designates the output connector as follows:
- S — 8 pin solder hook terminal. Standard on all units with case size A through F.
- T — Terminal strip. Standard on all units with case size G through J.
- P — Octal plug. Optional on case sizes A through F at $10 for one piece and $5 each for two to four pieces.
- C — Cannon connector MS3112E-16-8P with mate. Optional on case sizes A through F at $30 for one piece and $20 for two to four pieces.

2.5 Designates the continuous full load output current.

14 Designates the inclusion of the desired optional features. For a list of the features available, and their numbers, please see the "Optional Features" section for Model R series, below. For example, R28S2.5-14 designates a 60 Hz to 28 VDC at 2.5 amps unit using an 8 pin solder hook terminal, having the optional features "overvoltage protection" and "remote voltage adjustment".

OPTIONAL FEATURES (For Model "R" series only)

To include the optional features desired in the power supply, simply add a dash and the feature number to the end of the model number. (See "Model Designation" section above.)

Feature	Description	Feature Number	Price 1-4 pcs.
Overvoltage Protection	If the output voltage rises 10% or 2V WIG above the nominal setting, the overvoltage protection circuitry reduces the voltage to approximately 1 volt within 15 microseconds. Under worst case conditions the output voltage could rise an additional 10% max during this 15 microsecond period.	1	$20
Connector Location	The output connector can be supplied on the surface labeled "Optional Location" on the dimensional drawing for case size B through F.	2	5
230 VAC Operation	Units can be modified to operate with an input voltage of 210 to 250 VRMS, 50 to 420 Hz.	3	10
Remote Voltage Adjustment	Provision is made for locating an adjustment potentiometer in a remote location from the power supply.	4	10
Output Voltage Resolution	Provisions can be made to increase the output voltage adjustment resolution as follows: **Nominal Output Voltage — Resolution** 5V through 16V — 1.5 mv max. 18V through 50V — 3.0 mv max. 55V through 95V — 5.0 mv max	5	10
Parallel Operation	Units can be modified for parallel operation providing: a) Each unit has the same output voltage. b) Output current of each unit is derated 20%.	6	10

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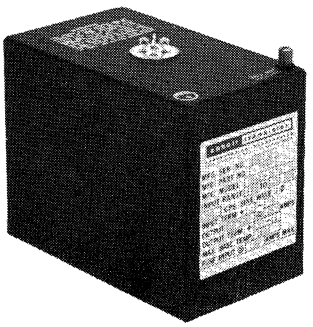
Output Voltage Range	Output Curr. (Amps)	Size	Wt. (Lbs.)	Model Number	Price 1-4 pcs.
4.5-5.5	0.15	A	3.0	R5S0.15	$ 83
	0.3	A	3.0	R5S0.3	98
	0.6	B	6.0	R5S0.6	105
	1.2	B	6.0	R5S1.2	115
	2.5	C	8.0	R5S2.5	140
	5.0	D	13.0	R5S5	170
	10	F	22.0	R5S10	235
	15	G	28.0	R5T15	285
	20	J	33.0	R5T20	327
5.5-6.5	0.15	A	3.0	R6S0.15	83
	0.3	A	3.0	R6S0.3	98
	0.6	B	6.0	R6S0.6	105
	1.2	B	6.0	R6S1.2	115
	2.5	C	8.0	R6S2.5	140
	5.0	D	13.0	R6S5	170
	10	F	22.0	R6S10	235
	15	G	28.0	R6T15	285
	20	J	33.0	R6T20	327
6.5-7.5	0.15	A	3.0	R7S0.15	83
	0.3	A	3.0	R7S0.3	98
	0.6	B	6.0	R7S0.6	105
	1.2	B	6.0	R7S1.2	115
	2.5	C	8.0	R7S2.5	140
	5.0	D	13.0	R7S5	170
	10	F	22.0	R7S10	235
	15	G	28.0	R7T15	285
	20	J	33.0	R7T20	327
7.5-8.5	0.15	A	3.0	R8S0.15	83
	0.3	A	3.0	R8S0.3	98
	0.6	B	6.0	R8S0.6	105
	1.2	B	6.0	R8S1.2	115
	2.5	C	8.0	R8S2.5	140
	5.0	D	13.0	R8S5	170
	10	F	22.0	R8S10	235
	15	G	28.0	R8T15	285
	20	J	33.0	R8T20	327
8.5-9.5	0.15	A	3.0	R9S0.15	83
	0.3	A	3.0	R9S0.3	98
	0.6	B	6.0	R9S0.6	105
	1.2	B	6.0	R9S1.2	115
	2.5	C	8.0	R9S2.5	140
	5.0	D	13.0	R9S5	170
	10	F	22.0	R9S10	235
	15	H	31.0	R9T15	306
	20	J	33.0	R9T20	327
9.5-10.5	0.15	A	3.0	R10S0.15	83
	0.3	A	3.0	R10S0.3	98
	0.6	B	6.0	R10S0.6	105
	1.2	B	6.0	R10S1.2	115
	2.5	C	8.0	R10S2.5	140
	5.0	D	13.0	R10S5	170
	10	F	22.0	R10S10	235
	15	H	31.0	R10T15	306
	20	J	33.0	R10T20	327
10.5-11.5	0.15	A	3.0	R11S0.15	83
	0.3	A	3.0	R11S0.3	98
	0.6	B	6.0	R11S0.6	105
	1.2	B	6.0	R11S1.2	115
	2.5	C	8.0	R11S2.5	140
	5.0	D	13.0	R11S5	170
	10	F	22.0	R11S10	235
	15	H	31.0	R11T15	306
	20	J	33.0	R11T20	327
11-13	0.15	A	3.0	R12S0.15	83
	0.3	A	3.0	R12S0.3	98
	0.6	B	6.0	R12S0.6	105
	1.2	B	6.0	R12S1.2	115
	2.5	C	8.0	R12S2.5	140
	5.0	D	13.0	R12S5	170
	10	F	22.0	R12S10	235
	15	H	31.0	R12T15	306
	20	J	33.0	R12T20	327
13-15	0.15	A	3.0	R14S0.15	83
	0.3	A	3.0	R15S0.3	98
	0.6	B	6.0	R14S0.6	105
	1.2	B	6.0	R14S1.2	115
	2.5	C	8.0	R14S2.5	140
	5.0	D	13.0	R14S5	170
	10	G	28.0	R14T10	262
	15	H	31.0	R14T15	306
15-17	0.15	A	3.0	R16S0.15	$ 83
	0.3	A	3.0	R16S0.3	98
	0.6	B	6.0	R16S0.6	105
	1.2	B	6.0	R16S1.2	115
	2.5	C	8.0	R16S2.5	140
	5.0	D	13.0	R16S5	170
	10	G	28.0	R16T10	262
	15	H	31.0	R16T15	306
17-19	0.15	A	3.0	R18S0.15	83
	0.3	A	3.0	R18S0.3	98
	0.6	B	6.0	R18S0.6	105
	1.2	B	6.0	R18S1.2	115
	2.5	C	8.0	R18S2.5	140
	5.0	D	13.0	R18S5	170
	10	G	28.0	R18T10	262
19-21	0.15	A	3.0	R20S0.15	83
	0.3	A	3.0	R20S0.3	98
	0.6	B	6.0	R20S0.6	105
	1.2	B	6.0	R20S1.2	115
	2.5	C	8.0	R20S2.5	140
	5.0	D	13.0	R20S5	170
	10	G	28.0	R20T10	262
21-23	0.15	A	3.0	R22S0.15	83
	0.3	A	3.0	R22S0.3	98
	0.6	B	6.0	R22S0.6	105
	1.2	B	6.0	R22S1.2	115
	2.5	C	8.0	R22S2.5	140
	5.0	E	13.0	R22S5	170
	10	G	28.0	R22T10	262
23-25	0.15	A	3.0	R24S0.15	83
	0.3	A	3.0	R24S0.3	98
	0.6	B	6.0	R24S0.6	105
	1.2	B	6.0	R24S1.2	115
	2.5	C	8.0	R24S2.5	140
	5.0	E	13.0	R24S5	170
	10	G	28.0	R24T10	262
25-27	0.15	A	3.0	R26S0.15	86
	0.3	B	6.0	R26S0.3	104
	0.6	B	6.0	R26S0.6	119
	1.2	C	8.0	R26S1.2	136
	2.5	D	13.0	R26S2.5	176
	5.0	E	20.0	R26S5	219
27-29	0.15	A	3.0	R28S0.15	86
	0.3	B	6.0	R28S0.3	104
	0.6	B	6.0	R28S0.6	119
	1.2	C	8.0	R28S1.2	136
	2.5	D	13.0	R28S2.5	176
	5.0	E	20.0	R28S5	219
29-31	0.15	A	3.0	R30S0.15	86
	0.3	B	6.0	R30S0.3	104
	0.6	B	6.0	R30S0.6	119
	1.2	C	8.0	R30S1.2	136
	2.5	D	13.0	R30S2.5	176
	5.0	E	20.0	R30S5	219
31-33	0.15	A	3.0	R32S0.15	86
	0.3	B	6.0	R32S0.3	104
	0.6	B	6.0	R32S0.6	119
	1.2	C	8.0	R32S1.2	136
	2.5	D	13.0	R32S2.5	176
	5.0	E	20.0	R32S5	219
33-35	0.15	A	3.0	R34S0.15	86
	0.3	B	6.0	R34S0.3	104
	0.6	B	6.0	R34S0.6	119
	1.2	C	8.0	R34S1.2	136
	2.5	D	13.0	R34S2.5	176
	5.0	E	20.0	R34S5	219
35-37	0.15	A	3.0	R36S0.15	86
	0.3	B	6.0	R36S0.3	104
	0.6	B	6.0	R36S0.6	119
	1.2	C	8.0	R36S1.2	136
	2.5	D	13.0	R36S2.5	176
	5.0	E	20.0	R36S5	219
37-39	0.15	A	3.0	R38S0.15	$ 86
	0.3	B	6.0	R38S0.3	104
	0.6	B	6.0	R38S0.6	119
	1.2	C	8.0	R38S1.2	136
	2.5	D	13.0	R38S2.5	176
	5.0	E	20.0	R38S5	219
39-41	0.15	A	3.0	R40S0.15	86
	0.3	B	6.0	R40S0.3	104
	0.6	B	6.0	R40S0.6	119
	1.2	C	8.0	R40S1.2	149
	2.5	D	13.0	R40S2.5	176
	5.0	F	22.0	R40S5	269
41-43	0.15	A	3.0	R42S0.15	86
	0.3	B	6.0	R42S0.3	104
	0.6	B	6.0	R42S0.6	119
	1.2	C	8.0	R42S1.2	149
	2.5	D	13.0	R42S2.5	176
	5.0	F	22.0	R42S5	269
43-45	0.15	A	3.0	R44S0.15	86
	0.3	B	6.0	R44S0.3	104
	0.6	B	6.0	R44S0.6	119
	1.2	C	8.0	R44S1.2	149
	2.5	D	13.0	R44S2.5	176
	5.0	F	22.0	R44S5	269
45-47	0.15	A	3.0	R46S0.15	86
	0.3	B	6.0	R46S0.3	104
	0.6	B	6.0	R46S0.6	119
	1.2	C	8.0	R46S1.2	149
	2.5	D	13.0	R46S2.5	176
	5.0	F	22.0	R46S5	269
47-49	0.15	A	3.0	R48S0.15	86
	0.3	B	6.0	R48S0.3	104
	0.6	B	6.0	R48S0.6	119
	1.2	C	8.0	R48S1.2	149
	2.5	D	13.0	R48S2.5	176
	5.0	F	22.0	R48S5	269
49-51	0.15	A	3.0	R50S0.15	86
	0.3	B	6.0	R50S0.3	104
	0.6	B	6.0	R50S0.6	119
	1.2	C	8.0	R50S1.2	149
	2.5	D	13.0	R50S2.5	176
	5.0	F	22.0	R50S5	269
50-60	0.15	B	6.0	R55S0.15	102
	0.3	B	6.0	R55S0.3	111
	0.6	C	8.0	R55S0.6	154
	1.2	D	13.0	R55S1.2	182
	2.5	E	20.0	R55S2.5	213
60-70	0.15	B	6.0	R65S0.15	102
	0.3	B	6.0	R65S0.3	111
	0.6	C	8.0	R65S0.6	154
	1.2	D	13.0	R65S1.2	182
	2.5	E	20.0	R65S2.5	213
70-80	0.15	B	6.0	R75S0.15	102
	0.3	B	6.0	R75S0.3	111
	0.6	C	8.0	R75S0.6	154
	1.2	D	13.0	R75S1.2	182
	2.5	E	20.0	R75S2.5	213
80-90	0.15	B	6.0	R85S0.15	102
	0.3	B	6.0	R85S0.3	111
	0.6	C	8.0	R85S0.6	154
	1.2	D	13.0	R85S1.2	182
	2.5	E	20.0	R85S2.5	213
90-100	0.15	B	6.0	R95S0.15	102
	0.3	B	6.0	R95S0.3	111
	0.6	C	8.0	R95S0.6	154
	1.2	D	13.0	R95S1.2	182
	2.5	E	20.0	R95S2.5	213

abbott 60 ⏦ to DC (Reg.) Hermetically Sealed



POWER MODULES

features

- Close regulation
- 5 to 10,000 volts
- Hermetically sealed
- Compact
- Low ripple
- For aerospace application

specifications

Input Voltage and Frequency
105-125 VAC, 55-65 Hertz, 1 phase, per MIL-STD-704A, Category B

Line Regulation
±0.2% for input 105-125 VAC

Voltage Regulation
±0.5% — for input 105-125 VAC and from ½ load to full load on Model V's
±1.5% — for input 105-125 VAC and from ½ load to full load on Model HA's
±2.5% — for input 105-125 VAC and from ½ load to full load on Model HAL's and HC's

Ripple
0.2% RMS — Model V's
0.5% RMS — Model HA's
1% RMS — Model HAL's and HC's

Short Circuit Protection
Protected against overload and short circuit conditions

Voltage Adjustment Range
12% by screwdriver adjustment

Reliability
80,000 hours MTBF typical per MIL-HDBK-217 under worst case operating conditions

Environment
+160°F max. at mounting base, using adequate heat sink
−4°F (−20°C) min. at mounting surface
Altitude: to vacuum (true hermetic seal)
Vibration, shock, sand, dust, humidity, salt spray, fungus, sunshine, rain, and explosion to MIL-E-5272C

Output Voltage and Current
See specific models listed (Outputs and inputs are isolated)

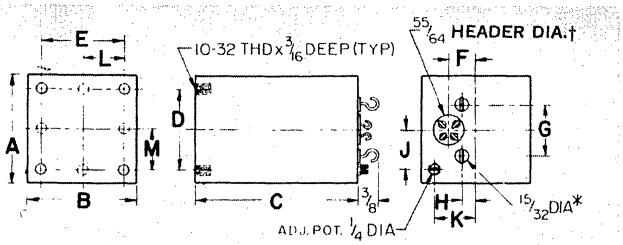
If you have a size problem, this line of power modules may help you. Abbott's modular packaging techniques provide small, lightweight, 60 Hz to DC power modules. This family of Abbott power modules is called the V/HA series. The next two pages list 300 models to supply any voltage you require from 5 to 740 VDC. Output power levels are from 5 to 240 watts.

These units are hermetically sealed and encapsulated to meet severe environmental conditions of fungus, sand, dust, humidity, salt spray, etc., per MIL-E-5272C. The power module case is made of electro-copper plated steel. It is fused to a ¼ inch thick Aluminum base. These modules can be used in tropic, arctic, desert, and sea environments, as well as in the laboratory. The predicted reliability of these power supplies has been calculated in accordance with the Military Handbook MIL-HDBK-217. The failure rates of each of the component parts, transistors, resistors, etc., have been carefully calculated **for their worst case operation** and then added up and converted into the expected hours that the power supply will satisfactorily operate before a failure will occur. The typical Mean Time Between Failure (MTBF) for these units is 84,000 hours. Copies of formal reports are available, on request, from our factory. More significant, however, is the fact that these Abbott modules are being used in many different Military and Industrial systems throughout the world and have a proven reliability history.

Output Voltage Range	Output Current (Amps)	Size (See Dwg.)	Wt. lbs.	Model Number	Price 1 pc.	Price 2-4 pcs.
4.7-5.3	1.0	9B	4.0	V05DS-5A	$220	$185
	2.0	9A	4.2	V1DS-5A	235	190
	4.0	10A	6.1	V2DS-5A	245	200
	6.0	11C	8.3	V3DS-5A	255	210
	12.0	13A	16.1	V6DS-5A	315	265
5.3-5.9	0.9	9B	4.0	V05DS-5.6A	220	185
	1.8	9A	4.2	V1DS-5.6A	235	190
	3.6	10A	6.1	V2DS-5.6A	245	200
	5.4	11C	8.3	V3DS-5.6A	255	210
	10.8	13A	16.1	V6DS-5.6A	315	265
5.9-6.6	0.8	9B	4.0	V05DS-6.3A	220	185
	1.6	9A	4.2	V1DS-6.3A	235	190
	3.2	10A	6.1	V2DS-6.3A	245	200
	4.8	11C	8.3	V3DS-6.3A	255	210
	9.6	13A	16.1	V6DS-6.3A	310	260
6.6-7.4	0.7	9B	4.0	V05DS-7A	220	185
	1.4	9A	4.2	V1DS-7A	235	190
	2.8	10A	6.1	V2DS-7A	245	200
	4.2	11C	8.3	V3DS-7A	255	210
	8.4	13A	16.1	V6DS-7A	310	260
7.4-8.3	0.63	9B	4.0	V05DS-7.9A	215	180
	1.26	9A	4.2	V1DS-7.9A	220	185
	2.52	10A	6.1	V2DS-7.9A	240	195
	3.78	11C	8.3	V3DS-7.9A	250	205
	7.56	12A	11.6	V6DS-7.9A	310	260
8.3-9.3	0.57	9B	4.0	V05DS-8.8A	215	180
	1.14	9A	4.2	V1DS-8.8A	220	185
	2.28	10A	6.1	V2DS-8.8A	240	195
	3.42	11C	8.3	V3DS-8.8A	250	205
	6.84	12A	11.6	V6DS-8.8A	310	260
9.3-10.4	0.50	9B	4.0	V05DS-9.9A	215	180
	1.00	9A	4.2	V1DS-9.9A	220	185
	2.00	10A	6.1	V2DS-9.9A	240	195
	3.00	11C	8.3	V3DS-9.9A	250	205
	6.00	12A	11.6	V6DS-9.9A	310	260
	12.00	13A	16.1	V12DS-9.9A	390	325
10.4-11.6	0.45	9B	4.0	V05DS-11A	215	180
	0.91	9A	4.2	V1DS-11A	220	185
	1.82	10A	6.1	V2DS-11A	240	195
	2.73	11C	8.3	V3DS-11A	250	205
	5.46	12A	11.6	V6DS-11A	310	260
	10.92	13A	16.1	V12DS-11A	390	325
11.6-13.0	0.40	9B	4.0	V05DS-12.3A	215	180
	0.81	9A	4.2	V1DS-12.3A	220	185
	1.62	10A	6.1	V2DS-12.3A	240	195
	2.43	11C	8.3	V3DS-12.3A	250	205
	4.86	12A	11.6	V6DS-12.3A	305	255
	9.72	13A	16.1	V12DS-12.3A	380	315
	19.44	16A	16.3	V24DS-12.3A	475	395
13.0-14.8	0.36	9B	4.0	V05DS-13.8A	210	175
	0.72	9A	4.2	V1DS-13.8A	215	180
	1.44	10A	6.1	V2DS-13.8A	235	190
	2.16	11C	8.3	V3DS-13.8A	245	200
	4.32	12A	11.6	V6DS-13.8A	305	255
	8.64	13A	16.1	V12DS-13.8A	380	315
	17.28	16A	16.3	V24DS-13.8A	475	395
14.8-16.6	0.32	9B	4.0	V05DS-15.7A	210	175
	0.64	9A	4.2	V1DS-15.7A	215	180
	1.28	10A	6.1	V2DS-15.7A	235	190
	1.92	11C	8.3	V3DS-15.7A	245	200
	3.84	12A	11.6	V6DS-15.7A	305	255
	7.68	13A	16.1	V12DS-15.7A	370	305
	15.36	16A	16.3	V24DS-15.7A	465	385
16.6-18.6	0.28	9B	4.0	V05DS-17.6A	210	175
	0.57	9A	4.2	V1DS-17.6A	215	180
	1.14	10A	6.1	V2DS-17.6A	235	190
	1.71	11C	8.3	V3DS-17.6A	245	200
	3.42	12A	11.6	V6DS-17.6A	305	255
	6.84	13A	16.1	V12DS-17.6A	370	305
	13.68	16A	16.3	V24DS-17.6A	465	385
18.6-20.8	0.255	9B	4.0	V05DS-19.7A	210	175
	0.510	9A	4.2	V1DS-19.7A	215	180
	1.02	10A	6.1	V2DS-19.7A	235	190
	1.53	11C	8.3	V3DS-19.7A	245	200
	3.06	12A	11.6	V6DS-19.7A	300	250
	6.12	13A	16.1	V12DS-19.7A	370	305
	12.24	16A	16.3	V24DS-19.7A	465	385
20.8-23.3	0.230	9B	4.0	V05DS-22A	205	170
	0.460	9A	4.2	V1DS-22A	210	175
	0.920	10A	6.1	V2DS-22A	220	185
	1.38	11C	8.3	V3DS-22A	240	195
	2.76	12A	11.6	V6DS-22A	300	250
	5.52	13A	16.1	V12DS-22A	360	300
	11.02	16A	16.3	V24DS-22A	450	375
23.3-26.1	0.205	9B	4.0	V05DS-24.7A	205	170
	0.410	9A	4.2	V1DS-24.7A	210	175
	0.820	10A	6.1	V2DS-24.7A	220	185
	1.23	11C	8.3	V3DS-24.7A	240	195
	2.46	12A	11.6	V6DS-24.7A	300	250
	4.92	13A	16.1	V12DS-24.7A	360	300
	9.84	16A	16.3	V24DS-24.7A	450	375
26.1-29.2	0.180	9B	4.0	V05DS-27.6A	205	170
	0.360	9A	4.2	V1DS-27.6A	210	175
	0.720	10A	6.1	V2DS-27.6A	220	185
	1.08	11C	8.3	V3DS-27.6A	240	195
	2.16	12A	11.6	V6DS-27.6A	300	250
	4.32	13A	16.1	V12DS-27.6A	350	290
	8.64	16A	16.3	V24DS-27.6A	435	365
29.2-32.6	0.160	9B	4.0	V05DS-31A	205	170
	0.320	9A	4.2	V1DS-31A	210	175
	0.640	10A	6.1	V2DS-31A	220	185
	0.960	11C	8.3	V3DS-31A	240	195
	1.92	12A	11.6	V6DS-31A	300	250
	3.84	13A	16.1	V12DS-31A	370	305
	7.68	16A	16.3	V24DS-31A	465	385

Size	A	B	C	D	E	F	G	H	J	K	L	M
9A	2¾	4¾	3¾	2.25	4.25	0	2	0	1⅛	2⅛	—	—
9B	2¾	4¾	3½	2.25	4.25	0	2	0	1⅛	2⅛	—	—
10A	3	5	4	2.50	4.50	0	2	0	1¼	2¼	—	—
11A	4¼	4½	4	3.75	4.00	1⅝	2	1⅝	1⅞	2	—	—
11C	4¼	5¼	4	3.75	4.75	0	2	0	1⅞	2⅜	2.37	—
12A	4½	6	4	4.00	5.50	0	2	0	2	2¾	2.75	—
13A	5½	6½	4½	5.00	6.00	0	2	0	2½	3	3.00	2.50
14	6	6	4	5.50	5.50	2⅜	2	2⅜	2¾	2¾	2.75	2.75
16A	6¾	7½	4¼	6.25	7.00	2¾	2	2¾	3⅛	3½	3.50	3.12
17A	7	8	4¼	6.50	7.50	3	2	3	3¼	3¾	3.75	3.25
18	8¾	9¾	5	8.25	9.25	2⅞	2	2⅞	4⅛	4⅝	4.62	4.12

DIMENSIONAL TOLERANCES: FRACTIONS ±1/32; DECIMALS .XX ±0.015.



* Used only on outputs 740-3650 volts;

† To have the header located on the mounting base, change the model number character preceding the first dash of Model Number to "B". (Example: V05B-5A indicates a header out the base.) No increase in price for this service.

60 HERTZ TO DC (Regulated)

INPUT VOLTAGE: 115 VAC, 60 Hz, 1 PHASE

Output Voltage Range	Output Current (Amps)	Size (See Dwg.)	Wt. lbs.	Model Number	Price 1 pc.	Price 2-4 pcs.
32.6-36.5	0.145	9B	4.0	V05DS-34.6A	205	170
	0.290	9A	4.2	V1DS-34.6A	210	175
	0.580	10A	6.1	V2DS-34.6A	220	185
	0.870	11C	8.3	V3DS-34.6A	240	195
	1.74	12A	11.6	V6DS-34.6A	300	250
	3.48	13A	16.1	V12DS-34.6A	390	325
	6.96	16A	16.3	V24DS-34.6A	480	400
36.5-40.9	0.130	9B	4.0	V05DS-38.7A	205	170
	0.260	9A	4.2	V1DS-38.7A	210	175
	0.520	10A	6.1	V2DS-38.7A	220	185
	0.780	11C	8.3	V3DS-38.7A	245	200
	1.56	12A	11.6	V6DS-38.7A	305	255
	3.12	13A	16.1	V12DS-38.7A	415	350
	6.24	16A	16.3	V24DS-38.7A	505	420
40.9-45.8	0.115	9B	4.0	V05DS-43.3A	205	170
	0.230	9A	4.2	V1DS-43.3A	210	175
	0.460	10A	6.1	V2DS-43.3A	220	185
	0.690	11C	8.3	V3DS-43.3A	245	200
	1.38	12A	11.6	V6DS-43.3A	305	255
	2.76	13A	16.1	V12DS-43.3A	435	365
	5.52	16A	16.3	V24DS-43.3A	530	445
45.8-51.4	0.103	9B	4.0	V05DS-48.6A	210	175
	0.206	9A	4.2	V1DS-48.6A	215	180
	0.412	10A	6.1	V2DS-48.6A	235	190
	0.618	11C	8.3	V3DS-48.6A	250	205
	1.24	12A	11.6	V6DS-48.6A	310	260
	2.48	13A	16.1	V12DS-48.6A	465	385
	4.94	16A	16.3	V24DS-48.6A	555	460
51.4-59.0	0.091	9B	4.0	V05DS-55.2A	$235	$190
	0.182	9A	4.2	V1DS-55.2A	240	195
	0.365	10A	6.1	V2DS-55.2A	250	205
	0.546	11C	8.3	V3DS-55.2A	260	215
	1.10	12A	11.6	V6DS-55.2A	315	265
	2.20	13A	16.1	V12DS-55.2A	465	385
	4.40	16A	16.3	V24DS-55.2A	555	460
59.0-66.0	0.080	9B	4.0	HA05D-63A	270	225
	0.160	9A	4.2	HA1D-63A	275	230
	0.320	11A	6.9	HA2D-63A	285	240
	0.480	12A	10.3	HA3D-63A	330	275
	0.960	14	12.9	HAL6D-63A	385	315
	1.900	17A	25.8	HAL12D-63A	450	375
	3.800	18	44.5	HCL24D-63A	540	450
66.0-74.0	0.071	9B	4.0	HA05D-70A	270	225
	0.143	9A	4.2	HA1D-70A	275	230
	0.286	11A	6.9	HA2D-70A	285	240
	0.429	12A	10.3	HA3D-70A	325	270
	0.858	14	12.9	HAL6D-70A	380	305
	1.72	17A	25.8	HAL12D-70A	450	375
	3.44	18	44.5	HCL24D-70A	540	450
74.0-83.0	0.063	9B	4.0	HA05D-79A	270	225
	0.127	9A	4.2	HA1D-79A	275	230
	0.254	11A	6.9	HA2D-79A	285	240
	0.381	12A	10.3	HA3D-79A	320	265
	0.762	14	12.9	HAL6D-79A	355	295
	1.52	17A	25.8	HAL12D-79A	450	375
	3.04	18	44.5	HCL24D-79A	540	450
83.0-93.0	0.057	9B	4.0	HA05D-88A	270	225
	0.114	9A	4.2	HA1D-88A	275	230
	0.228	11A	6.9	HA2D-88A	285	240
	0.342	12A	10.3	HA3D-88A	315	260
	0.684	14	12.9	HAL6D-88A	345	285
	1.38	17A	25.8	HAL12D-88A	450	375
	2.76	18	44.5	HCL24D-88A	540	450
93.0-104	0.050	9B	4.0	HA05D-99A	270	225
	0.100	9A	4.2	HA1D-99A	275	230
	0.200	11A	6.9	HA2D99A	285	240
	0.300	12A	10.3	HA3D-99A	300	255
	0.600	14	12.9	HA6D-99A	330	275
	1.20	17A	25.8	HAL12D-99A	450	375
	2.40	18	44.5	HCL24D-99A	540	450
104-116	0.045	9B	4.0	HA05D-110A	270	225
	0.091	9A	4.2	HA1D-110A	275	230
	0.182	11A	6.9	HA2D-110A	285	240
	0.273	12A	10.3	HA3D-110A	300	255
	0.546	14	12.9	HA6D-110A	330	275
	1.092	17A	25.8	HAL12D-110A	450	375
	2.184	18	44.5	HCL24D-110A	540	450
116-130	0.040	9B	4.0	HA05D-123A	270	225
	0.081	9A	4.2	HA1D-123A	275	230
	0.162	11A	6.9	HA2D-123A	285	240
	0.243	12A	10.3	HA3D-123A	300	255
	0.486	14	12.9	HA6D-123A	330	275
	0.972	17A	25.8	HAL12D-123A	450	375
	1.944	18	44.5	HCL24D-123A	540	450
130-148	0.036	9B	4.0	HA05D-138A	270	225
	0.072	9A	4.2	HA1D-138A	275	230
	0.144	11A	6.9	HA2D-138A	285	240
	0.216	12A	10.3	HA3D-138A	300	255
	0.432	14	12.9	HA6D-138A	330	275
	0.864	17A	25.8	HAL12D-138A	440	365
	1.728	18	44.5	HCL24D-138A	530	440
148-166	0.032	9B	4.0	HA05D-157A	$270	$225
	0.064	9A	4.2	HA1D-157A	275	230
	0.128	11A	6.9	HA2D-157A	285	240
	0.192	12A	10.3	HA3D-157A	300	255
	0.384	14	12.9	HA6D-157A	330	275
	0.768	17A	25.8	HAL12D-157A	425	355
	1.536	18	44.5	HCL24D-157A	510	430
166-186	0.028	9B	4.0	HA05D-176A	270	225
	0.057	9A	4.2	HA1D-176A	275	230
	0.114	11A	6.9	HA2D-176A	285	240
	0.171	12A	10.3	HA3D-176A	300	255
	0.342	14	12.9	HA6D-176A	330	275
	0.648	17A	25.8	HAL12D-176A	410	345
	1.368	18	44.5	HCL24D-176A	505	425
186-208	0.025	9B	4.0	HA05D-197A	270	225
	0.051	9A	4.2	HA1D-197A	275	230
	0.102	11A	6.9	HA2D-197A	285	240
	0.153	12A	10.3	HA3D-197A	300	255
	0.306	14	12.9	HA6D-197A	330	275
	0.612	17A	25.8	HA12D-197A	400	335
	1.224	18	44.5	HCL24D-197A	495	410
208-233	0.023	9B	4.0	HA05D-220A	270	225
	0.046	9A	4.2	HA1D-220A	275	230
	0.092	11A	6.9	HA2D-220A	285	240
	0.138	12A	10.3	HA3D-220A	300	255
	0.276	14	12.9	HA6D-220A	330	275
	0.552	17A	25.8	HA12D-220A	390	330
	1.104	18	44.5	HCL24D-220A	480	400
233-261	0.020	9B	4.0	HA05D-247A	270	225
	0.041	9A	4.2	HA1D-247A	275	230
	0.082	11A	6.9	HA2D-247A	285	240
	0.123	12A	10.3	HA3D-247A	300	255
	0.246	14	12.9	HA6D-247A	330	275
	0.492	17A	25.8	HA12D-247A	390	330
	0.984	18	44.5	HCL24D-247A	480	400
261-292	0.018	9B	4.0	HA05D-276A	270	225
	0.036	9A	4.2	HA1D-276A	275	230
	0.072	11A	6.9	HA2D-276A	285	240
	0.108	12A	10.3	HA3D-276A	300	255
	0.216	14	12.9	HA6D-276A	330	275
	0.432	17A	25.8	HA12D-276A	400	335
	0.864	18	44.5	HCL24D-276A	490	405
292-326	0.016	9B	4.0	HA05D-310A	270	225
	0.032	9A	4.2	HA1D-310A	275	230
	0.064	11A	6.9	HA2D-310A	285	240
	0.096	12A	10.3	HA3D-310A	300	255
	0.192	14	12.9	HA6D-310A	330	275
	0.384	17A	24.8	HA12D-310A	400	335
	0.768	18	44.5	HCL24D-310A	495	410
326-365	0.014	9B	4.0	HA05D-346A	275	230
	0.029	9A	4.2	HA1D-346A	280	235
	0.058	11A	6.9	HA2D-346A	290	245
	0.087	12A	10.3	HA3D-346A	315	260
	0.174	14	12.9	HA6D-346A	335	280
	0.348	17A	25.8	HA12D-346A	405	340
	0.696	18	44.5	HCL24D-346A	500	420
365-409	0.013	9B	4.0	HA05D-387A	275	230
	0.026	9A	4.2	HA1D-387A	280	235
	0.052	11A	6.9	HA2D-387A	290	245
	0.078	12A	10.3	HA3D-387A	315	260
	0.156	14	12.9	HA6D-387A	335	280
	0.312	17A	25.8	HA12D-387A	410	345
	0.624	18	44.5	HCL24D-387A	500	420
409-458	0.011	9B	4.0	HA05D-433A	275	230
	0.023	9A	4.2	HA1D-433A	280	235
	0.046	11A	6.9	HA2D-433A	290	245
	0.069	12A	10.3	HA3D-433A	315	260
	0.138	14	12.9	HA6D-433A	$345	$285
	0.276	17A	25.8	HA12D-433A	420	350
	0.552	18	44.5	HC24D-433A	505	425
458-514	0.010	9B	4.0	HA05D-486A	280	235
	0.021	9A	4.2	HA1D-486A	285	240
	0.041	11A	6.9	HA2D-486A	295	250
	0.062	12A	10.3	HA3D-486A	320	265
	0.124	14	12.9	HA6D-486A	345	285
	0.248	17A	25.8	HA12D-486A	425	355
	0.496	18	44.5	HC24D-486A	510	430
514-590	0.009	9B	4.0	HA05D-552A	280	235
	0.018	9A	4.2	HA1D-552A	285	240
	0.036	11A	6.9	HA2D-552A	295	250
	0.055	12A	10.3	HA3D-552A	320	265
	0.110	14	12.9	HA6D-552A	345	285
	0.220	17A	25.8	HA12D-522A	440	365
	0.440	18	44.5	HC24D-552A	515	435
590-660	0.008	9B	4.0	HA05D-630A	285	240
	0.016	9A	4.2	HA1D-630A	290	245
	0.032	11A	6.9	HA2D-630A	300	255
	0.048	12A	10.3	HA3D-630A	325	270
	0.096	14	12.9	HA6D-630A	350	290
	0.190	17A	25.8	HA12D-630A	450	375
	0.380	18	44.5	HC24D-630A	535	445
660-740	0.007	9B	4.0	HA05D-700A	285	240
	0.014	9A	4.2	HA1D-700A	290	245
	0.028	11A	6.9	HA2D-700A	300	255
	0.043	12A	10.3	HA3D-700A	325	270
	0.086	14	12.9	HA6D-700A	350	290
	0.172	17A	25.8	HA12D-700A	455	380
	0.344	18	44.5	HC24D-700A	540	450

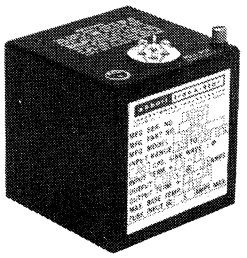
NOTE: For no load operation, add a resistance on the output to draw a minimum 4% of the rated current.

EASTERN OFFICE: 1224 ANDERSON AVE. / FORT LEE, N. J. 07024 / (201) 224-6900

abbott transistor
LABORATORIES, INCORPORATED

5200 W. Jefferson Blvd. / Los Angeles 90016
(213) WEbster 6-8185 Cable: ABTLABS

abbott 400~ to DC (Reg.) Hi-Temp.



POWER MODULES

features

- Hi-temp. +212°F.
- 5 to 3500 volts
- Hermetically sealed
- Compact, low cost
- Low ripple
- For aerospace application

specifications

Input Voltage & Frequency
105-125 VAC, 380-420 Hertz, 1 phase, per MIL-STD-704A, Category B

Line Regulation
±0.2% for input 105-125 VAC on Model U's, GB's and GBL's
±0.5% for input 105-125 VAC on Model GBK's

Voltage Regulation
±0.5%—for input 105-125 VAC and from ½ load to full load on Model U's
±1.5%—for input 105-125 VAC and from ½ load to full on Model GB's
±2.5%—for input 105-125 VAC and from ½ load to full load on Model GBK's and GBL's

Voltage Adjustment Range
12% by screwdriver adjustment

Ripple
0.2% RMS—Model U's
0.5% RMS—Model GB's
1% RMS—Model GBK's, and GBL's

Short Circuit Protection
Protected against overload and short circuit conditions

Reliability
70,000 hours MTBF typical per MIL-HDBK-217 under worst case operating conditions

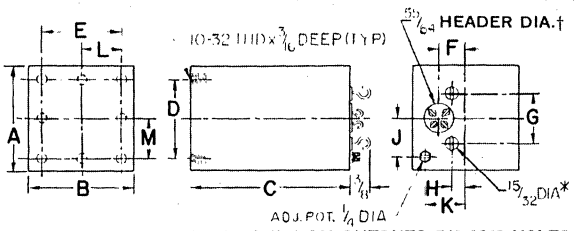
Environment
+212°F max. at mounting base using adequate heat sink
−65°F min. at mounting surface
Altitude: To vacuum (true hermetic seal)
Vibration, shock, sand, dust, humidity, salt spray, fungus, sunshine, rain, and explosion to MIL-E-5272C and MIL-E-5400K, Class 2

Output Voltage & Current
See specific models listed
(Outputs and inputs are isolated)

Output Voltage Range	Output Current (Amps)	Size (See Dwg.)	Wt. lbs.	Model Number	Price 1 pc.	Price 2-4 pcs.
4.7-5.3	0.400	2C	0.8	U02DS-5A	$232	$193
	1.0	3A	1.7	U05DS-5A	239	198
	2.0	3	1.8	U1DS-5A	245	203
	4.0	5	2.0	U2DS-5A	257	214
	6.0	6	2.3	U3DS-5A	272	226
	10.0	11	5.5	U5DS-5A	338	282
5.3-5.9	0.357	2C	0.8	U02DS-5.6A	232	193
	0.9	3A	1.7	U05DS-5.6A	239	198
	1.8	3	1.8	U1DS-5.6A	245	203
	3.6	5	2.0	U2DS-5.6A	257	214
	5.4	6	2.3	U3DS-5.6A	272	226
	8.91	11	5.5	U5DS-5.6A	338	282
5.9-6.6	0.318	2C	0.8	U02DS-6.3A	232	193
	0.8	3A	1.7	U05DS-6.3A	239	198
	1.6	3	1.8	U1DS-6.3A	245	203
	3.2	5	2.0	U2DS-6.3A	257	214
	4.8	6	2.3	U3DS-6.3A	272	226
	7.92	11	5.5	U5DS-6.3A	332	276
6.6-7.4	0.286	2C	0.8	U02DS-7A	232	193
	0.7	3A	1.7	U05DS-7A	239	198
	1.4	3	1.8	U1DS-7A	245	203
	2.8	5	2.0	U2DS-7A	257	214
	4.2	6	2.3	U3DS-7A	272	226
	7.15	11	5.5	U5DS-7A	332	276
7.4-8.3	0.253	2C	0.8	U02DS-7.9A	224	186
	0.63	3A	1.7	U05DS-7.9A	230	192
	1.26	3	1.8	U1DS-7.9A	239	198
	2.52	5	2.0	U2DS-7.9A	251	209
	3.78	6	2.3	U3DS-7.9A	272	226
	6.32	7	3.0	U5DS-7.9A	332	276
8.3-9.3	0.227	2C	0.8	U02DS-8.8A	224	186
	0.57	3A	1.7	U05DS-8.8A	230	192
	1.14	3	1.8	U1DS-8.8A	239	198
	2.28	5	2.0	U2DS-8.8A	251	209
	3.42	6	2.3	U3DS-8.8A	272	226
	5.68	7	3.0	U5DS-8.8A	332	276
9.3-10.4	0.202	2C	0.8	U02DS-9.9A	224	186
	0.50	3A	1.7	U05DS-9.9A	230	192
	1.00	3	1.8	U1DS-9.9A	239	198
	2.00	5	2.0	U2DS-9.9A	251	209
	3.00	6	2.3	U3DS-9.9A	266	221
	5.05	7	3.0	U5DS-9.9A	332	276
	10.10	11	5.5	U10DS-9.9A	419	349
10.4-11.6	0.182	2C	0.8	U02DS-11A	224	186
	0.45	3A	1.7	U05DS-11A	230	192
	0.91	3	1.8	U1DS-11A	239	198
	1.82	5	2.0	U2DS-11A	251	209
	2.73	6	2.3	U3DS-11A	266	221
	4.55	7	3.0	U5DS-11A	332	276
	9.10	11	5.5	U10DS-11A	419	349
11.6-13.0	0.163	2C	0.8	U02DS-12.3A	224	186
	0.40	3A	1.7	U05DS-12.3A	230	192
	0.81	3	1.8	U1DS-12.3A	239	198
	1.62	5	2.0	U2DS-12.3A	251	209
	2.43	6	2.3	U3DS-12.3A	266	221
	4.06	7	3.0	U5DS-12.3A	326	271
	8.12	11	5.5	U10DS-12.3A	407	338
	13.83	14	14.5	U17DS-12.3A	477	397
13.0-14.8	0.145	2C	0.8	U02DS-13.8A	218	181
	0.36	3A	1.7	U05DS-13.8A	224	186
	0.72	3	1.8	U1DS-13.8A	230	192
	1.44	5	2.0	U2DS-13.8A	245	203
	2.16	6	2.3	U3DS-13.8A	257	214
	3.62	7	3.0	U5DS-13.8A	326	271
	7.24	11	5.5	U10DS-13.8A	407	338
	12.31	14	14.5	U17DS-13.8A	477	397
14.8-16.6	0.127	2C	0.8	U02DS-15.7A	218	181
	0.32	3A	1.7	U05DS-15.7A	224	186
	0.64	3	1.8	U1DS-15.7A	230	192
	1.28	5	2.0	U2DS-15.7A	245	203
	1.92	6	2.3	U3DS-15.7A	257	214
14.8-16.6	3.18	7	3.0	U5DS-15.7A	$326	$271
	6.36	11	5.5	U10DS-15.7A	392	327
	10.81	14	14.5	U17DS-15.7A	464	386
16.6-18.6	0.114	2C	0.8	U02DS-17.6A	218	181
	0.28	3A	1.7	U05DS-17.6A	224	186
	0.57	3	1.8	U1DS-17.6A	230	192
	1.14	5	2.0	U2DS-17.6A	245	203
	1.71	6	2.3	U3DS-17.6A	257	214
	2.84	7	3.0	U5DS-17.6A	326	271
	5.68	11	5.5	U10DS-17.6A	392	327
	9.65	14	14.5	U17DS-17.6A	464	386
18.6-20.8	0.101	2C	0.8	U02DS-19.7A	218	181
	0.255	3A	1.7	U05DS-19.7A	224	186
	0.510	3	1.8	U1DS-19.7A	230	192
	1.02	5	2.0	U2DS-19.7A	245	203
	1.53	6	2.3	U3DS-19.7A	257	214
	2.54	7	3.0	U5DS-19.7A	320	266
	5.08	11	5.5	U10DS-19.7A	392	327
	8.62	14	14.5	U17DS-19.7A	464	386
20.8-23.3	0.098	2C	0.8	U02DS-22A	212	176
	0.230	3A	1.7	U05DS-22A	218	181
	0.460	3	1.8	U1DS-22A	224	186
	0.920	5	2.0	U2DS-22A	239	198
	1.38	6	2.3	U3DS-22A	251	209
	2.27	7	3.0	U5DS-22A	320	266
	4.54	11	5.5	U10DS-22A	386	321
	7.72	14	14.5	U17DS-22A	452	376
23.3-26.1	0.081	2C	0.8	U02DS-24.7A	212	176
	0.205	3A	1.7	U05DS-24.7A	218	181
	0.410	3	1.8	U1DS-24.7A	224	186
	0.820	5	2.0	U2DS-24.7A	239	198
	1.23	6	2.3	U3DS-24.7A	251	209
	2.02	7	3.0	U5DS-24.7A	320	266
	4.04	11	5.5	U10DS-24.7A	386	321
	6.88	14	14.5	U17DS-24.7A	452	376
26.1-29.2	0.073	2C	0.8	U02DS-27.6A	212	176
	0.180	3A	1.7	U05DS-27.6A	218	181
	0.360	3	1.8	U1DS-27.6A	224	186
	0.720	5	2.0	U2DS-27.6A	239	198
	1.08	6	2.3	U3DS-27.6A	251	209
	1.81	7	3.0	U5DS-27.6A	320	266
	3.62	11	5.5	U10DS-27.6A	374	311
	6.16	14	14.5	U17DS-27.6A	439	365
29.2-32.6	0.065	2C	0.8	U02DS-31A	212	176
	0.160	3A	1.7	U05DS-31A	218	181
	0.320	3	1.8	U1DS-31A	224	186
	0.640	5	2.0	U2DS-31A	239	198
	0.960	6	2.3	U3DS-31A	251	209
	1.61	7	3.0	U5DS-31A	320	266
	3.22	11	5.5	U10DS-31A	392	327
	5.48	14	14.5	U17DS-31A	464	386
32.6-36.5	0.058	2C	0.8	U02DS-34.6A	212	176
	0.145	3A	1.7	U05DS-34.6A	218	181
	0.290	3	1.8	U1DS-34.6A	224	186
	0.580	5	2.0	U2DS-34.6A	239	198
	0.870	6	2.3	U3DS-34.6A	251	209
	1.44	7	3.0	U5DS-34.6A	320	266
	2.88	11	5.5	U10DS-34.6A	419	349
	4.91	14	14.5	U17DS-34.6A	485	404
36.5-40.9	0.052	2C	0.8	U02DS-38.7A	212	176
	0.130	3A	1.7	U05DS-38.7A	218	181
	0.260	3	1.8	U1DS-38.7A	224	186
	0.520	5	2.0	U2DS-38.7A	239	198
	0.780	6	2.3	U3DS-38.7A	257	214
	1.29	7	3.0	U5DS-38.7A	326	271
	2.58	11	5.5	U10DS-38.7A	446	372
	4.39	14	14.5	U17DS-38.7A	512	427
40.9-45.8	0.046	2C	0.8	U02DS-43.3A	212	176
	0.115	3A	1.7	U05DS-43.3A	218	181
	0.230	3	1.8	U1DS-43.3A	224	186
40.9-45.8	0.460	5	2.0	U2DS-43.3A	$239	$198
	0.690	6	2.3	U3DS-43.3A	257	214
	1.15	7	3.0	U5DS-43.3A	326	271
	2.30	11	5.5	U10DS-43.3A	467	389
	3.92	14	14.5	U17DS-43.3A	537	447
45.8-51.4	0.041	2C	0.8	U02DS-48.6A	218	181
	0.103	3A	1.7	U05DS-48.6A	224	186
	0.206	3	1.8	U1DS-48.6A	230	192
	0.412	5	2.0	U2DS-48.6A	245	203
	0.618	6	2.3	U3DS-48.6A	266	221
	1.03	7	3.0	U5DS-48.6A	332	276
	2.06	11	5.5	U10DS-48.6A	494	411
	3.49	14	14.5	U17DS-48.6A	560	466
51.4-59.0	0.036	2C	0.8	U02DS-55.2A	239	198
	0.091	3A	1.7	U05DS-55.2A	245	203
	0.182	3	1.8	U1DS-55.2A	251	209
	0.364	5	2.0	U2DS-55.2A	266	221
	0.546	6	2.3	U3DS-55.2A	278	231
	0.905	7	3.0	U5DS-55.2A	338	282
	1.81	11	5.5	U10DS-55.2A	494	411
	3.07	14	14.5	U17DS-55.2A	560	466
59.0-66.0	0.032	2C	0.8	GB02D-63A	283	236
	0.080	8A	2.2	GB05D-63A	289	241
	0.160	8	2.8	GB1D-63A	297	248
	0.320	9	3.0	GB2D-63A	310	258
	0.480	10	3.8	GB3D-63A	357	298
	0.792	12	5.8	GBL5D-63A	405	338
	1.590	13	8.8	GBL10D-63A	486	405
	2.69	17	25.5	GBL17D-63A	552	460
66.0-74.0	0.029	2C	0.8	GB02D-70A	283	236
	0.071	8A	2.2	GB05D-70A	289	241
	0.143	8	2.8	GB1D-70A	297	248
	0.286	9	3.0	GB2D-70A	310	258
	0.429	10	3.8	GB3D-70A	351	293
	0.715	12	5.8	GBL5D-70A	397	331
	1.43	13	8.8	GBL10D-70A	486	405
	2.42	17	25.5	GBL17D-70A	552	460
74.0-83.0	0.025	2C	0.8	GB02D-79A	283	236
	0.063	8A	2.2	GB05D-79A	289	241
	0.127	8	2.8	GB1D-79A	297	248
	0.254	9	3.0	GB2D-79A	310	258
	0.381	10	3.8	GB3D-79A	343	286
	0.634	12	5.8	GBL5D-79A	384	320
	1.27	13	8.8	GBL10D-79A	486	405
	2.15	17	25.5	GBL17D-79A	552	460
83.0-93.0	0.023	2C	0.8	GB02D-88A	283	236
	0.057	8A	2.2	GB05D-88A	289	241
	0.114	8	2.8	GB1D-88A	297	248
	0.228	9	3.0	GB2D-88A	310	258
	0.342	10	3.8	GB3D-88A	337	281
	0.568	12	5.8	GBL5D-88A	370	309
	1.14	13	8.8	GBL10D-88A	486	405
	1.93	17	25.5	GBL17D-88A	552	460
93.0-104	0.020	2C	0.8	GB02D-99A	283	236
	0.050	8A	2.2	GB05D-99A	289	241
	0.100	8	2.8	GB1D-99A	297	248
	0.200	9	3.0	GB2D-99A	310	258
	0.300	10	3.8	GB3D-99A	330	275
	0.510	12	5.8	GBL5D-99A	357	328
	1.02	13	8.8	GBL10D-99A	486	405
	1.71	17	25.5	GBL17D-99A	552	460
104-116	0.018	2C	0.8	GB02D-110A	283	236
	0.045	8A	2.2	GB05D-110A	289	241
	0.091	8	2.8	GB1D-110A	297	248
	0.182	9	3.0	GB2D-110A	310	258
	0.273	10	3.8	GB3D-110A	330	275
	0.455	12	5.8	GBL5D-110A	357	328
	0.910	13	8.8	GBL10D-110A	486	405
	1.545	17	25.5	GBL17D-110A	552	460

Size	A	B	C	D	E	F	G	H	J	K	L	M
2C	2	2¾	2⅛	1.50	2.25	0	—	—	¾	1⅛	—	—
3	2¾	2¾	3	2.25	2.25	¾	2	½	1⅛	1⅛	—	—
3A	2¾	2¾	2¾	2.25	2.25	¾	2	½	1⅛	1⅛	—	—
5	2¾	2¾	3¼	2.25	2.25	¾	2	½	1⅛	1⅛	—	—
6	2¾	3	3¼	2.25	2.50	¾	2	½	1⅛	1¼	—	—
7	2¾	2¾	4	2.25	2.25	¾	2	½	1⅛	1⅛	—	—
8	2¾	4¼	3	2.25	3.75	0	2	0	1⅛	1⅞	—	—
8A	2¾	4½	2¾	2.25	3.75	0	2	0	1⅛	1⅞	—	—
9	2¾	4⅝	3¼	2.25	4.12	0	2	0	1⅛	2⅛	—	—
10	2¾	5¼	3¼	2.25	4.75	0	2	0	1⅛	2⅜	2.37	—
11	3	5½	3¼	2.50	5.00	2⅛	2	1⅞	1¼	2½	2.50	—
12	3	5½	4	2.50	5.00	2⅛	2	1⅞	1¼	2½	2.50	—
13	6	6	3¼	5.50	5.50	2⅜	2	2⅜	2¾	2¾	2.75	2.75
14	6	6	4	5.50	5.50	2⅜	2	2⅜	2¾	2¾	2.75	2.75
17	6	12	4	5.50	11.50	4¾	2	4¾	2¾	5¾	5.75	2.75

DIMENSIONAL TOLERANCES: FRACTIONS ±1/32; DECIMALS .XX ±0.015.



* USED ONLY ON OUTPUTS 740-3650 VOLTS

† To have the header located on the mounting base change the model number character preceding the first dash of Model Number to "B". (Example: U05B-5A indicates a header out the base.) No increase in price for this service.

400 HERTZ TO DC (Reg.) HI-TEMP. INPUT VOLTAGE: 115 VAC (Nominal), 380-420 Hz, 1 PHASE

Output Voltage Range	Output Current (Amps)	Size (See Dwg.)	Wt. lbs.	Model Number	Price 1 pc.	Price 2-4 pcs.
116-130	0.016	2C	0.8	GB02D-123A	$283	$236
	0.040	8A	2.2	GB05D-123A	289	241
	0.081	8	2.8	GB1D-123A	297	248
	0.162	9	3.0	GB2D-123A	310	258
	0.243	10	3.8	GB3D-123A	330	275
	0.406	12	5.8	GBL5D-123A	357	328
	0.812	13	8.8	GBL10D-123A	486	405
	1.381	17	25.5	GBL17D-123A	552	460
130-148	0.014	2C	0.8	GB02D-138A	283	236
	0.036	8A	2.2	GB05D-138A	289	241
	0.072	8	2.8	GB1D-138A	297	248
	0.144	9	3.0	GB2D-138A	310	258
	0.216	10	3.8	GB3D-138A	330	275
	0.362	12	5.8	GBL5D-138A	357	328
	0.724	13	8.8	GBL10D-138A	472	393
	1.231	17	25.5	GBL17D-138A	537	448
148-166	0.013	2C	0.8	GB02D-157A	283	236
	0.032	8A	2.2	GB05D-157A	289	241
	0.064	8	2.8	GB1D-157A	297	248
	0.128	9	3.0	GB2D-157A	310	258
	0.192	10	3.8	GB3D-157A	330	275
	0.318	12	5.8	GB5D-157A	357	328
	0.636	13	8.8	GBL10D-157A	459	383
	1.082	17	25.5	GBL17D-157A	525	437
166-186	0.011	2C	0.8	GB02D-176A	283	236
	0.028	8A	2.2	GB05D-176A	289	241
	0.057	8	2.8	GB1D-176A	297	248
	0.114	9	3.0	GB2D-176A	310	258
	0.171	10	3.8	GB3D-176A	330	275
	0.284	12	5.8	GB5D-176A	357	328
	0.568	13	8.8	GBL10D-176A	445	371
	0.965	17	25.5	GBL17D-176A	515	429
186-208	0.010	2C	0.8	GB02D-197A	283	236
	0.025	8A	2.2	GB05D-197A	289	241
	0.051	8	2.8	GB1D-197A	297	248
	0.102	9	3.0	GB2D-197A	310	258
	0.153	10	3.8	GB3D-197A	330	275
	0.254	12	5.8	GB5D-197A	357	328
	0.508	13	8.8	GBL10D-197A	432	360
	0.862	17	25.5	GBL17D-197A	502	419
208-233	0.009	2C	0.8	GB02D-220A	283	236
	0.023	8A	2.2	GB05D-220A	289	241
	0.046	8	2.8	GB1D-220A	297	248
	0.092	9	3.0	GB2D-220A	310	258
	0.138	10	3.8	GB3D-220A	330	275
	0.228	12	5.8	GB5D-220A	357	328
	0.456	13	8.8	GBL10D-220A	424	354
	0.772	17	25.5	GBL17D-220A	490	409
233-261	0.008	2C	0.8	GB02D-247A	283	236
	0.020	8A	2.2	GB05D-247A	289	241
	0.041	8	2.8	GB1D-247A	297	248
	0.082	9	3.0	GB2D-247A	310	258
	0.123	10	3.8	GB3D-247A	330	275
	0.203	12	5.8	GB5D-247A	357	328
	0.406	13	8.8	GBL10D-247A	424	354
	0.688	17	25.5	GBL17D-247A	490	409
261-292	0.007	2C	0.8	GB02D-276A	283	236
	0.018	8A	2.2	GB05D-276A	289	241
	0.036	8	2.8	GB1D-276A	297	248
	0.072	9	3.0	GB2D-276A	310	258
	0.108	10	3.8	GB3D-276A	330	275
	0.181	12	5.8	GB5D-276A	357	328
	0.362	13	8.8	GBL10D-276A	432	360
	0.615	17	25.5	GBL17D-276A	498	415
292-326	0.006	2C	0.8	GB02D-310A	$283	$236
	0.016	8A	2.2	GB05D-310A	289	241
	0.032	8	2.8	GB1D-310A	297	248
	0.064	9	3.0	GB2D-310A	310	258
	0.096	10	3.8	GB3D-310A	330	275
	0.161	12	5.8	GB5D-310A	357	328
	0.322	13	8.8	GB10D-310A	432	360
	0.548	17	25.5	GBL17D-310A	502	419
326-365	0.006	2C	0.8	GB02D-346A	291	242
	0.014	8A	2.2	GB05D-346A	297	248
	0.029	8	2.8	GB1D-346A	303	253
	0.058	9	3.0	GB2D-346A	316	264
	0.087	10	3.8	GB3D-346A	337	281
	0.145	12	5.8	GB5D-346A	364	303
	0.290	13	8.8	GB10D-346A	438	365
	0.491	17	25.5	GBL17D-346A	509	424
365-409	0.005	2C	0.8	GB02D-387A	291	242
	0.013	8A	2.2	GB05D-387A	297	248
	0.026	8	2.8	GB1D-387A	303	253
	0.052	9	3.0	GB2D-387A	316	264
	0.078	10	3.8	GB3D-387A	337	281
	0.129	12	5.8	GB5D-387A	364	303
	0.258	13	8.8	GB10D-387A	445	371
	0.439	17	25.5	GBL17D-387A	510	426
409-458	0.005	2C	0.8	GB02D-433A	291	242
	0.011	8A	2.2	GB05D-433A	297	248
	0.023	8	2.8	GB1D-433A	303	253
	0.046	9	3.0	GB2D-433A	316	264
	0.069	10	3.8	GB3D-433A	337	281
	0.166	12	5.8	GB5D-433A	370	309
	0.232	13	8.8	GB10D-433A	451	376
	0.392	17	25.5	GBL17D-433A	517	431
458-514	0.004	2C	0.8	GB02D-486A	297	248
	0.010	8A	2.2	GB05D-486A	303	253
	0.021	8	2.8	GB1D-486A	310	258
	0.041	9	3.0	GB2D-486A	324	270
	0.062	10	3.8	GB3D-486A	343	286
	0.103	12	5.8	GB5D-486A	370	309
	0.206	13	8.8	GB10D-486A	459	383
	0.349	17	25.5	GBL17D-486A	525	437
514-590	0.004	2C	0.8	GB02D-552A	297	248
	0.009	8A	2.2	GB05D-552A	303	253
	0.018	8	2.8	GB1D-552A	310	258
	0.036	9	3.0	GB2D-552A	324	270
	0.055	10	3.8	GB3D-552A	343	286
	0.090	12	5.8	GB5D-552A	370	309
	0.180	13	8.8	GB10D-552A	472	393
	0.307	17	25.5	GBL17D-552A	533	445
590-660	0.008	8A	2.2	GB05D-630A	310	258
	0.016	8	2.8	GB1D-630A	316	264
	0.032	9	3.0	GB2D-630A	330	275
	0.048	10	3.8	GB3D-630A	351	293
	0.079	12	5.8	GB5D-630A	378	315
	0.158	13	8.8	GB10D-630A	486	405
	0.269	17	25.5	GBL17D-630A	540	450
660-740	0.007	8A	2.2	GB05D-700A	310	258
	0.014	8	2.8	GB1D-700A	316	264
	0.028	9	3.0	GB2D-700A	330	275
	0.043	10	3.8	GB3D-700A	351	293
	0.071	12	5.8	GB5D-700A	378	315
	0.142	13	8.8	GB10D-700A	492	410
	0.242	17	25.5	GBL17D-700A	554	462
740-830	0.006	8A	2.2	GB05D-790A	316	264
	0.012	8	2.8	GB1D-790A	324	270
	0.025	9	3.0	GB2D-790A	337	281
740-830	0.038	10	3.8	GB3D-790A	$357	$298
	0.063	12	5.8	GB5D-790A	384	320
	0.126	13	8.8	GB10D-790A	513	428
	0.215	17	25.5	GBL17D-790A	564	471
830-930	0.005	8A	2.2	GB05D-880A	324	270
	0.011	8	2.8	GB1D-880A	330	275
	0.022	9	3.0	GB2D-880A	343	286
	0.034	10	3.8	GB3D-880A	364	303
	0.057	12	5.8	GB5D-880A	391	326
	0.014	13	8.8	GB10D-880A	526	438
	0.193	17	25.5	GBL17D-880A	573	478
930-1040	0.005	8A	2.2	GB05D-990A	330	275
	0.010	8	2.8	GB1D-990A	337	281
	0.020	9	3.0	GB2D-990A	351	293
	0.030	10	3.8	GB3D-990A	370	309
	0.051	12	5.8	GB5D-990A	397	331
	0.102	13	8.8	GB10D-990A	526	438
	0.171	17	25.5	GBL17D-990A	581	485
1040-1160	0.018	9	3.0	GB2D-1100A	357	298
	0.027	10	3.8	GBK3D-1100A	378	315
	0.045	12	5.8	GBK5D-1100A	405	338
	0.090	14	8.9	GBK10D-1100A	532	444
	0.154	17	25.5	GBK17D-1100A	590	491
1160-1300	0.016	9	3.0	GBK2D-1230A	364	303
	0.024	10	3.8	GBK3D-1230A	384	320
	0.041	12	5.8	GBK5D-1230A	411	343
	0.082	14	8.9	GBK10D-1230A	540	450
	0.138	17	25.5	GBK17D-1230A	596	497
1300-1480	0.014	9	3.0	GBK2D-1380A	370	309
	0.021	10	3.8	GBK3D-1380A	391	326
	0.036	12	5.8	GBK5D-1380A	418	348
	0.072	14	8.9	GBK10D-1380A	546	455
	0.123	17	25.5	GBK17D-1380A	608	507
1480-1660	0.013	9	3.0	GBK2D-1570A	378	315
	0.019	10	3.8	GBK3D-1570A	396	331
	0.032	12	5.8	GBK5D-1570A	423	353
	0.064	14	8.9	GBK10D-1570A	552	460
	0.108	17	25.5	GBK17D-1570A	622	519
1660-1860	0.010	9	3.0	GBK2D-1760A	390	325
	0.017	10	3.8	GBK3D-1760A	411	349
	0.028	12	5.8	GBK5D-1760A	438	365
	0.056	14	8.9	GBK10D-1760A	558	466
	0.096	17	25.5	GBK17D-1760A	634	529
1860-2080	0.010	9	3.0	GBK2D-1970A	405	337
	0.015	10	3.8	GBK3D-1970A	423	353
	0.025	12	5.8	GBK5D-1970A	450	376
	0.051	14	8.8	GBK10D-1970A	573	477
	0.086	17	25.5	GBK17D-1970A	653	544
2080-2330	0.023	12	5.8	GBK5D-2200A	465	387
	0.045	14	8.9	GBK10D-2200A	585	488
	0.077	17	25.5	GBK17D-2200A	675	563
2330-2610	0.020	12	5.8	GBK5D-2470A	492	410
	0.040	14	8.9	GBK10D-2470A	600	500
	0.068	17	25.5	GBK17D-2470A	693	576
2610-2920	0.018	12	5.8	GBK5D-2760A	498	415
	0.036	14	8.9	GBK10D-2760A	606	505
	0.061	17	25.5	GBK17D-2760A	714	595
2920-3260	0.016	12	5.8	GBK5D-3100A	519	432
	0.032	14	8.9	GBK10D-3100A	612	511
	0.054	17	25.5	GBK17D-3100A	736	613
3260-3650	0.014	12	5.8	GBK5D-3460A	531	448
	0.029	14	8.9	GBK10D-3460A	639	533
	0.049	17	25.5	GBK17D-3460A	773	644

NOTE: For no load operation, add a resistance on the output to draw a minimum 4% of the rated current.

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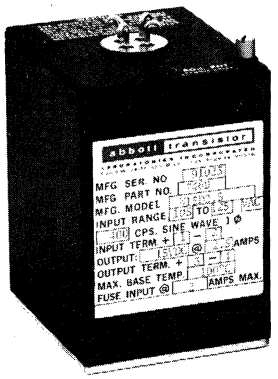
abbott transistor
LABORATORIES, INCORPORATED

5200 W. Jefferson Blvd. / Los Angeles 90016
(213) WEbster 6-8185 Cable: ABTLABS

abbott 400 ~ to DC Hi-Performance



FEATURES

- Low Peak-to-Peak Ripple
- RFI/EMI to MIL-STD-461
- Small
- Hermetically Sealed
- +100°C Operation
- 0.1% Regulation

NOTE: Additional standard models with output currents up to 20 amps are now available. Consult our nearest office for complete information.

DELIVERY FROM STOCK*

SPECIFICATIONS

INPUT VOLTAGE RANGE: 105 to 125 VRMS

INPUT FREQUENCY RANGE: 380 to 420 Hertz, 1 phase

INPUT POWER: Per MIL-STD-704A for category B equipment

OUTPUT VOLTAGE AND CURRENT: See specific models listed in table

LINE REGULATION: 0.1% or 10 mv (whichever is greater) for input change of 105 to 125 VRMS with load constant

LOAD REGULATION: 0.1% or 20 mv (whichever is greater) for change from no load to full load with line constant

RIPPLE: 0.02% or 5 mv RMS (whichever is greater) 25 mv peak-to-peak maximum, measured with scope having 1 MHz bandwidth

OUTPUT VOLTAGE ADJUSTMENT: Voltage is continuously adjustable between the limits shown in the table by means of an externally accesible screwdriver adjustment potentiometer

ADJUSTMENT RESOLUTION:

Nom. Output Voltage	Resolution
5 - 16 vdc	35 mv
18 - 50 vdc	60 mv
55 - 95 vdc	90 mv

ISOLATION VOLTAGE: 750 vdc input to output and input to case • 200 vdc output to case

INSULATION RESISTANCE: 50 megohms minimum between input and output, input and case, and output and case when measured at 50 vdc

POLARITY: Inputs and outputs are isolated, either positive or negative side may be grounded.

TEMPERATURE RANGE: Operating: −55° to +100°C maximum at center of mounting base
Storage: −55°C to +125°C

TEMPERATURE COEFFICIENT: 0.03% per degree centigrade maximum

ENVIRONMENT: Encapsulated to meet the environmental requirements of MIL-E-5272C and MIL-E-5400K, Class 2, including: altitude (to a vacuum), vibration, shock, acceleration, sand, dust, humidity, salt spray, fungus, explosion, etc.

SHORT CIRCUIT PROTECTION: Each unit is completely protected against an overload or short circuit of any duration. The output voltage automatically restores to normal when the overload is removed

INPUT TRANSIENT PROTECTION: MIL-STD-704A Figure 3, Limit 1 (180 VAC for 0.1 seconds)

OVER VOLTAGE PROTECTION: Over voltage protection modules are available for these units. Please consult the factory.

LOAD TRANSIENT RECOVERY TIME: Output voltage returns to regulation limits within 100 microseconds after 50% step change in load current

OUTPUT IMPEDANCE:
DC to 1K Hz — 0.004 R_L or 0.04 ohm max.
1K Hz to 10K Hz — 0.015 R_L or 0.15 ohm max.
10K Hz to 100K Hz — 0.030 R_L or 0.50 ohm max.
R_L = Rated Load

ELECTROMAGNETIC INTERFERENCE: Built to meet the requirements of MIL-STD-461 for generation of and susceptability to radiated and conducted interference

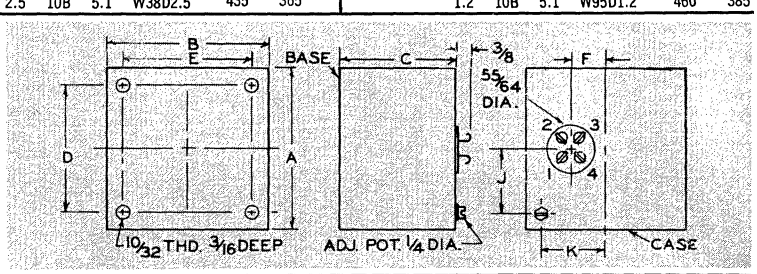
RELIABILITY: The Mean Time Between Failure (MTBF) per MIL-HDBK-217 under worst case operating conditions of full rated output current, 125 vac input voltage, and +100°C base plate temperature, ranges from 47,393 hours for Model W95D0.3 to 56,148 hours for Model W5D10.

Output Voltage Range	Output Curr. (Amps)	Size (See Dwg.)	Wt. (Lbs.)	Model Number	Price 1 pc.	Price 2-4 pcs.
4.5-5.5	2.5	2E	1.9	**W5D2.5**	$310	$260
	5.0	4D	2.7	**W5D5.0**	350	295
	10.0	10B	5.1	**W5D10**	420	350
5.5-6.5	2.5	2E	1.9	**W6D2.5**	310	260
	5.0	4D	2.7	**W6D5.0**	350	295
	10.0	10B	5.1	**W6D10**	420	350
6.5-7.5	2.5	2E	1.9	**W7D2.5**	310	260
	5.0	4D	2.7	**W7D5.0**	350	295
	10.0	10B	5.1	**W7D10**	420	350
7.5-8.5	2.5	2E	1.9	**W8D2.5**	310	260
	5.0	4D	2.7	**W8D5.0**	350	295
	10.0	10B	5.1	**W8D10**	420	350
8.5-9.5	2.5	2E	1.9	**W9D2.5**	320	270
	5.0	4D	2.7	**W9D5.0**	370	310
	10.0	10B	5.1	**W9D10**	440	370
9.5-10.5	2.5	2E	1.9	**W10D2.5**	320	270
	5.0	4D	2.7	**W10D5.0**	370	310
	10.0	10B	5.1	**W10D10**	440	370
10.5-11.5	2.5	2E	1.9	**W11D2.5**	320	270
	5.0	4D	2.7	**W11D5.0**	370	310
	10.0	10B	5.1	**W11D10**	440	370
11-13	2.5	2E	1.9	**W12D2.5**	320	270
	5.0	4D	2.7	**W12D5.0**	370	310
	10.0	10B	5.1	**W12D10**	440	370
13-15	1.2	2E	1.9	**W14D1.2**	310	260
	2.5	4D	2.7	**W14D2.5**	350	295
	5.0	10B	5.1	**W14D5.0**	420	350
14-16	1.2	2E	1.9	**W15D1.2**	310	260
	2.5	4D	2.7	**W15D2.5**	350	295
	5.0	10B	5.1	**W15D5.0**	420	350
15-17	1.2	2E	1.9	**W16D1.2**	310	260
	2.5	4D	2.7	**W16D2.5**	350	295
	5.0	10B	5.1	**W16D5.0**	420	350
17-19	1.2	2E	1.9	**W18D1.2**	$310	$260
	2.5	4D	2.7	**W18D2.5**	350	295
	5.0	10B	5.1	**W18D5.0**	420	350
19-21	1.2	2E	1.9	**W20D1.2**	315	265
	2.5	4D	2.7	**W20D2.5**	370	310
	5.0	10B	5.1	**W20D5.0**	440	370
21-23	1.2	2E	1.9	**W22D1.2**	315	265
	2.5	4D	2.7	**W22D2.5**	370	310
	5.0	10B	5.1	**W22D5.0**	440	370
23-25	1.2	2E	1.9	**W24D1.2**	315	265
	2.5	4D	2.7	**W24D2.5**	370	310
	5.0	10B	5.1	**W24D5.0**	440	370
25-27	1.2	2E	1.9	**W26D1.2**	315	265
	2.5	4D	2.7	**W26D2.5**	370	310
	5.0	10B	5.1	**W26D5.0**	440	370
27-29	1.2	2E	1.9	**W28D1.2**	315	265
	2.5	4D	2.7	**W28D2.5**	370	310
	5.0	10B	5.1	**W28D5.0**	440	370
29-31	0.6	2E	1.9	**W30D0.6**	305	255
	1.2	4D	2.7	**W30D1.2**	365	305
	2.5	10B	5.1	**W30D2.5**	435	365
31-33	0.6	2E	1.9	W32D0.6	305	255
	1.2	4D	2.7	W32D1.2	365	305
	2.5	10B	5.1	W32D2.5	435	365
33-35	0.6	2E	1.9	W34D0.6	305	255
	1.2	4D	2.7	W34D1.2	365	305
	2.5	10B	5.1	W34D2.5	435	365
35-37	0.6	2E	1.9	W36D0.6	305	255
	1.2	4D	2.7	W36D1.2	365	305
	2.5	10B	5.1	W36D2.5	435	365
37-39	0.6	2E	1.9	W38D0.6	305	255
	1.2	4D	2.7	W38D1.2	365	305
	2.5	10B	5.1	W38D2.5	435	365
39-41	0.6	2E	1.9	W40D0.6	$305	$255
	1.2	4D	2.7	W40D1.2	365	305
	2.5	10B	5.1	W40D2.5	435	365
41-43	0.6	2E	1.9	W42D0.6	305	255
	1.2	4D	2.7	W42D1.2	365	305
	2.5	10B	5.1	W42D2.5	435	365
43-45	0.6	2E	1.9	W44D0.6	320	270
	1.2	4D	2.7	W44D1.2	380	320
	2.5	10B	5.1	W44D2.5	460	385
45-47	0.6	2E	1.9	W46D0.6	320	270
	1.2	4D	2.7	W46D1.2	380	320
	2.5	10B	5.1	W46D2.5	460	385
47-49	0.6	2E	1.9	W48D0.6	320	270
	1.2	4D	2.7	W48D1.2	380	320
	2.5	10B	5.1	W48D2.5	460	385
49-51	0.6	2E	1.9	W50D0.6	320	270
	1.2	4D	2.7	W50D1.2	380	320
	2.5	10B	5.1	W50D2.5	460	385
50-60	0.3	2E	1.9	W55D0.3	310	260
	0.6	4D	2.7	W55D0.6	365	305
	1.2	10B	5.1	W55D1.2	435	365
60-70	0.3	2E	1.9	W65D0.3	310	260
	0.6	4D	2.7	W65D0.6	365	305
	1.2	10B	5.1	W65D1.2	435	365
70-80	0.3	2E	1.9	W75D0.3	320	270
	0.6	4D	2.7	W75D0.6	380	320
	1.2	10B	5.1	W75D1.2	460	385
80-90	0.3	2E	1.9	W85D0.3	320	270
	0.6	4D	2.7	W85D0.6	380	320
	1.2	10B	5.1	W85D1.2	460	385
90-100	0.3	2E	1.9	W95D0.3	320	270
	0.6	4D	2.7	W95D0.6	380	320
	1.2	10B	5.1	W95D1.2	460	385

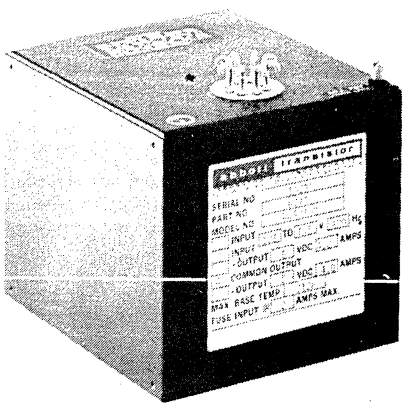
* All models with output voltages from 5 to 30 vdc are normally available from stock.

Size	A	B	C	D	E	F	J	K
2E	2⅛	3¼	3¼	1.62	2.75	⅞	13/16	1⅜
4D	2½	3½	3½	2.00	3.00	0	1	1½
10B	2⅞	4¼	4⅜	2.37	3.75	1⅜	13/16	1⅞

TOLERANCES
FRACTION = ±1/32 **DECIMAL** = ±0.015



abbott 400 ~ to DC Dual Output



FEATURES

- 1% Tracking Accuracy
- 0.2% Regulation
- Low Peak-To-Peak Ripple
- RFI/EMI to MIL-STD-461
- Hermetically Sealed
- +100°C Operation

SPECIFICATIONS

INPUT VOLTAGE RANGE: 105 to 125 VRMS
INPUT FREQUENCY RANGE: 380 to 420 Hertz, 1 phase
INPUT POWER: Per MIL-STD-704A for category B equipment
LINE REGULATION: 0.2% or 10 mv (whichever is greater) for input change of 105 to 125 VRMS
LOAD REGULATION: 0.2% or 20 mv (whichever is greater) for change from no load to full load
RIPPLE: 0.02% or 5 mv RMS (whichever is greater) 25 mv peak-to-peak max. each output (1 MHz bandwidth)
TRACKING ACCURACY: The negative output will track the positive output to within 1.0% or 100 mv (whichever is greater) for all rated conditions of input voltage, output current, operating temperature, and output voltage adjustment.
OUTPUT VOLTAGE ADJUSTMENT: Voltage is continuously adjustable between the limits shown in the table by means of an externally accessible screwdriver adjustment potentiometer.
ADJUSTMENT RESOLUTION: 25 mv for outputs up to ±4.5 vdc; 35 mv for outputs ±5.0 thru ±15 vdc; 60 mv for outputs ±16 vdc and above
ISOLATION VOLTAGE: 750 vdc input to output and input to case: 200 vdc output to case
INSULATION RESISTANCE: 50 megohms minimum between input and output, input and case, and output and case when measured at 50 vdc
TEMPERATURE RANGE: Operating: −55°C to +100°C maximum at center of mounting base
Storage: −55°C to +125°C
TEMPERATURE COEFFICIENT: 0.03% per degree centigrade maximum
ENVIRONMENT: Encapsulated to meet the environmental requirements of MIL-E-5272C and MIL-E-5400K, Class 2, including: altitude (to a vacuum), vibration, shock, acceleration, sand, dust, humidity, salt spray, fungus, explosion, etc.
SHORT CIRCUIT PROTECTION: Each unit is completely protected against an overload or short circuit of any duration. The output voltage automatically restores to normal when the overload is removed.
INPUT TRANSIENT PROTECTION: In accordance with MIL-STD-704A, Figure 3, Limit 1 (180 vac for 0.1 seconds)
OVERVOLTAGE PROTECTION: Overvoltage protection modules are available for use with these units. Please consult the factory.
LOAD TRANSIENT RECOVERY TIME: Output voltage returns to regulation limits within 200 microseconds after a 50% step change in load current.
ELECTROMAGNETIC INTERFERENCE: Built to meet the requirements of MIL-STD-461 for generation of and susceptability to radiated and conducted interference.
RELIABILITY: The Mean Time Between Failure (MTBF) per MIL-HDBK-217 under worst case operating conditions of full rated output current, 125 vac input voltage, and +100°C base plate temperature, ranges from 48,450 hours for Model WW3D4.0 to 67,385 hours for Model WW3D0.3.

OUTPUT IMPEDANCE:

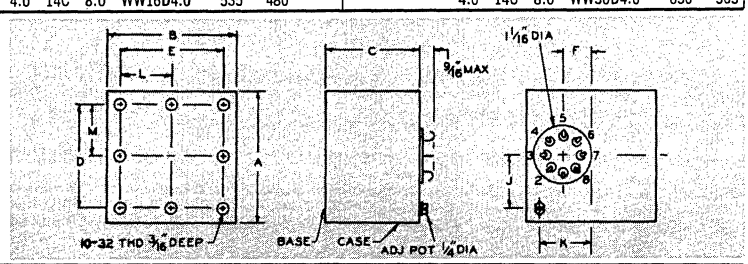
	RATED OUTPUT CURRENT (Amps)				
	0.3A	0.5A	1.0A	2.0A	4.0A
DC-1 KHz	0.2Ω	0.15Ω	0.1Ω	0.08Ω	0.04Ω
1 KHz-10 KHz	0.5Ω	0.4Ω	0.3Ω	0.2Ω	0.1Ω
10 KHz-100 KHz	0.5Ω	0.5Ω	0.5Ω	0.5Ω	0.3Ω

Output Voltage Range	Output Current (Amps)*	Size (See Dwg.)	Wt (Lbs.)	Model Number	Price 1 pc.	Price 2-4 pcs.
±2.75-±3.25	0.3	8B	1.9	WW3D0.3	$300	$270
	0.5	9C	2.2	WW3D0.5	335	300
	1.0	9C	2.2	WW3D1.0	365	325
	2.0	9D	3.1	WW3D2.0	395	355
	4.0	11D	5.5	WW3D4.0	430	385
±3.25-±3.75	0.3	8B	1.9	WW3.5D0.3	300	270
	0.5	9C	2.2	WW3.5D0.5	335	300
	1.0	9C	2.2	WW3.5D1.0	365	325
	2.0	9D	3.1	WW3.5D2.0	395	355
	4.0	11D	5.5	WW3.5D4.0	430	385
±3.75-±4.25	0.3	8B	1.9	WW4D0.3	300	270
	0.5	9C	2.2	WW4D0.5	335	300
	1.0	9C	2.2	WW4D1.0	365	325
	2.0	9D	3.1	WW4D2.0	395	355
	4.0	11D	5.5	WW4D4.0	430	385
±4.25-±4.75	0.3	8B	1.9	WW4.5D0.3	300	270
	0.5	9C	2.2	WW4.5D0.5	335	300
	1.0	9C	2.2	WW4.5D1.0	365	325
	2.0	9D	3.1	WW4.5D2.0	395	355
	4.0	11D	5.5	WW4.5D4.0	430	385
±4.5-±5.5	0.3	8B	1.9	WW5D0.3	300	270
	0.5	9C	2.2	WW5D0.5	335	300
	1.0	9C	2.2	WW5D1.0	365	325
	2.0	9D	3.1	WW5D2.0	395	355
	4.0	11D	5.5	WW5D4.0	430	385
±5.5-±6.5	0.3	8B	1.9	WW6D0.3	300	270
	0.5	9C	2.2	WW6D0.5	335	300
	1.0	9C	2.2	WW6D1.0	365	325
	2.0	9D	3.1	WW6D2.0	395	355
	4.0	11D	5.5	WW6D4.0	430	385
±6.5-±7.5	0.3	8B	1.9	WW7D0.3	300	270
	0.5	9C	2.2	WW7D0.5	335	300
	1.0	9C	2.2	WW7D1.0	365	325
	2.0	9D	3.1	WW7D2.0	395	355
	4.0	11D	5.5	WW7D4.0	430	385
±7.5-±8.5	0.3	8B	1.9	WW8D0.3	305	275
	0.5	9C	2.2	WW8D0.5	340	305
	1.0	9C	2.2	WW8D1.0	375	335
	2.0	9D	3.1	WW8D2.0	410	365
	4.0	11D	5.5	WW8D4.0	455	410
±8.5-±9.5	0.3	8B	1.9	WW9D0.3	$305	$275
	0.5	9C	2.2	WW9D0.5	340	305
	1.0	9C	2.2	WW9D1.0	375	335
	2.0	9D	3.1	WW9D2.0	410	365
	4.0	11D	5.5	WW9D4.0	455	410
±9.5-±10.5	0.3	8B	1.9	WW10D0.3	305	275
	0.5	9C	2.2	WW10D0.5	340	305
	1.0	9C	2.2	WW10D1.0	375	335
	2.0	9D	3.1	WW10D2.0	410	365
	4.0	11D	5.5	WW10D4.0	455	410
±10.5-±11.5	0.3	8B	1.9	WW11D0.3	305	275
	0.5	9C	2.2	WW11D0.5	340	305
	1.0	9C	2.2	WW11D1.0	375	335
	2.0	9D	3.1	WW11D2.0	410	365
	4.0	11D	5.5	WW11D4.0	455	410
±11-±13	0.3	8B	1.9	WW12D0.3	315	280
	0.5	9C	2.2	WW12D0.5	345	310
	1.0	9C	2.2	WW12D1.0	385	345
	2.0	9D	3.1	WW12D2.0	430	385
	4.0	11D	5.5	WW12D4.0	480	430
±13-±15	0.3	8B	1.9	WW14D0.3	315	280
	0.5	9C	2.2	WW14D0.5	345	310
	1.0	9C	2.2	WW14D1.0	385	345
	2.0	9D	3.1	WW14D2.0	430	385
	4.0	11D	5.5	WW14D4.0	535	480
±14-±16	0.3	8B	1.9	WW15D0.3	315	280
	0.5	9C	2.2	WW15D0.5	345	310
	1.0	9C	2.2	WW15D1.0	385	345
	2.0	9D	3.1	WW15D2.0	430	385
	4.0	11D	5.5	WW15D4.0	535	480
±15-±17	0.3	9C	2.2	WW16D0.3	315	280
	0.5	9C	2.2	WW16D0.5	345	310
	1.0	9D	3.1	WW16D1.0	385	345
	2.0	11D	5.5	WW16D2.0	460	410
	4.0	14C	8.0	WW16D4.0	535	480
±17-±19	0.3	9C	2.2	WW18D0.3	$330	$295
	0.5	9C	2.2	WW18D0.5	360	320
	1.0	9D	3.1	WW18D1.0	405	365
	2.0	11D	5.5	WW18D2.0	460	410
	4.0	14C	8.0	WW18D4.0	535	480
±19-±21	0.3	9C	2.2	WW20D0.3	330	295
	0.5	9C	2.2	WW20D0.5	360	320
	1.0	9D	3.1	WW20D1.0	405	365
	2.0	11D	5.5	WW20D2.0	490	440
	4.0	14C	8.0	WW20D4.0	585	525
±21-±23	0.3	9C	2.2	WW22D0.3	330	295
	0.5	9C	2.2	WW22D0.5	360	320
	1.0	9D	3.1	WW22D1.0	405	365
	2.0	11D	5.5	WW22D2.0	490	440
	4.0	14C	8.0	WW22D4.0	585	525
±23-±25	0.3	9C	2.2	WW24D0.3	340	305
	0.5	9C	2.2	WW24D0.5	375	335
	1.0	9D	3.1	WW24D1.0	430	385
	2.0	11D	5.5	WW24D2.0	500	450
	4.0	14C	8.0	WW24D4.0	585	525
±25-±27	0.3	9C	2.2	WW26D0.3	340	305
	0.5	9C	2.2	WW26D0.5	375	335
	1.0	9D	3.1	WW26D1.0	430	385
	2.0	11D	5.5	WW26D2.0	525	470
	4.0	14C	8.0	WW26D4.0	605	545
±27-±29	0.3	9C	2.2	WW28D0.3	340	305
	0.5	9C	2.2	WW28D0.5	375	335
	1.0	9D	3.1	WW28D1.0	430	385
	2.0	11D	5.5	WW28D2.0	525	470
	4.0	14C	8.0	WW28D4.0	605	545
±29-±31	0.3	9C	2.2	WW30D0.3	340	305
	0.5	9C	2.2	WW30D0.5	375	335
	1.0	9D	3.1	WW30D1.0	430	385
	2.0	11D	5.5	WW30D2.0	545	490
	4.0	14C	8.0	WW30D4.0	630	565

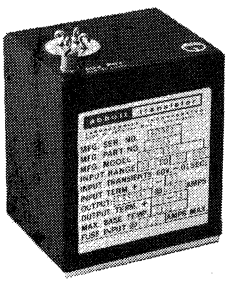
*Each Output

Size	A	B	C	D	E	F	J	K	L	M
8B	2⅝	3½	2⅞	2.12	3.00	¾	1 1/16	1½	—	—
9C	2½	4⅜	3⅛	2.00	3.87	1	1	1 15/16	—	—
9D	2⅝	4¾	3⅝	2.12	4.25	1	1 1/16	2⅛	—	—
11D	4	4⅞	3⅞	3.50	4.37	1⅜	1¾	2 3/16	—	—
14C	5½	5½	3⅝	5.00	5.00	1⅞	2½	2½	2.50	2.50

TOLERANCES
FRACTION = ±1/32 **DECIMAL** = ±0.015



abbott 28 VDC to DC (Reg.) Hi-Temp.



POWER MODULES

features

- Hi-temp. +212°F.
- 5 to 3500 volts
- Hermetically sealed
- Short circuit protection
- Input spike protection

specifications

Input Voltage Range
24 to 30 volts DC

Line Regulation
±0.2% for input 24 to 30 VDC on Model B's and BL's
±0.5% for input 24 to 30 VDC on Model BK's

Voltage Regulation
±1.5% for input 24 to 30 VDC and from ½ load to full load on Model B's
±2.5% for input 24 to 30 VDC and from ½ load to full load on Model BK's and BL's

Ripple
0.5 RMS — Model B's
1.0% RMS — Model BK's and BL's

Voltage Adjustment Range
12% by screwdriver adjustment

Input Transient Protection
In accordance with MIL-STD-704A, Limit 1, Category B (80 volts for 0.1 sec.)

Reliability
120,000 hours MTBF typical per MIL-HDBK-217 under worst case operating conditions

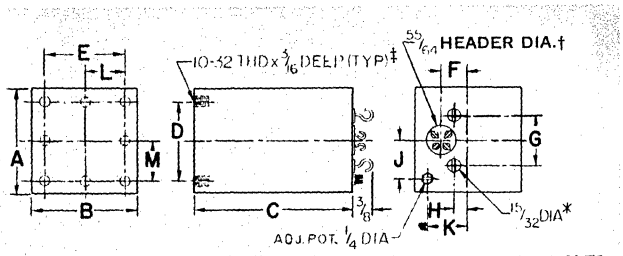
Environment
+212°F max. at mounting base using adequate heat sink
−65°F min. at mounting surface
Altitude: To vacuum (true hermetic seal). Vibration, shock, sand, dust, humidity, salt-spray, fungus, sunshine, rain, and explosion to MIL-E-5272C and MIL-E-5400K, Class 2

Output Voltage and Current
See specific models listed
(Outputs and inputs are isolated)

Output Voltage Range	Output Current (Amps)	Size (See Dwg.)	Wt. lbs.	Model Number	Price 1 pc.	Price 2-4 pcs.
4.7-5.3	0.400	1B	0.5	BL02D-5A	$261	$218
	1.0	1A	0.9	BL05D-5A	277	231
	2.0	1	1.0	BL1D-5A	291	243
	4.0	2	1.1	BL2D-5A	321	268
	6.0	4	1.3	BL3D-5A	344	287
	10.0	6A	2.5	BL5D-5A	397	331
5.3-5.9	0.357	1B	0.5	BL02D-5.6A	254	212
	0.9	1A	0.9	BL05D-5.6A	270	225
	1.8	1	1.0	BL1D-5.6A	284	237
	3.6	2	1.1	BL2D-5.6A	307	256
	5.4	4	1.3	BL3D-5.6A	337	281
	8.91	6A	2.5	BL5D-5.6A	390	325
5.9-6.6	0.318	1B	0.5	BL02D-6.3A	254	212
	0.8	1A	0.9	BL05D-6.3A	270	225
	1.6	1	1.0	BL1D-6.3A	284	237
	3.2	2	1.1	BL2D-6.3A	307	256
	4.8	4	1.3	BL3D-6.3A	337	281
	7.92	6	1.9	BL5D-6.3A	390	325
6.6-7.4	0.286	1B	0.5	BL02D-7A	254	212
	0.7	1A	0.9	BL05D-7A	270	225
	1.4	1	1.0	BL1D-7A	284	237
	2.8	2	1.1	BL2D-7A	307	256
	4.2	4	1.3	BL3D-7A	330	275
	7.15	6	1.9	BL5D-7A	381	318
7.4-8.3	0.253	1B	0.5	BL02D-7.9A	254	212
	0.63	1A	0.9	B05D-7.9A	270	225
	1.26	1	1.0	BL1D-7.9A	284	237
	2.52	2	1.1	BL2D-7.9A	307	256
	3.78	4	1.3	BL3D-7.9A	330	275
	6.32	6	1.9	BL5D-7.9A	381	318
8.3-9.3	0.227	1B	0.5	BL02D-8.8A	254	212
	0.57	1A	0.9	B05D-8.8A	270	225
	1.14	1	1.0	BL1D-8.8A	277	231
	2.28	2	1.1	BL2D-8.8A	300	250
	3.42	4	1.3	BL3D-8.8A	321	268
	5.68	6	1.9	BL5D-8.8A	374	312
9.3-10.4	0.202	1B	0.5	B02D-9.9A	247	206
	0.50	1A	0.9	B05D-9.9A	261	218
	1.00	1	1.0	BL1D-9.9A	277	231
	2.00	2	1.1	BL2D-9.9A	291	243
	3.00	4	1.3	BL3D-9.9A	314	262
	5.05	6	1.9	BL5D-9.9A	374	312
	10.10	11	3.7	BL10D-9.9A	441	365
10.4-11.6	0.182	1B	0.5	B02D-11A	247	206
	0.45	1A	0.9	B05D-11A	261	218
	0.91	1	1.0	BL1D-11A	270	225
	1.82	2	1.1	BL2D-11A	284	237
	2.73	4	1.3	BL3D-11A	314	262
	4.55	6	1.9	BL5D-11A	367	306
	9.10	11	3.7	BL10D-11A	434	362
11.6-13.0	0.163	1B	0.5	B02D-12.3A	247	206
	0.40	1A	0.9	B05D-12.3A	261	218
	0.81	1	1.0	BL1D-12.3A	270	225
	1.62	2	1.1	BL2D-12.3A	291	243
	2.43	4	1.3	BL3D-12.3A	314	262
	4.06	6	1.9	BL5D-12.3A	360	300
	8.12	11	3.7	BL10D-12.3A	420	350
	13.83	14	10.3	BL17D-12.3A	498	465
13.0-14.8	0.145	1B	0.5	B02D-13.8A	247	206
	0.36	1A	0.9	B05D-13.8A	261	218
	0.72	1	1.0	BL1D-13.8A	270	225
	1.44	2	1.1	BL2D-13.8A	307	256
	2.16	4	1.3	BL3D-13.8A	321	268
	3.62	6	1.9	BL5D-13.8A	351	293
	7.24	11	3.7	BL10D-13.8A	411	343
	12.31	14	10.3	BL17D-13.8A	490	409
14.8-16.6	0.127	1B	0.5	B02D-15.7A	247	206
	0.32	1A	0.9	B05D-15.7A	261	218
	0.64	1	1.0	BL1D-15.7A	270	225
	1.28	2	1.1	BL2D-15.7A	307	256
	1.92	4	1.3	BL3D-15.7A	321	268
	3.18	6	1.9	BL5D-15.7A	351	293
	6.36	11	3.7	BL10D-15.7A	404	337
	10.81	14	10.3	BL17D-15.7A	477	398
16.6-18.6	0.114	1B	0.5	B02D-17.6A	240	200
	0.28	1A	0.9	B05D-17.6A	254	212
	0.57	1	1.0	BL1D-17.6A	261	218
16.6-18.6	1.14	2	1.1	BL2D-17.6A	$300	$250
	1.71	4	1.3	BL3D-17.6A	307	256
	2.84	6	1.9	BL5D-17.6A	344	287
	5.68	11	3.7	BL10D-17.6A	397	331
	9.65	14	10.3	BL17D-17.6A	470	392
18.6-20.8	0.101	1B	0.5	B02D-19.7A	240	200
	0.255	1A	0.9	B05D-19.7A	254	212
	0.510	1	1.0	BL1D-19.7A	261	218
	1.02	2	1.1	BL2D-19.7A	300	250
	1.63	4	1.3	BL3D-19.7A	307	256
	2.54	6	1.9	BL5D-19.7A	330	275
	5.08	11	3.7	BL10D-19.7A	397	331
	8.62	14	10.3	BL17D-19.7A	470	392
20.8-23.3	0.091	1B	0.5	B02D-22A	231	193
	0.230	1A	0.9	B05D-22A	247	206
	0.460	1	1.0	BL1D-22A	254	212
	0.920	2	1.1	BL2D-22A	291	243
	1.38	4	1.3	BL3D-22A	300	250
	2.27	6	1.9	BL5D-22A	330	275
	4.54	11	3.7	BL10D-22A	397	331
	7.72	14	10.3	BL17D-22A	476	392
23.3-26.1	0.081	1B	0.5	B02D-24.7A	231	193
	0.205	1A	0.9	B05D-24.7A	247	206
	0.410	1	1.0	BL1D-24.7A	254	212
	0.820	2	1.1	BL2D-24.7A	291	243
	1.23	4	1.3	BL3D-24.7A	300	250
	2.02	6	1.9	BL5D-24.7A	330	275
	4.04	11	3.7	BL10D-24.7A	397	331
	6.88	14	10.3	BL17D-24.7A	470	392
26.1-29.2	0.073	1B	0.5	B02D-27.6A	231	193
	0.180	1A	0.9	B05D-27.6A	247	206
	0.360	1	1.0	BL1D-27.6A	254	212
	0.720	2	1.1	BL2D-27.6A	284	237
	1.08	4	1.3	BL3D-27.6A	300	250
	1.81	6	1.9	BL5D-27.6A	330	275
	3.62	11	3.7	BL10D-27.6A	397	331
	6.16	14	10.3	BL17D-27.6A	470	392
29.2-32.6	0.065	1B	0.5	B02D-31A	231	193
	0.160	1A	0.9	B05D-31A	247	206
	0.320	1	1.0	B1D-31A	254	212
	0.640	2	1.1	B2D-31A	261	231
	0.960	4	1.3	BL3D-31A	300	250
	1.61	6	1.9	BL5D-31A	330	275
	3.22	11	3.7	BL10D-31A	397	331
	5.48	14	10.3	BL17D-31A	470	392
32.6-36.5	0.058	1B	0.5	B02D-34.6A	231	193
	0.145	1A	0.9	B05-34.6A	247	206
	0.290	1	1.0	B1D-34.6A	254	212
	0.580	2	1.1	B2D-34.6A	261	218
	0.870	4	1.3	BL3D-34.6A	300	250
	1.44	6	1.9	BL5D-34.6A	330	275
	2.88	11	3.7	BL10D-34.6A	397	331
	4.91	14	10.3	BL17D-34.6A	470	392
36.5-40.9	0.052	1B	0.5	B02D-38.7A	231	193
	0.130	1A	0.9	B05D-38.7A	247	206
	0.260	1	1.0	B1D-38.7A	254	212
	0.520	2	1.1	B2D-38.7A	261	218
	0.780	4	1.3	BL3D-38.7A	300	250
	1.29	6	1.9	BL5D-38.7A	330	275
	2.58	11	3.7	BL10D-38.7A	397	331
	4.39	14	10.3	BL17D-38.7A	470	392
40.9-45.8	0.046	1B	0.5	B02D-43.3A	231	193
	0.155	1A	0.9	B05D-43.3A	247	206
	0.230	1	1.0	B1D-43.3A	254	212
	0.460	2	1.1	B2D-43.3A	261	218
	0.690	4	1.3	BL3D-43.3A	300	250
	1.15	6	1.9	BL5D-43.3A	330	275
	2.30	11	3.7	BL10D-43.3A	397	331
	3.92	14	10.3	BL17D-43.3A	470	392
45.8-51.4	0.041	1B	0.5	B02D-48.6A	231	193
	0.103	1A	0.9	B05D-48.6A	247	206
	0.206	1	1.0	B1D-48.6A	254	212
	0.412	2	1.1	B2D-48.6A	261	218
	0.618	4	1.3	B3D-48.6A	300	250
45.8-51.4	1.03	6	1.9	BL5D-48.6A	$330	$275
	2.06	11	3.7	BL10D-48.6A	397	331
	3.49	14	10.3	BL17D-48.6A	470	392
51.4-59.0	0.036	1B	0.5	B02D-55.2A	231	193
	0.091	1A	0.9	B05D-55.2A	247	206
	0.182	1	1.0	B1D-55.2A	254	212
	0.364	2	1.1	B2D-55.2A	261	218
	0.546	4	1.3	B3D-55.2A	300	250
	0.905	6	1.9	BL5D-55.2A	330	275
	1.81	11	3.7	BL10D-55.2A	397	331
	3.07	14	10.3	BL17D-55.2A	470	392
59.0-66.0	0.032	1B	0.5	B02D-63A	231	193
	0.080	1A	0.9	B05D-63A	247	206
	0.160	1	1.0	B1D-63A	254	212
	0.320	2	1.1	B2D-63A	261	218
	0.480	4	1.3	B3D-63A	300	250
	0.795	6	1.9	BL5D-63A	330	275
	1.59	11	3.7	BL10D-63A	397	331
	2.69	14	10.3	BL17D-63A	470	392
66.0-74.0	0.029	1B	0.5	B02D-70A	231	193
	0.071	1A	0.9	B05D-70A	247	206
	0.143	1	1.0	B1D-70A	254	212
	0.286	2	1.1	B2D-70A	261	218
	0.429	4	1.3	B3D-70A	291	243
	0.715	6	1.9	BL5D-70A	321	268
	1.43	11	3.7	BL10D-70A	397	331
	2.42	14	10.3	BL17D-70A	470	392
74.0-83.0	0.025	1B	0.5	B02D-79A	231	193
	0.063	1A	0.9	B05D-79A	247	206
	0.127	1	1.0	B1D-79A	254	212
	0.254	2	1.1	B2D-79A	261	218
	0.381	4	1.3	B3D-79A	291	243
	0.634	6	1.9	BL55-79A	307	256
	1.27	11	3.7	BL10D-79A	397	331
	2.15	14	10.3	BL17D-79A	470	392
83.0-93.0	0.023	1B	0.5	B02D-88A	231	193
	0.057	1A	0.9	B05D-88A	247	206
	0.114	1	1.0	B1D-88A	254	212
	0.228	2	1.1	B2D-88A	261	218
	0.342	4	1.3	B3D-88A	277	231
	0.568	6	1.9	BL5D-88A	291	243
	1.14	11	3.7	BL10D-88A	397	331
	1.93	14	10.3	BL17D-88A	470	392
93.0-104	0.020	1B	0.5	B02D-99A	231	193
	0.050	1A	0.9	B05D-99A	247	206
	0.100	1	1.0	B1D-99A	254	212
	0.200	2	1.1	B2D-99A	261	218
	0.300	4	1.3	B3D-99A	270	225
	0.510	6	1.9	BL5D-99A	277	231
	1.02	11	3.7	BL10D-99A	397	331
	1.71	14	10.3	BL17D-99A	470	392
104-116	0.018	1B	0.5	B02D-110A	231	193
	0.045	1A	0.9	B05D-110A	247	206
	0.091	1	1.0	B1D-110A	254	212
	0.182	2	1.1	B2D-110A	261	218
	0.273	4	1.3	B3D-110A	270	225
	0.455	6	1.9	BL5D-110A	277	231
	0.910	11	3.7	BL10D-110A	397	331
	1.545	14	10.3	BL17D-110A	470	392
116-130	0.016	1B	0.5	B02D-123A	231	193
	0.040	1A	0.9	B05D-123A	247	206
	0.081	1	1.0	B1D-123A	254	212
	0.162	2	1.1	B2D-123A	261	218
	0.243	4	1.3	B3D-123A	270	225
	0.406	6	1.9	BL5D-123A	277	231
	0.812	11	3.7	BL10D-123A	397	331
	1.381	14	10.3	BL17D-123A	470	392
130-148	0.014	1B	0.5	B02D-138A	231	193
	0.036	1A	0.9	B05D-138A	247	206
	0.072	1	1.0	B1D-138A	254	212
	0.144	2	1.1	B2D-138A	261	218
	0.216	4	1.3	B3D-138A	270	225
	0.362	6	1.9	BL5D-138A	277	231
	0.724	11	3.7	BL10D-138A	381	318
	1.231	14	10.3	BL17D-138A	454	379

Size	A	B	C	D	E	F	G	H	J	K	L	M
1	1½	2¾	3	1.00	2.25	5/16	15/16	1/16	½	1⅛	—	—
1A	1½	2¾	2¾	1.00	2.25	5/16	15/16	1 1/16	½	1⅛	—	—
1B	1½	2	2	1.00	1.50	0	—	—	½	¾	—	—
2	1⅞	2¾	3¼	1.37	2.25	¾	1⅜	½	11/16	1⅛	—	—
4	2¼	2¾	3¼	1.75	2.25	¾	1⅝	½	⅞	1⅛	—	—
6	2¾	3	3¼	2.25	2.50	¾	2	½	1⅛	1¼	—	—
6A	2¾	3	4	2.25	2.50	3/1	2	½	1⅛	1¼	—	—
11	3	5½	3¼	2.50	5.00	2⅛	2	1⅞	1¼	2½	2.50	—
12	3	5½	4	2.50	5.00	2⅛	2	1⅞	1¼	2½	2.50	—
14	6	6	4	5.50	5.50	2⅜	2	2⅜	2¾	2¾	2.75	2.75

DIMENSIONAL TOLERANCES: FRACTIONS ±1/32; DECIMALS .XX ±0.015.



* USED ONLY ON OUTPUTS 740-3650 VOLTS

‡ 6-32 THD x 3/16 DEEP (TYP) FOR MODELS BL02 AND B02

† To have the header located on the mounting base, change the model number character preceding the first dash of Model Number to "B". (Example: BL5B-5A indicates a header out the base.) No increase in price for this service. Not available on Model B02 series.

28 VDC TO DC (Reg.) HI-TEMP.

INPUT VOLTAGE RANGE: 24 TO 30 VOLTS, DC

Output Voltage Range	Output Current (Amps)	Size (See Dwg.)	Wt. lbs.	Model Number	Price 1 pc.	Price 2-4 pcs.
148-166	0.013	1B	0.5	B02D-157A	$231	$193
	0.032	1A	0.9	B05D-157A	247	206
	0.064	1	1.0	B1D-157A	254	212
	0.128	2	1.1	B2D-157A	261	218
	0.192	4	1.3	B3D-157A	270	225
	0.318	6	1.9	B5D-157A	277	231
	0.636	11	3.7	BL10D-157A	367	306
	1.082	14	10.3	BL17D-157A	440	367
166-186	0.011	1B	0.5	B02D-176A	231	193
	0.028	1A	0.9	B05D-176A	247	206
	0.057	1	1.0	B1D-176A	254	212
	0.114	2	1.1	B2D-176A	261	218
	0.171	4	1.3	B3D-176A	270	225
	0.284	6	1.9	B5D-176A	277	231
	0.568	11	3.7	BL10D-176A	351	293
	0.965	14	10.3	BL17D-176A	430	359
186-208	0.010	1B	0.5	B02D-197A	231	193
	0.025	1A	0.9	B05D-197A	247	206
	0.051	1	1.0	B1D-197A	254	212
	0.102	2	1.1	B2D-197A	261	218
	0.153	4	1.3	B3D-197A	270	225
	0.254	6	1.9	B5D-197A	277	231
	0.508	11	3.7	BL10D-197A	337	281
	0.862	14	10.3	BL17D-197A	415	346
208-233	0.009	1B	0.5	B02D-220A	231	193
	0.023	1A	0.9	B05D-220A	247	206
	0.046	1	1.0	B1D-220A	254	212
	0.092	2	1.1	B2D-220A	261	218
	0.138	4	1.3	B3D-220A	270	225
	0.228	6	1.9	B5D-220A	277	231
	0.456	11	3.7	BL10D-220A	330	275
	0.772	14	10.3	BL17D-220A	403	336
233-261	0.008	1B	0.5	B02D-247A	231	193
	0.020	1A	0.9	B05-247A	247	206
	0.041	1	1.0	B1D-247A	254	212
	0.082	2	1.1	B2D-247A	261	218
	0.123	4	1.3	B3D-247A	270	225
	0.203	6	1.9	B5D-247A	277	231
	0.406	11	3.7	BL10D-247A	330	275
	0.688	14	10.3	BL17D-247A	403	336
261-292	0.007	1B	0.5	B02D-276A	231	193
	0.018	1A	0.9	B05D-276A	247	206
	0.036	1	1.0	B1D-276A	254	212
	0.072	2	1.1	B2D-276A	261	218
	0.108	4	1.3	B3D-276A	270	225
	0.181	6	1.9	B5D-276A	277	231
	0.362	11	3.7	BL10D-276A	337	281
	0.615	14	10.3	BL17D-276A	410	342
292-326	0.006	1B	0.5	B02D-310A	231	193
	0.016	1A	0.9	B05D-310A	247	206
	0.032	1	1.0	B1D-310A	254	212
	0.064	2	1.1	B2D-310A	261	218
	0.096	4	1.3	B3D-310A	270	225
	0.161	6	1.9	B5D-310A	277	231
	0.322	11	3.7	B10D-310A	337	281
	0.548	14	10.3	BL17D-310A	415	346
326-365	0.006	1B	0.5	B02D-346A	240	200
	0.014	1A	0.9	B05D-346A	254	212
	0.029	1	1.0	B1D-346A	261	218
	0.058	2	1.1	B2D-346A	270	225
	0.087	4	1.3	B3D-346A	277	231
	0.145	6	1.9	B5D-346A	284	237
	0.290	11	3.7	B10D-346A	344	287
	0.491	14	10.3	BL17D-346A	422	352
365-409	0.005	1B	0.5	B02D-387A	$240	$200
	0.013	1A	0.9	B05D-387A	254	212
	0.026	1	1.0	B1D-387A	261	218
	0.052	2	1.1	B2D-387A	270	225
	0.078	4	1.3	B3D-387A	277	231
	0.129	6	1.9	B5D-387A	284	237
	0.258	11	3.7	B10D-387A	351	293
	0.439	14	10.3	BL17D-387A	424	354
409-458	0.005	1B	0.5	B02D-433A	240	200
	0.012	1A	0.9	B05D-433A	254	212
	0.023	1	1.0	B1D-433A	261	218
	0.046	2	1.1	B2D-433A	270	225
	0.069	4	1.3	B3D-433A	277	231
	0.116	6	1.9	B5D-433A	284	237
	0.232	11	3.7	B10D-433A	360	300
	0.392	14	10.3	BL17D-433A	433	361
458-514	0.004	1B	0.5	B02D-486A	247	206
	0.010	1A	0.9	B05D-486A	261	218
	0.021	1	1.0	B1D-486A	270	225
	0.041	2	1.1	B2D-486A	277	231
	0.062	4	1.3	B3D-486A	284	237
	0.103	6	1.9	B5D-486A	291	243
	0.206	11	3.7	B10D-486A	367	306
	0.349	14	10.3	BL17D-486A	440	367
514-590	0.004	1B	0.5	B02D-552A	247	206
	0.009	1A	0.9	B05D-552A	261	218
	0.018	1	1.0	B1D-552A	270	225
	0.036	2	1.1	B2D-552A	277	231
	0.055	4	1.3	B3D-552A	284	237
	0.090	6	1.9	B5D-552A	291	248
	0.180	11	3.7	B10D-552A	381	318
	0.307	14	10.3	BL17D-552A	450	375
590-660	0.008	1A	0.9	B05D-630A	270	225
	0.016	1	1.0	B1D-630A	277	231
	0.032	2	1.1	B2D-630A	284	237
	0.048	4	1.3	B3D-630A	291	243
	0.079	6	1.9	B5D-630A	300	250
	0.158	11	3.7	B10D-630A	397	331
	0.269	14	10.3	BL17D-630A	465	388
660-740	0.007	1A	0.9	B05D-700A	270	225
	0.014	1	1.0	B1D-700A	277	231
	0.028	2	1.1	B2D-700A	284	237
	0.043	4	1.3	B3D-700A	291	243
	0.071	6	1.9	B5D-700A	300	250
	0.142	11	3.7	B10D-700A	404	337
	0.242	14	10.3	BL17D-700A	472	394
740-830	0.006	1A	0.9	B05D-790A	277	231
	0.012	1	1.0	B1D-790A	284	237
	0.025	2	1.1	B2D-790A	291	243
	0.038	4	1.3	B3D-790A	300	250
	0.063	6	1.9	B5D-790A	307	256
	0.126	11	3.7	B10D-790A	427	356
	0.215	14	10.3	BL17D-790A	484	404
830-930	0.005	1A	0.9	B05D-880A	284	237
	0.011	1	1.0	B1D-880A	291	243
	0.022	2	1.1	B2D-880A	300	250
	0.034	4	1.3	B3D-880A	307	256
830-930	0.057	6	1.9	B5D-880A	$314	$262
	0.114	11	3.7	B10D-880A	441	368
	0.193	14	10.3	BL17D-880A	494	412
930-1040	0.005	1A	0.9	B05D-990A	291	243
	0.010	1	1.0	B1D-990A	300	250
	0.020	2	1.1	B2D-990A	307	256
	0.030	4	1.3	B3D-990A	314	262
	0.051	6	1.9	B5D-990A	321	268
	0.102	11	3.7	B10D-990A	441	368
	0.171	14	10.3	BL17D-990A	505	421
1040-1160	0.018	2	1.1	BK2D-1100A	314	262
	0.027	4	1.3	BK3D-1100A	321	268
	0.045	6A	2.3	BK5D-1100A	330	275
	0.090	12	4.4	BK10D-1100A	450	375
	0.154	14	11.2	BK17D-1100A	512	427
1160-1300	0.016	2	1.1	BK2D-1230A	321	268
	0.024	4	1.3	BK3D-1230A	300	275
	0.041	6A	2.3	BK5D-1230A	337	281
	0.082	12	4.4	BK10D-1230A	457	381
	0.138	14	11.2	BK17D-1230A	519	433
1300-1480	0.014	2	1.1	BK2D-1380A	330	275
	0.021	4	1.3	BK3D-1380A	337	281
	0.036	6A	2.3	BK5D-1380A	344	287
	0.072	12	4.4	BK10D-1380A	464	387
	0.123	14	11.2	BK17D-1380A	532	444
1480-1660	0.013	2	1.1	BK2D-1570A	337	281
	0.019	4	1.3	BK3D-1570A	344	287
	0.032	6A	2.3	BK5D-1570A	351	293
	0.064	12	4.4	BK10D-1570A	471	393
	0.108	14	11.2	BK17D-1570A	550	459
1660-1860	0.010	2	1.1	BK2D-1760A	351	293
	0.017	4	1.3	BK3D-1760A	360	300
	0.028	6A	2.3	BK5D-1760A	367	306
	0.056	12	4.4	BK10D-1760A	480	400
	0.096	14	11.2	BK17D-1760A	564	470
1860-2080	0.010	2	1.1	BK2D-1970A	367	306
	0.015	4	1.3	BK3D-1970A	374	312
	0.025	6A	2.3	BK5D-1970A	381	318
	0.051	12	4.4	BK10D-1970A	494	412
	0.086	14	11.2	BK17D-1970A	583	486
2080-2330	0.023	6A	2.3	BK5D-2200A	397	331
	0.045	12	4.4	BK10D-2200A	510	425
	0.077	14	11.2	BK17D-2200A	609	508
2330-2610	0.020	6A	2.3	BK5D-2470A	427	356
	0.040	12	4.4	BK10D-2470A	524	437
	0.068	14	11.2	BK17D-2470A	628	524
2610-2920	0.018	6A	2.3	BK5D-2760A	434	362
	0.036	12	4.4	BK10D-2760A	531	443
	0.061	14	11.2	BK17D-2760A	652	544
2920-3260	0.016	6A	2.3	BK5D-3100A	457	381
	0.032	12	4.4	BK10D-3100A	540	450
	0.054	14	11.2	BK17D-3100A	675	563
3260-3650	0.014	6A	2.3	BK5D-3460A	471	393
	0.029	12	4.4	BK10D-3460A	570	475
	0.049	14	11.2	BK17D-3460A	716	597

NOTE: For no load operation, add a resistance on the output to draw a minimum 4% of the rated current.

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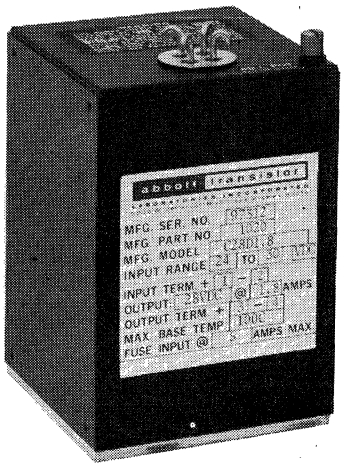
(213) WEbster 6-8185 Cable: ABTLABS

abbott 28 VDC to DC Hi-Performance



FEATURES

- Low Peak-to-Peak Ripple
- RFI/EMI to MIL-STD-461
- Small
- Hermetically Sealed
- +100°C Operation
- 0.1% Regulation

DELIVERY FROM STOCK*

SPECIFICATIONS

INPUT VOLTAGE RANGE: 24 to 30 vdc.

LINE REGULATION: 0.1% or 10 mv (whichever is greater) for input change of 24 to 30 vdc with load constant.

LOAD REGULATION: 0.1% or 20 mv (whichever is greater) for load change of no load to full load with line constant.

RIPPLE: 0.02% or 5 mv RMS (whichever is greater) 50 mv peak-to-peak maximum, measured with scope having a bandwidth of 1 MHz.

OUTPUT VOLTAGE ADJUSTMENT: Voltage is continuously adjustable between the limits shown in the table by means of an externally accessible screwdriver adjustment potentiometer.

ADJUSTMENT RESOLUTION:

Nominal Output Voltage	Resolution
5 thru 16 vdc	35 mv max.
18 thru 50 vdc	60 mv max.
55 thru 95 vdc	90 mv max.

ISOLATION VOLTAGE: 200 volts DC between input and output, input and case, and output and case.

INSULATION RESISTANCE: 50 megohms minimum at 50 volts DC between input and output, input and case, and output and case.

POLARITY: Inputs and outputs are isolated; either positive or negative side may be grounded.

TEMPERATURE RANGE: Operating: −55°C to +100°C maximum at center of mounting base.
Storage: −55°C to +125°C.

TEMPERATURE COEFFICIENT: 0.03% per degree centigrade maximum.

ENVIRONMENT: Encapsulated to meet the environmental requirements of MIL-E-5272C and MIL-E-5400K, Class 2, including altitude (to a vacuum), vibration, shock, acceleration, sand, dust, humidity, salt spray, fungus, explosion, etc.

SHORT CIRCUIT PROTECTION
Each unit is completely protected against an overload or short circuit of any duration. The output voltage automatically restores to normal when the overload is removed.

INPUT TRANSIENT PROTECTION: MIL-STD-704A, Limit 1, Category B (80 volts for 0.1 sec.).

OVER VOLTAGE PROTECTION: Over voltage protection modules are available for use with these units. Please consult the factory.

LOAD TRANSIENT RECOVERY TIME: Output voltage returns to regulation limits within 100 microseconds after a 50% step change in load current.

OUTPUT IMPEDANCE:
DC to 1 K Hz — 0.004 R_L or 0.04 ohm max.
1K Hz to 10K Hz — 0.015 R_L or 0.15 ohms max.
10K Hz to 100K Hz — 0.030 R_L or 0.50 ohms max.
R_L = Rated Load.

ELECTROMAGNETIC INTERFERENCE: Built to meet the requirements of MIL-STD-461 for generation of and susceptability to radiated and conducted interference.

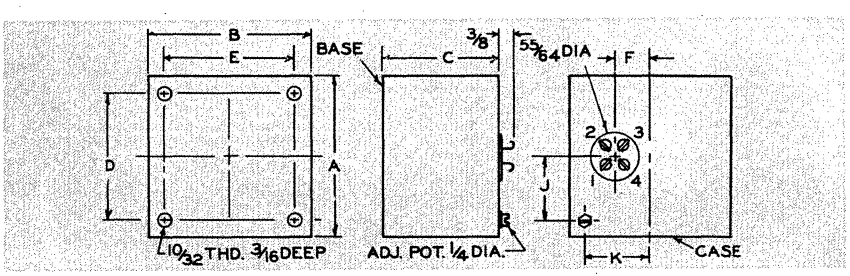
RELIABILITY: The mean time between failure (MTFB) per MIL-HDBK-217 under worst case operating conditions of full rated output current, 30 vdc input voltage, and +100°C base plate temperature, ranges from 41,305 hours for Model C5D10 to 55,463 for Model C95D0.25.

Output Voltage Range	Output Curr. (Amps)	Size (See Dwg.)	Wt. (Lbs.)	Model Number	Price 1 pc.	Price 2-4 pcs.
4.5-5.5	2.5	2D	1.2	**C0D2.5**	$336	$280
	5.0	6B	1.7	**C5D5.0**	375	313
	10.0	7A	2.6	**C5D10**	450	375
5.5-6.5	2.5	2D	1.2	**C6D2.5**	336	280
	5.0	6B	1.7	**C6D5.0**	375	313
	10.0	7A	2.6	**C6D10**	450	375
6.5-7.5	2.5	2D	1.2	**C7D2.5**	336	280
	5.0	6B	1.7	**C7D5.0**	375	313
	10.0	7A	2.6	**C7D10**	450	375
7.5-8.5	1.8	2D	1.2	**C8D1.8**	330	275
	3.5	6B	1.7	**C8D3.5**	369	308
	7.5	7A	2.6	**C8D7.5**	444	370
8.5-9.5	1.8	2D	1.2	**C9D1.8**	330	275
	3.5	6B	1.7	**C9D3.5**	369	308
	7.5	7A	2.6	**C9D7.5**	444	370
9.5-10.5	1.8	2D	1.2	**C10D1.8**	330	275
	3.5	6B	1.7	**C10D3.5**	369	308
	7.5	7A	2.6	**C10D7.5**	444	370
10.5-11.5	1.8	2D	1.2	**C11D1.8**	330	275
	3.5	6B	1.7	**C11D3.5**	369	308
	7.5	7A	2.6	**C11D7.5**	444	370
11-13	1.2	2D	1.2	**C12D1.2**	324	270
	2.5	6B	1.7	**C12D2.5**	364	304
	5.0	7A	2.6	**C12D5.0**	438	365
13-15	1.2	2D	1.2	**C14D1.2**	324	270
	2.5	6B	1.7	**C14D2.5**	364	304
	5.0	7A	2.6	**C14D5.0**	438	365
14-16	1.2	2D	1.2	**C15D1.2**	324	270
	2.5	6B	1.7	**C15D2.5**	364	304
	5.0	7A	2.6	**C15D5.0**	438	365
15-17	1.2	2D	1.2	**C16D1.2**	324	270
	2.5	6B	1.7	**C16D2.5**	364	304
	5.0	7A	2.6	**C16D5.0**	438	365
17-19	1.2	2D	1.2	**C18D1.2**	$324	$270
	2.5	6B	1.7	**C18D2.5**	364	304
	5.0	7A	2.6	**C18D5.0**	438	365
19-21	0.8	2D	1.2	**C20D0.8**	319	266
	1.8	6B	1.7	**C20D1.8**	360	300
	3.5	7A	2.6	**C20D3.5**	430	359
21-23	0.8	2D	1.2	**C22D0.8**	319	266
	1.8	6B	1.7	**C22D1.8**	360	300
	3.5	7A	2.6	**C22D3.5**	430	359
23-25	0.8	2D	1.2	**C24D0.8**	319	266
	1.8	6B	1.7	**C24D1.8**	360	300
	3.5	7A	2.6	**C24D3.5**	430	359
25-27	0.8	2D	1.2	**C26D0.8**	319	266
	1.8	6B	1.7	**C26D1.8**	360	300
	3.5	7A	2.6	**C26D3.5**	430	359
27-29	0.8	2D	1.2	**C28D0.8**	319	266
	1.8	6B	1.7	**C28D1.8**	360	300
	3.5	7A	2.6	**C28D3.5**	430	359
29-31	0.6	2D	1.2	**C30D0.6**	309	258
	1.2	6B	1.7	**C30D1.2**	351	293
	2.5	7A	2.6	**C30D2.5**	424	354
31-33	0.6	2D	1.2	C32D0.6	309	258
	1.2	6B	1.7	C32D1.2	351	293
	2.5	7A	2.6	C32D2.5	424	354
33-35	0.6	2D	1.2	C34D0.6	309	258
	1.2	6B	1.7	C34D1.2	351	293
	2.5	7A	2.6	C34D2.5	424	354
35-37	0.6	2D	1.2	C36D0.6	309	258
	1.2	6B	1.7	C36D1.2	351	293
	2.5	7A	2.6	C36D2.5	424	354
37-39	0.6	2D	1.2	C38D0.6	309	258
	1.2	6B	1.7	C38D1.2	351	293
	2.5	7A	2.6	C38D2.5	424	354
39-41	0.5	2D	1.2	C40D0.5	$306	$255
	0.8	6B	1.7	C40D0.8	342	285
	1.8	7A	2.6	C40D1.8	417	348
41-43	0.5	2D	1.2	C42D0.5	306	255
	0.8	6B	1.7	C42D0.8	342	285
	1.8	7A	2.6	C42D1.8	417	348
43-45	0.5	2D	1.2	C44D0.5	306	255
	0.8	6B	1.7	C44D0.8	342	285
	1.8	7A	2.6	C44D1.8	417	348
45-47	0.5	2D	1.2	C46D0.5	306	255
	0.8	6B	1.7	C46D0.8	342	285
	1.8	7A	2.6	C46D1.8	417	348
47-49	0.5	2D	1.2	C48D0.5	306	255
	0.8	6B	1.7	C48D0.8	342	285
	1.8	7A	2.6	C48D1.8	417	348
49-51	0.5	2D	1.2	C50D0.5	306	255
	0.8	6B	1.7	C50D0.8	342	285
	1.8	7A	2.6	C50D1.8	417	348
50-60	0.25	2D	1.2	C55D0.25	288	240
	0.5	6B	1.7	C55D0.5	331	276
	1.0	7A	2.6	C55D1.0	410	342
60-70	0.25	2D	1.2	C65D0.25	288	240
	0.5	6B	1.7	C65D0.5	331	276
	1.0	7A	2.6	C65D1.0	410	342
70-80	0.25	2D	1.2	C75D0.25	288	240
	0.5	6B	1.7	C75D0.5	331	276
	1.0	7A	2.6	C75D1.0	410	342
80-90	0.25	2D	1.2	C85D0.25	288	240
	0.5	6B	1.7	C85D0.5	331	276
	1.0	7A	2.6	C85D1.0	410	342
90-100	0.25	2D	1.2	C95D0.25	288	240
	0.5	6B	1.7	C95D0.5	331	276
	1.0	7A	2.6	C95D1.0	410	342

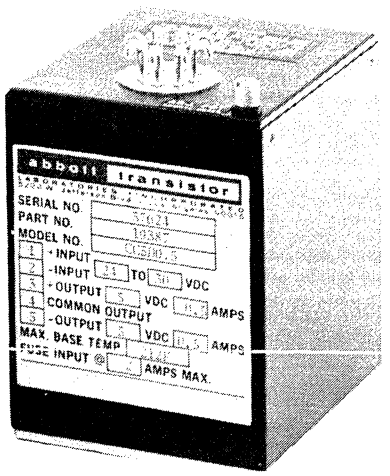
* All models with output voltages from 5 to 30 VDC are normally available from stock

Size	A	B	C	D	E	F	J	K
2D	2	3	3½	1.50	2.50	¾	¾	1¼
6B	2¾	3⅛	3⅝	2.25	2.62	¾	1⅛	1⅝6
7A	2⅞	3⅜	4½	2.37	2.87	¾	1⅜6	1⅞6

TOLERANCES
FRACTION = ±1/32 **DECIMAL** = ±0.015



abbott 28 VDC to DC Dual Output



FEATURES

- 1% Tracking Accuracy
- 0.2% Regulation
- Low Peak-To-Peak Ripple
- RFI/EMI to MIL-STD-461
- Hermetically Sealed
- +100°C Operation

SPECIFICATIONS

INPUT VOLTAGE RANGE: 24 to 30 vdc.

LINE REGULATION: 0.2% or 10 mv (whichever is greater) for input change of 24 to 30 vdc with load constant.

LOAD REGULATION: 0.2% or 20 mv (whichever is greater) for load change of no load to full load with line

RIPPLE: 0.02% or 5 mv RMS (whichever is greater), 50 mv peak-to-peak maximum for each output, measured with scope having bandwidth of 1 MHz.

TRACKING ACCURACY: The negative output will track the positive output to within 1.0% or 100 mv (whichever is greater) for all rated conditions of input voltage, output current, operating temperature, and output voltage adjustment.

OUTPUT VOLTAGE ADJUSTMENT: Voltage is continuously adjustable between the limits shown in the table by means of an externally accessible screwdriver adjustment potentiometer.

ADJUSTMENT RESOLUTION: 25 mv for outputs up to ±4.5 vdc; 35 mv for outputs ±5.0 to ±15 vdc; 60 mv for outputs ±16 vdc and above.

ISOLATION VOLTAGE: 200 volts DC between input and output, input and case, and output and case.

INSULATION RESISTANCE: 50 megohms minimum at 50 volts DC between input and output, input and case, and output and case.

POLARITY: Inputs and outputs are isolated; either positive or negative side may be grounded.

TEMPERATURE RANGE: Operating: −55°C to +100°C maximum at center of mounting base. Storage: −55°C to +125°C.

TEMPERATURE COEFFICIENT: 0.03% per degree centrigrade maximum.

ENVIRONMENT: Encapsulated to meet the environmental requirements of MIL-E-5272C and MIL-E-5400K, Class 2, including altitude (to a vacuum), vibration, shock, acceleration, sand, dust, humidity, saltspray, fungus, explosion, etc.

SHORT CIRCUIT PROTECTION: Each unit is completely protected against an overload or short circuit of any duration. The output voltage automatically restores to normal when the overload is removed.

INPUT TRANSIENT PROTECTION: In accordance with MIL-STD-704A, Figure 9, Limit 1 (80 vdc for 0.1 sec.).

OVERVOLTAGE PROTECTION: Overvoltage protection modules are available for use with these units. Please consult the factory.

LOAD TRANSIENT RECOVERY TIME: Output voltage returns to regulation limits within 200 microseconds after a 50% step change in load current.

ELECTROMAGNETIC INTERFERENCE: Built to meet the requirements of MIL-STD-461 for generation of and susceptability to radiated and conducted interference.

RELIABILITY: The mean time between failure (MTBF) per MIL-HDBK-217 under worst case operating conditions of full rated output current, 30 vdc input voltage, and +100°C base plate temperature, range from 20,105 hours for Model CC30D3.5 to 34,710 for Model CC3D3.5.

OUTPUT IMPEDANCE:

	RATED OUTPUT CURRENT (amps)			
	0.5	1.0	2.0	3.5
DC-1 KHz	0.15Ω	0.1Ω	0.08Ω	0.04Ω
1 KHz-10 KHz	0.4Ω	0.3Ω	0.2Ω	0.1Ω
10 KHz-100 KHz	0.5Ω	0.5Ω	0.5Ω	0.3Ω

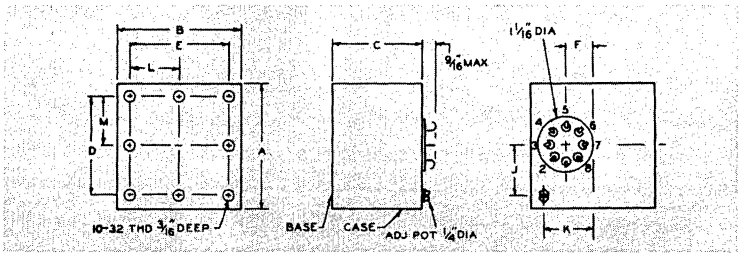
Output Voltage Range	Output Current (Amps)*	Size (See Dwg.)	Wt (Lbs.)	Model Number	Price 1 pc.	Price 2-4 pcs.
±2.75-±3.25	0.5	10C	2.3	CC3D0.5	$340	$305
	1.0	10C	2.3	CC3D1.0	370	330
	2.0	10D	2.5	CC3D2.0	395	355
	3.5	11E	3.9	CC3D3.5	440	395
±3.25-±3.75	0.5	10C	2.3	CC3.5D0.5	340	305
	1.0	10C	2.3	CC3.5D1.0	370	330
	2.0	10D	2.5	CC3.5D2.0	395	355
	3.5	11E	3.9	CC3.5D3.5	440	395
±3.75-±4.25	0.5	10C	2.3	CC4D0.5	340	305
	1.0	10C	2.3	CC4D1.0	370	330
	2.0	10D	2.5	CC4D2.0	395	355
	3.5	11E	3.9	CC4D3.5	440	395
±4.25-±4.75	0.5	10C	2.3	CC4.5D0.5	340	305
	1.0	10C	2.3	CC4.5D1.0	370	330
	2.0	10D	2.5	CC4.5D2.0	395	355
	3.5	11E	3.9	CC4.5D3.5	440	395
±4.5-±5.5	0.5	10C	2.3	CC5D0.5	340	305
	1.0	10C	2.3	CC5D1.0	370	330
	2.0	10D	2.5	CC5D2.0	395	355
	3.5	11E	3.9	CC5D3.5	440	395
±5.5-±6.5	0.5	10C	2.3	CC6D0.5	345	310
	1.0	10C	2.3	CC6D1.0	375	335
	2.0	10D	2.5	CC6D2.0	410	370
	3.5	11E	3.9	CC6D3.5	465	420
±6.5-±7.5	0.5	10C	2.3	CC7D0.5	345	310
	1.0	10C	2.3	CC7D1.0	375	335
	2.0	10D	2.5	CC7D2.0	410	370
	3.5	11E	3.9	CC7D3.5	465	420
±7.5-±8.5	0.5	10C	2.3	CC8D0.5	345	310
	1.0	10C	2.3	CC8D1.0	375	335
	2.0	10D	2.5	CC8D2.0	410	370
	3.5	11E	3.9	CC8D3.5	465	420
±8.5-±9.5	0.5	10C	2.3	CC9D0.5	$345	$310
	1.0	10C	2.3	CC9D1.0	375	335
	2.0	10D	2.5	CC9D2.0	410	370
	3.5	11E	3.9	CC9D3.5	465	420
±9.5-±10.5	0.5	10C	2.3	CC10D0.5	345	310
	1.0	10C	2.3	CC10D1.0	375	335
	2.0	10D	2.5	CC10D2.0	410	370
	3.5	11E	3.9	CC10D3.5	465	420
±10.5-±11.5	0.5	10C	2.3	CC11D0.5	345	310
	1.0	10C	2.3	CC11D1.0	375	335
	2.0	10D	2.5	CC11D2.0	410	370
	3.5	11E	3.9	CC11D3.5	465	420
±11-±13	0.5	10C	2.3	CC12D0.5	350	315
	1.0	10C	2.3	CC12D1.0	380	340
	2.0	10D	2.5	CC12D2.0	430	385
	3.5	11E	3.9	CC12D3.5	500	450
±13-±15	0.5	10C	2.3	CC14D0.5	350	315
	1.0	10C	2.3	CC14D1.0	380	340
	2.0	10D	2.5	CC14D2.0	430	385
	3.5	11E	3.9	CC14D3.5	500	450
±14-±16	0.5	10C	2.3	CC15D0.5	350	315
	1.0	10C	2.3	CC15D1.0	380	340
	2.0	10D	2.5	CC15D2.0	430	385
	3.5	11E	3.9	CC15D3.5	500	450
±15-±17	0.5	10C	2.3	CC16D0.5	360	320
	1.0	10D	2.5	CC16D1.0	390	350
	2.0	11E	3.9	CC16D2.0	445	400
	3.5	14D	7.9	CC16D3.5	530	475
±17-±19	0.5	10C	2.3	CC18D0.5	$360	$320
	1.0	10D	2.5	CC18D1.0	390	350
	2.0	11E	3.9	CC18D2.0	445	400
	3.5	14D	7.9	CC18D3.5	530	475
±19-±21	0.5	10C	2.3	CC20D0.5	360	320
	1.0	10D	2.5	CC20D1.0	390	350
	2.0	11E	3.9	CC20D2.0	445	400
	3.5	14D	7.9	CC20D3.5	530	475
±21-±23	0.5	10C	2.3	CC22D0.5	365	325
	1.0	10D	2.5	CC22D1.0	400	360
	2.0	11E	3.9	CC22D2.0	465	420
	3.5	14D	7.9	CC22D3.5	545	490
±23-±25	0.5	10C	2.3	CC24D0.5	365	325
	1.0	10D	2.5	CC24D1.0	400	360
	2.0	11E	3.9	CC24D2.0	465	420
	3.5	14D	7.9	CC24D3.5	545	490
±25-±27	0.5	10C	2.3	CC26D0.5	370	330
	1.0	10D	2.5	CC26D1.0	410	370
	2.0	11E	3.9	CC26D2.0	490	440
	3.5	14D	7.9	CC26D3.5	570	515
±27-±29	0.5	10C	2.3	CC28D0.5	370	330
	1.0	10D	2.5	CC28D1.0	410	370
	2.0	11E	3.9	CC28D2.0	490	440
	3.5	14D	7.9	CC28D3.5	570	515
±29-±31	0.5	10C	2.3	CC30D0.5	375	335
	1.0	10D	2.5	CC30D1.0	420	380
	2.0	11E	3.9	CC30D2.0	510	460
	3.5	14D	7.9	CC30D3.5	595	535

*Each Output

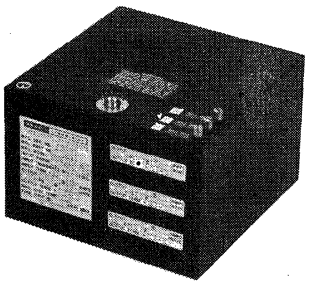
Size	A	B	C	D	E	F	J	K	L	M
10C	3⅜	3⅜	3¾	2.87	2.87	¾	1 1/16	1 1/16	—	—
10D	3½	3½	4	3.00	3.00	¾	1½	1½	—	—
11E	3¾	4½	4¼	3.25	4.00	¾	1⅝	2	—	—
14D	6	6¼	3⅞	5.50	5.75	1¼	2¾	2⅞	2.87	2.75

TOLERANCES

FRACTION = ±1/32 **DECIMAL** = ±0.015



abbott DC to Sine Wave 1φ or 3φ



POWER MODULES *specifications*

features

- Close regulation
- 400 or 800 Hertz
- Hermetically sealed
- No moving parts
- Compact
- For aerospace application

DELIVERY FROM STOCK

Input Voltage Range
24 to 30 volts DC

Line Regulation
±0.2% for input 24 to 30 VDC

Load Regulation
±0.5% from ½ to full load on Model S's
±0.8% from ½ to full load on Model N's and Q's

Frequency Stability ±1%

Phase Displacement (3 φ only)
120° ±5° from ½ to full load and P.F. 0.7 lag or lead

Voltage Adjustment Range
12% by screwdriver adj.

Reliability
100,000 hours MTBF typical per MIL-HDBK-217 under worst case operating conditions on Model N's
55,000 hours MTBF on Model S's

Short Circuit Protection
Standard on all models

Input Transient Protection
In accordance with MIL-STD-704A, Limit 1, Category B (80 volts for 0.1 sec.)

Environment
+ 160°F max. at mtg. base using adequate heat sink on Model N's
+ 212°F max. at mtg. base using adequate heat sink on Model S's and Q's
−65°F min. at mounting surface
Altitude: To vacuum (true hermetic seal)

Vibration, shock, sand, dust, humidity, salt spray, fungus, sunshine, rain, and explosion to MIL-E-5272C and MIL-E-5400K

Output Voltage, Current and Frequency
See specific models listed (Outputs and inputs are isolated)
Output frequencies up to 1600 Hz are listed in our catalog as standard models. Contact our nearest office for your free copy.

DC TO SINE WAVE (1 φ or 3 φ) INPUT VOLTAGE RANGE: 24 TO 30 VOLTS DC

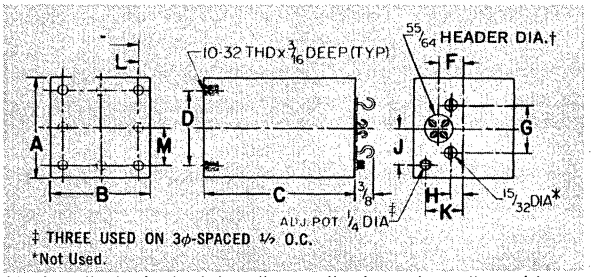
Output No. of Phases	Output Frequency (Hertz)	Output Voltage Range (Per Phase)	Output Power (Volt-Amps)	Harmonic Distortion (%)	Size (See Dwg.)	Weight (Lbs.)	Model Number	Price 1 Piece	Price 2-4 Pieces
1	400	25.4-28.6	5	3	4	1.4	N05D-27A-400	$249	$204
			10	3	4C	1.5	N1D-27A-400	251	211
			20	3	4A	2.1	N2D-27A-400	253	213
			30	3	6	2.2	N3D-27A-400	255	215
			60	4	11	4.5	N6D-27A-400	399	333
			120	5	13	9.1	N12D-27A-400	624	520
1	400	108-122	5	3	4	1.4	N05D-115A-400	220	184
			10	3	4C	1.5	N1D-115A-400	226	186
			20	3	4A	2.1	N2D-115A-400	228	188
			30	3	6	2.2	N3D-115A-400	230	190
			60	4	11	4.5	N6D-115A-400	376	314
			120	5	13	9.1	N12D-115A-400	595	496
1	400	25.4-28.6	5	2.0	4	1.6	**S05D-27A-400**	297	248
			10	2.5	4C	1.7	**S1D-27A-400**	301	251
			20	2.5	4B	2.3	**S2D-27A-400**	303	253
			30	2.5	6A	2.4	**S3D-27A-400**	307	256
			60	3.0	12	4.8	**S6D-27A-400**	476	397
			120	4.0	14	9.1	**S12D-27A-400**	750	625
1	400	108-122	5	2.0	4	1.6	**S05D-115A-400**	267	223
			10	2.5	4C	1.7	**S1D-115A-400**	271	226
			20	2.5	4B	2.3	**S2D-115A-400**	273	228
			30	2.5	6A	2.4	**S3D-115A-400**	277	231
			60	3.0	12	4.8	**S6D-115A-400**	447	373
			120	4.0	14	9.1	**S12D-115A-400**	714	595
3 *	400	108-122	33	4	13	8.3	Q3D-115A-400Y	1905	1587
			66	4	14	9.2	Q6D-115A-400Y	1975	1658
			100	5	14	9.2	Q10D-115A-400Y	2081	1728
3*	400	25.4-28.6	33	4	13	8.3	Q3D-27A-400Y	1940	1622
			66	4	14	9.2	Q6D-27A-400Y	2046	1693
			100	5	14	9.2	Q10D-27A-400Y	2142	1764
3*	800	108-122	33	4	13	8.3	Q3D-115A-800Y	1940	1622
			66	4	14	9.2	Q6D-115A-800Y	2046	1693
			100	5	14	9.2	Q10-115A-800Y	2142	1764
3*	800	25.4-28.6	33	4	13	8.3	Q3D-27A-800Y	1975	1658
			66	4	14	9.2	Q6D-27A-800Y	2081	1728
			100	5	14	9.2	Q10D-27A-800Y	2152	1799

NOTE: All models beginning with "S" are available from stock for immediate delivery.

* The output of the three phase models is normally four wire "WYE" connected. To obtain "Delta" instead of "WYE" change last letter of model number to "D." (Example: Q3D-115A-400**D**.)

Size	A	B	C	D	E	F	G	H	J	K	L	M
4	2¼	2¾	3¼	1.75	2.25	¾	—	—	⅞	1⅛	—	—
4C	2¼	2¾	3½	1.75	2.25	¾	—	—	⅞	1⅛	—	—
4A	2½	3	3¼	2.00	2.50	¾	—	—	1	1¼	—	—
4B	2½	3	3¾	2.00	2.50	¾	—	—	1	1¼	—	—
6	2¾	3	3¼	2.25	2.50	¾	—	—	1⅛	1¼	—	—
6A	2¾	3	4	2.25	2.50	¾	—	—	1⅛	1¼	—	—
11	3	5½	3¼	2.50	5.00	2⅛	—	—	1¼	2½	2.50	—
12	3	5½	4	2.50	5.00	2⅛	—	—	1¼	2½	2.50	—
13	6	6	3¼	5.50	5.50	2⅜	—	—	2¾	2¾	2.75	2.75
14	6	6	4	5.50	5.50	2⅜	—	—	2¾	2¾	2.75	2.75

DIMENSIONAL TOLERANCES: FRACTIONS ±1/32; DECIMALS .XX ±0.015.



† To have the header located on the mounting base, change the model number character preceding the first dash of Model Number to "B". (Example: N3B-115A-400 indicates a header out the base.) See page 949. No increase in price for this service.

EASTERN OFFICE: 1224 ANDERSON AVE. / FORT LEE, N. J. 07024 / (201) 224-6900

abbott transistor LABORATORIES, INCORPORATED
5200 W. Jefferson Blvd. / Los Angeles 90016
(213) WEbster 6-8185 Cable: ABTLABS

astro·space Laboratories, Inc.

MULTI POWER

MULTIPLE OUTPUT MODULAR POWER SUPPLIES

- Series Regulated • • Discrete Regulators For Low Noise • Reliable • Low Cost Operation
- Convection Cooled
- Current Limiting, Standard
- Overvoltage Protection, Optional

AC INPUT:

105-128 V; 57-63 Hz Standard

115 V / 220 V / 240 V; 50-60 Hz Optional, at additional 5%

DC OUTPUT

Regulation, Line or Load: ±0.5%, Current Less 2 A
±1.0%, Current 2 A or Greater

Ripple: Less Than 25 mv p-p
Temperature Coefficient: 0.1% per Deg. C.
Output Voltage Adjustment Range: ±10%
Current Limiting: Standard on All Outputs
Operating Ambient: 0 Deg. to 50 Deg. C.
Storage Temperature: −40 Deg. C to +85 Deg. C.

CHARACTERISTICS

MODEL 501	MODEL 502	MODEL 503	MODEL 504	MODEL 505
OUTPUTS	OUTPUTS	OUTPUTS	OUTPUTS	OUTPUTS
+ 5 VDC @ 2.5 A +15 VDC @ 0.5 A −15 VDC @ 0.5 A	+ 5 VDC @ 5 A +15 VDC @ 1 A −15 VDC @ 1 A	+ 5 VDC @ 8 A +15 VDC @ 2.5 A −15 VDC @ 2.5 A	+ 5 VDC @ 5 A +15 VDC @ 1 A −15 VDC @ 1 A +28 VDC @ .5 A	+ 5 VDC @ 5 A +15 VDC @ 1 A −15 VDC @ 1 A +28 VDC @ .5 A − 6 VDC @ 1 A
SIZE	SIZE	SIZE	SIZE	SIZE
6" W 4.75" H 6" L	6" W 4.75" H 9" L	6" W 4.75" H 12" L	6" W 4.75" H 12" L	6"W 4.75" H 12" L
PRICE	PRICE	PRICE	PRICE	PRICE
1- 24: $125.00 25- 49: $110.00 50- 74: $105.00 75-100: $ 95.00	1- 24: $150.00 25- 49: $138.00 50- 74: $120.00 75-100: $115.00	1- 24: $195.00 25- 49: $180.00 50- 74: $165.00 75-100: $150.00	1- 24: $195.00 25- 49: $180.00 50- 74: $165.00 75-100: $150.00	1- 24: $225.00 25- 49: $208.00 50- 74: $190.00 75-100: $170.00

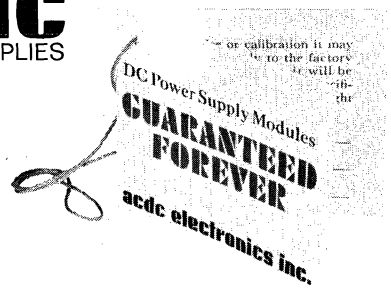
F.O.B. HUNTSVILLE, ALA.

- OTHER INPUTS/OUTPUTS AND LARGER QUANTITIES QUOTED ON REQUEST
- OVERVOLTAGE CROWBAR

1 - 24: $15.00
25 - 49: $10.00
50 - 74: $ 8.00
75 - 100: $ 7.00
} EACH PER VOLTAGE

Astro-Space Laboratories, Inc. Research Park / Huntsville, Alabama 35806

acdc
POWER SUPPLIES



Warranty

When used within specified operating conditions, every catalog listed ACDC power supply is unconditionally guaranteed to meet all of its published specifications for an unlimited length of time. This guarantee covers all parts of the module, including semiconductors, capacitors and mechanical parts, without regard to the date of purchase or installation. All terms of this guarantee are fully transferable when the power supply is sold as original equipment.

If at any time the power supply is in need of warranty service or calibration it may be returned directly to the factory, freight prepaid, where without charge, it will be adjusted to meet its original specifications.

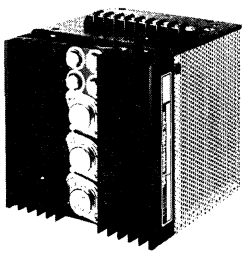
OEM THE VALUE ENGINEERED SERIES
4 TO 32 VOLTS, ±12 AND ±15 VOLTS, UP TO 36 AMPS

Our new OEM series features the low price and compatible construction to meet the needs of today's OEM manufacturers — large and small. With 0.1% regulation, excellent stability, overload protection, and designed to fit anywhere, the OEM specifications tell the story. Take a good look — then order and get off-the-shelf delivery!

STOCK DELIVERY **UL LISTED**

IC OPTIMUM PERFORMANCE FOR IC APPLICATIONS
5 VOLT OUTPUT — 2 TO 25 AMPS

A complete line of power supply modules designed to deliver optimum performance with IC circuits. Overvoltage and overload protection, plus stability and regulation matched to the application, make the IC series first choice in digital logic designs. Off-the-shelf delivery, too.

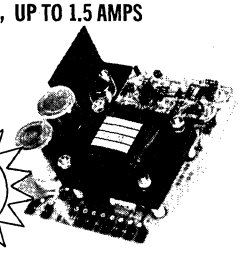


STOCK DELIVERY

CD A COMPLETE REGULATED DC POWER SUPPLY ON A CARD
4 TO 32 VOLTS, ±12 AND ±15 VOLTS, UP TO 1.5 AMPS

Designed for versatile mounting inside your equipment, the compact size of the CD series lets you put your power supply right where it's needed. This latest addition to the growing line of ACDC power modules has all of the performance features you need — stability, regulation, floating output.

Off-the-shelf delivery, and at the lowest prices, too!



STOCK DELIVERY

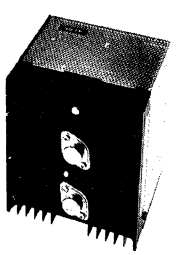
JR MINIATURIZED DESIGN
3 THROUGH 30 VOLTS, UP TO 10 AMPS

Still the leader in miniaturized power supplies, this compact, precision-regulated DC supply provides AC conversion, isolation, regulation and low output noise (only 25 mv p-p) in a slim, light package. At only one-fifth the usual size and weight, it's the answer to those "impossible packaging problems."

STOCK DELIVERY

OA DUAL OUTPUT POWER SUPPLY MODULE FOR OP AMPS
±12 AND ±15 VOLTS, UP TO 3.7 AMPS

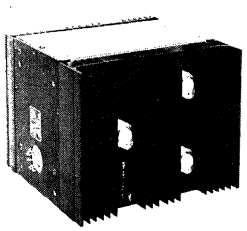
Built in tracking and long-term stability are the special features of our OA series power supply modules. Both regulation and temperature stability are optimized to assure the best performance in your op-amp applications. Size and weight are ideal for rack mounting.



STOCK DELIVERY

BX/BC PRECISION POWER SUPPLY MODULES
2 THROUGH 400 VOLTS, UP TO 20 AMPS

All of the high performance features you need are here in these precision power supply modules. 0.01% regulation, overvoltage and overload protection, minimum output impedance and output ripple all combine to make the BX series the outstanding performer in the ACDC line. When the regulation requirements are less critical, the BC series is the one to choose. Off-the-shelf delivery up to 28 volts — higher voltages take a little longer.



STOCK DELIVERY

Ordering Information

MODEL CALLOUT: Order ACDC power supplies by Model Number and be sure to include the proper suffix for any options desired. (Example: OEM5N10-1 calls out the 5 Volt, 10 Amp model of the OEM Series and also calls for built-in overvoltage protection.)

PRICES: All prices quoted apply within the U.S. (Add 4% in Canada.) F.O.B. point is Oceanside, Calif. and Terms are Net 30 days.

DISCOUNTS: ACDC offers liberal quantity discounts to OEM buyers. Contact us for quotations for quantities beyond those called out in the catalog.

SOURCE INSPECTION: Government or Customer source inspection involves additional liaison and handling and is charged for at $25 extra per shipment. For DD250 Form add an extra $10 ea. Certificates of compliance may be ordered at no extra charge.

SHIPPING: Orders are shipped by best surface route unless otherwise instructed.

DELIVERY: Stock items are shipped within 3 days ARO. Contact ACDC or your local ACDC representative (see back cover) for delivery information on other models.

RETURN SHIPMENTS: If it should become necessary for you to ship a unit back to the factory, we suggest that you contact us first so that we can schedule a prompt turn-around time as soon as possible. Shipments to the factory must be prepaid and contain the reason for return. After processing, units will be reshipped via the best surface route, collect, unless other routing is expressly authorized by you.

acdc electronics inc. Oceanside Industrial Center, Oceanside, California 92054 (714) 757-1880 TWX: 910-322-1470

GENERAL SPECIFICATIONS

acdc
POWER SUPPLIES

NEW! NEW!

STOCK DELIVERY — ALL MODELS —

	OEM	CD	IC	OA	BX/BC	JR
Output	4 to 32 volts ±12 and ±15 volts up to 36 amps	4 to 32 volts ±12 and ±15 volts up to 1.5 amps	5 volts 2 to 25 amps	±12 and ±15 volts up to 3.7 amps	2 through 400 volts up to 20 amps	3 through 30 volts up to 10 amps
Input	105-125VAC, 47-63Hz (usable also to 400Hz — consult acdc for derating). 210-250VAC input is available — consult ACDC.					105-125VAC, 47-420Hz, single phase.
Regulation	0.1% +5mV NL-FL. ±0.1% ±5mV for ±10% input variation.		0.05% for line changes of 10%. 0.05% for NL to FL changes.	OA and BX: Line change of 10% 0.01% or 0.001v; NL to FL change 0.01% or 0.002v	BC: 0.5% or 0.02v; 0.5% or 0.04v	0.1% +5mV NL-FL. ±0.1% ±5mV for ±10% input variation.
Ripple	2mV RMS and 20mV P-P max.			0.5mV or 0.001% max. RMS	10 mV or 0.01% max. RMS	3mV RMS max (120Hz). 25mV P-P (spikes at 50KHz rep. rate).
Temperature Stability	Typical 10mV for eight hour period after initial warmup.			Max. 0.1% or 10mV for eight hour period after initial warmup	Typ. 1% for eight hour period after initial warmup	Typical 10mV for eight hour period after initial warmup.
Transient Response	Output voltage returns to within regulation limits within 50μsec in response to a 50% step change in load current.					Typically less than 1 msec in response to an NL-FL step.
Remote Sensing	Terminals are provided to maintain regulation at the load, compensating for the DC voltage drop in the load cable.					
Remote Voltage Adjustment	Terminals are provided to adjust the output voltage by means of a remote variable resistor. Remote voltage adjustment is not provided on OA series.					
Ambient Temperature	Operating: Rated output at operating temperatures up to 71°C without forced air or heatsinking. Storage: −55°C to +85°C. (See tables for output rating vs. temp.)					Unit must be mounted to allow conductive heatsinking to hold the case temperature below 80°C.
Mil Specs	The listed catalog models are constructed with the highest quality components and have MTBF ratings in the neighborhood of 50,000 hours per MIL-HDBK-217. ACDC will also build supplies to meet specific MIL specs such as MIL-E-4158A, MIL-E-16400, MIL-T-21200, and meet environmental requirements such as MIL-E-5400, MIL-E-5272, MIL-E-4970, and RFI specs MIL-I-26600 and MIL-I-6181. ACDC is able to perform qualification testing when required. In order to provide the most efficient design, customer inquiries are invited, outlining exact specifications and environmental conditions required for the end product.					
Overload Protection	All models are inherently protected against overload and short circuits of any duration. Except for certain higher voltage units, no fuses or reset buttons are used — automatic recovery is electronically accomplished. On higher voltage units, short circuit protection is furnished by means of an accessible, replaceable fuse.					
Overvoltage Protection (Optional)	Any model, up to 50 volts, can be furnished with overvoltage protection which "crowbars" the output in the event of a rise in the output voltage of 10% or 2 volts (whichever is greater). On dual models, overvoltage protection "crowbars" both voltages to near zero in the event of a rise of one or both of the voltages of 20% or 4 volts (whichever is greater). (fixed on CD series)					A completely independent overvoltage protection module is available and straddles the output terminals. This protection does not depend on the regulating circuitry of the supply. Trip voltage adjustable from 5-30 volts.
Connector	All cases have barrier strip termination.	Power supply mates with standard PC edge card connector (22 x .156 x 1/16" thick) Barrier strip available as option	All cases have barrier strip termination.	Cases A through F are supplied with a solder hook terminal header. Case M1 is furnished with an attached 10 terminal PC edge connector which may be used either as a solder connection or readily removed by the user and mounted in his equipment to provide plug-in convenience. G and H cases have barrier strip termination.		All cases have barrier strip termination.
Output Impedance	• DC — 1KHz 0.001 R_L or 0.005 ohm max. 1-100KHz 0.005 R_L or 0.5 ohm max (whichever is greater). R_L = rated load.			OA and BX: DC - 1 KHz 0.0001 R_L or 0.001 ohm max; 1 - 10 KHz 0.0003 R_L or 0.01 ohm max; 10 - 100 KHz 0.0006 R_L or 0.3 ohm max	BC: 0.005 R_L or 0.04 ohm max; 0.02 R_L or 0.3 ohm max; 0.02 R_L or 0.3 ohm max	(See Regulation and Transient Response).
Temperature Coefficient	0.02%/°C max.		1mV/°C max.	Maximum 0.015% or 1 mV/°C	Typ. 1% or 5 mV/°C	0.02%/°C max.

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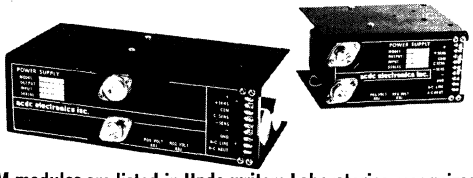
OEM
SERIES
STOCK DELIVERY



4 TO 32 VOLTS, ±12 AND ±15 VOLTS, UP TO 36 AMPS

acdc
POWER SUPPLIES

NEW!

OEM modules are listed in Underwriters Laboratories recognized components index

OEM SINGLE OUTPUT

Nominal output voltage ①	Adj. range ±V	Maximum current rating 40°C	55°C	71°C	Case size	Model Number add -1 for OVP	Price③ 10-24 pcs (See note ④ for OVP)
4	.25	6.0	5.1	3.9	R1	OEM4N6	$ 57.00
		11	9.3	7.1	R2	OEM4N11	69.50
		18	15.3	11.7	R3	OEM4N18	105.00
		26	22.1	16.9	R4	OEM4N26	167.00
		36	30.6	23.3	R5	OEM4N36	194.00
②5	**.25**	**5.7**	**4.8**	**3.7**	**R1**	**OEM5N5.7**	**57.00**
		10	**8.5**	**6.5**	**R2**	**OEM5N10**	**69.50**
		17	**14.5**	**11.0**	**R3**	**OEM5N17**	**105.00**
		25	**21.2**	**16.3**	**R4**	**OEM5N25**	**167.00**
		35	**29.8**	**22.8**	**R5**	**OEM5N35**	**194.00**
6	.25	5.2	4.4	3.4	R1	OEM6N5.2	57.00
		9.5	8.1	6.2	R2	OEM6N9.5	69.50
		15	12.7	9.7	R3	OEM6N15	105.00
		22	18.7	14.3	R4	OEM6N22	167.00
		30.7	26.1	20.0	R5	OEM6N30.7	194.00
8	.25	4.2	3.6	2.7	R1	OEM8N4.2	57.00
		7.5	6.4	4.9	R2	OEM8N7.5	69.50
		12	10.2	7.8	R3	OEM8N12	105.00
		17.5	14.9	14.3	R4	OEM8N17.5	167.00
		24.5	20.8	15.9	R5	OEM8N24.5	194.00
10	.5	3.5	3.0	2.3	R1	OEM10N3.5	57.00
		6.5	5.5	4.2	R2	OEM10N6.5	69.50
		10.2	8.6	6.6	R3	OEM10N10.2	105.00
		14.9	12.7	9.7	R4	OEM10N14.9	167.00
		21.0	17.9	13.6	R5	OEM10N21	194.00
②12	**.5**	**3.2**	**2.7**	**2.1**	**R1**	**OEM12N3.2**	**56.00**
		5.8	**4.9**	**3.8**	**R2**	**OEM12N5.8**	**67.00**
		9.5	**8.1**	**6.2**	**R3**	**OEM12N9.5**	**99.00**
		13.0	**11.1**	**8.5**	**R4**	**OEM12N13**	**167.00**
		18.5	**15.7**	**12.0**	**R5**	**OEM12N18.5**	**194.00**
14	.5	2.8	2.4	1.8	R1	OEM14N2.8	56.00
		5.2	4.4	3.4	R2	OEM14N5.2	67.00
		8.7	7.4	5.6	R3	OEM14N8.7	99.00
		12.0	10.2	7.8	R4	OEM14N12	167.00
		16.7	14.2	10.9	R5	OEM14N16.7	194.00
②15	**.5**	**2.7**	**2.3**	**1.7**	**R1**	**OEM15N2.7**	**56.00**
		5.0	**4.2**	**3.2**	**R2**	**OEM15N5**	**67.00**
		8.2	**7.0**	**5.3**	**R3**	**OEM15N8.2**	**99.00**
		11.2	**9.5**	**7.3**	**R4**	**OEM15N11.2**	**167.00**
		15.8	**13.4**	**10.3**	**R5**	**OEM15N15.8**	**194.00**
16	.5	2.6	2.2	1.7	R1	OEM16N2.6	56.00
		4.7	4.0	3.0	R2	OEM16N4.7	67.00
		7.7	6.5	5.0	R3	OEM16N7.7	99.00
		10.8	9.2	7.0	R4	OEM16N10.8	167.00
		15.0	12.8	9.8	R5	OEM16N15	194.00
18	.5	2.3	1.9	1.5	R1	OEM18N2.3	56.00
		4.2	3.6	2.7	R2	OEM18N4.2	67.00
		6.9	5.9	4.5	R3	OEM18N6.9	99.00
		9.6	8.2	6.2	R4	OEM18N9.6	167.00
		13.5	11.5	8.8	R5	OEM18N13.5	194.00
20	1	2.1	1.8	1.4	R1	OEM20N2.1	56.00
		3.8	3.2	2.5	R2	OEM20N3.8	67.00
		6.2	5.3	4.0	R3	OEM20N6.2	99.00
		8.7	7.4	5.7	R4	OEM20N8.7	167.00
		12.2	10.4	7.9	R5	OEM20N12.2	194.00
22	1	1.9	1.6	1.2	R1	OEM22N1.9	56.00
		3.6	3.1	2.3	R2	OEM22N3.6	67.00
		5.9	5.0	3.8	R3	OEM22N5.9	99.00
		8.1	6.9	5.3	R4	OEM22N8.1	167.00
		11.4	9.7	7.4	R5	OEM22N11.4	194.00

OEM SINGLE OUTPUT

Nominal output voltage ①	Adj. range ±V	Maximum current rating 40°C	55°C	71°C	Case size	Model Number add -1 for OVP	Price* 10-24 pcs (See note ④ for OVP)
②24	**1**	**1.8**	**1.5**	**1.2**	**R1**	**OEM24N1.8**	**56.00**
		3.3	**2.8**	**2.1**	**R2**	**OEM24N3.3**	**67.00**
		5.4	**4.6**	**3.5**	**R3**	**OEM24N5.4**	**99.00**
		7.5	**6.4**	**4.9**	**R4**	**OEM24N7.5**	**167.00**
		10.6	**9.0**	**6.9**	**R5**	**OEM24N10.6**	**194.00**
26	1	1.7	1.4	1.1	R1	OEM26N1.7	56.00
		3.1	2.6	2.0	R2	OEM26N3.1	67.00
		5.0	4.2	3.2	R3	OEM26N5.0	99.00
		7.1	6.1	4.6	R4	OEM26N7.1	167.00
		10.0	8.5	6.5	R5	OEM26N10.0	194.00
②28	**1**	**1.6**	**1.4**	**1.0**	**R1**	**OEM28N1.6**	**56.00**
		2.9	**2.5**	**1.9**	**R2**	**OEM28N2.9**	**67.00**
		4.7	**4.0**	**3.1**	**R3**	**OEM28N4.7**	**99.00**
		6.7	**5.7**	**4.4**	**R4**	**OEM28N6.7**	**167.00**
		9.3	**7.9**	**6.1**	**R5**	**OEM28N9.3**	**194.00**
30	1	1.5	1.3	1.0	R1	OEM30N1.5	56.00
		2.7	2.3	1.8	R2	OEM30N2.7	67.00
		4.5	3.8	2.9	R3	OEM30N4.5	99.00
		6.3	5.4	4.1	R4	OEM30N6.3	167.00
		8.8	7.5	5.7	R5	OEM30N8.8	194.00
32	1	1.4	1.2	0.9	R1	OEM32N1.4	56.00
		2.5	2.1	1.6	R2	OEM32N2.5	67.00
		4.3	3.6	2.8	R3	OEM32N4.3	99.00
		5.7	4.9	3.7	R4	OEM32N5.7	167.00
		8.1	6.9	5.3	R5	OEM32N8.1	194.00

① Contact ACDC for any voltage not listed
② In stock at ACDC (others available in 3 weeks)

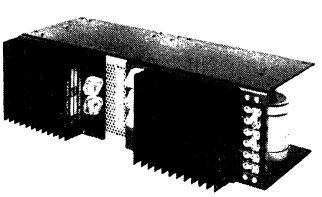
OEM DUAL OUTPUT

Nominal output voltage	Adj. range ±V	Maximum current rating 40°C	55°C	71°C	Case size	Model Number add -1 for OVP	Price* 10-24 pcs (See note ④ for OVP)
±12	.5	1.5	1.3	1.0	R1	OEM12D1.5	$81.00
		2.7	2.3	1.8	R2	OEM12D2.7	89.00
±15	.5	1.3	1.1	0.8	R1	OEM15D1.3	81.00
		2.4	2.0	1.6	R2	OEM15D2.4	89.00

③ 1-4 pcs: Add $25
5-9 pcs: Add $15

Request written quotation from factory for quantities in excess of 24 pieces.

④ Add $10 for Overvoltage protection on R1, R2, R3 cases.
④ Add $14 for Overvoltage protection on R4, R5 cases.



Covers for the OEM modules are available as an option. Add —2 to the part number and add $4.00 for case R1 or R2, and $6.00 for case R3, R4, or R5.

DIMENSIONS

Case Size	H	W	L	Weight Approx. (Lbs.)
R1	3 3/16	4 15/16	6 1/4	4 1/2
R2	3 3/16	4 15/16	10	7 1/2
R3	4 15/16	4 15/16	10	12
R4	4 15/16	6 5/8	12	20
R5	4 15/16	7 1/4	16	29

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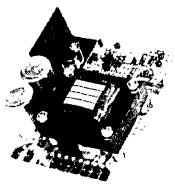
CD SERIES
STOCK DELIVERY

NEW!



4 TO 32 VOLTS, ±12 AND ±15 VOLTS, UP TO 1.5 AMPS.

acdc POWER SUPPLIES

CD SINGLE OUTPUT

VOLTS*	Max Current Rating 40°C	55°C	71°C	Model No add -1 for OVP	Price 10-24 pcs
4	1.5	1.3	1.0	CD4N1.5	Any Model $28.50
**5	1.5	1.3	1.0	CD5N1.5	
6	1.4	1.2	.9	CD6N1.4	
8	1.1	.94	.72	CD8N1.1	
10	.95	.81	.62	CD10N.95	
**12	.85	.72	.55	CD12N.85	
14	.77	.65	.50	CD14N.77	
**15	.74	.63	.48	CD15N.74	
16	.70	.60	.46	CD16N.70	
18	.64	.55	.42	CD18N.64	

*Factory fixed to within 1% **Stock item

CD SINGLE OUTPUT

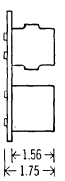
VOLTS*	Max Current Rating 40°C	55°C	71°C	Model No add -1 for OVP	Price 10-24 pcs
20	.58	.50	.38	CD20N.58	Any Model $28.50
22	.54	.46	.35	CD22N.54	
**24	.51	.44	.33	CD24N.51	
26	.48	.41	.31	CD26N.48	
**28	.45	.38	.29	CD28N.45	
30	.42	.36	.27	CD30N.42	
32	.40	.34	.26	CD32N.40	

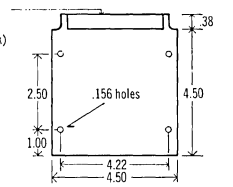
Options Barrier Strip $2.00
Overvoltage protection $4.00
Voltage Adj. (Pot) $2.00

1-4 Pieces: Add $15.00 5-9 Pieces: Add $10.00
Request written quotation from factory for quantities in excess of 24 pieces.

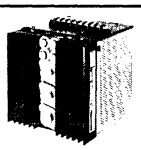
CD DUAL OUTPUT

VOLTS*	Max Current Rating 40°C	55°C	71°C	Model No add -1 for OVP	Price 10-24 pcs
±12	.42	.36	.27	CD12D.42	$37.50
±15	.37	.32	.24	CD15D.37	$37.50





IC SERIES
STOCK DELIVERY



5 VOLT POWER SUPPLY 2 TO 25 AMPS

Nominal Output Voltage (VDC)	Output Voltage Range (VDC)	Maximum Current Rating (Amps) 40°C	55°C	71°C	Maximum Dimensions (inches) H	W	L	Weight approx. (lbs.)	Case Size	Model (Add —1 for Overvoltage Protection)	Price
5	4.75 to 5.25	2.7	2.5	2.0	5.0	2.5	4.38	4	J1	IC5N2.7	$ 98.00 *
5	4.75 to 5.25	9.5	8.0	6.2	5.0	5.0	5.0	7.5	L1	IC5N9.5	134.00 **
5	4.75 to 5.25	13.5	11.5	9.2	5.0	5.0	7.5	11	N1	IC5N13.5	186.00 **
5	4.75 to 5.25	25.0	21.5	16.5	5.0	5.53	11.0	19	P1	IC5N25	258.00 **

*Add $20 for OVP **Add $30 for OVP

OA SERIES
STOCK DELIVERY

±12 AND ±15 VOLT DUAL OUTPUT UP TO 3.7 AMPS

Nominal Output Voltage (VDC)	Output Voltage Range (VDC)	Maximum Current Rating (Amps) 40°C	55°C	71°C	Maximum Dimensions (inches) H	W	L	Weight approx. (lbs.)	Case Size	Model (Add —1 for Overvoltage Protection)	Price (add $20 for OVP)
±12 ±15	11-13 14-16	0.500	0.425	0.350	5.00	2.50	4.38	4	J2	OA12D0.5 OA15D0.5	$119.00
±12 ±15	11-13 14-16	1.1	0.900	0.750	5.00	3.12	4.37	5	A1	OA12D1.1 OA15D1.1	149.00
±12 ±15	11-13 14-16	3.7	3.5	3.0	5.00	5.25	6.00	11	C1	OA12D3.7 OA15D3.7	195.00

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JR SERIES

3 THROUGH 30 VOLTS, UP TO 10 AMPS

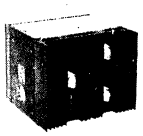
acdc POWER SUPPLIES

STOCK DELIVERY

Nominal Output Voltage (VDC)	Output Voltage Range* (VDC)	Maximum Current Rating (Amps)	Maximum Dimensions (inches) H	W	L	Weight approx. (lbs.)	Case Size	Model (Add —1 for Overvoltage Protection)	Quantity	Price (add $30 for OVP)
5	3.0 5.0 5.5 6.0	10 10 9 8	1.375	3.125	6.5	1.5	K1	JR5K10	1-9 10-24 25-49 50-99	$298 291 285 280
15	12 15 18	4.0 4.0 3.0	1.375	3.125	6.5	1.5	K1	JR15K4.0		
25	22 25 30	2.5 2.0 2.0	1.375	3.125	6.5	1.5	K1	JR25K2.0		

*Continuously adjustable

BX/BC SERIES



2 THROUGH 400 VOLTS, UP TO 20 AMPS

STOCK DELIVERY

Nominal Output Voltage (VDC)	Maximum Current Rating (Amps) at 71°C	BX series 0.01% regulation Max Dimensions (inches) H	W	L	Wt. (lbs.)	Case Size	Model (Add —1 for Overvoltage Protection)	Price	BC series 0.5% regulation Max Dimensions (inches) H	W	L	Wt. (lbs.)	Case Size	Model (Add —1 for Overvoltage Protection)	Price
2 through 28 in even voltages	0.3	1.88	3.44	4.75	1.6	M1	BX2N0.3 through BX28N0.3	$ 76.00*	1.88	2.75	4.75	1.6	M1	BC2N0.3 through BC28N0.3	$ 73.00*
2 through 28 in even voltages	1.2	5.00	3.12	4.37	4	A1	BX2N1.2 through BX28N1.2	116.00*	5.00	3.12	4.37	4	A1	BC2N1.2 through BC28N1.2	111.00*
2 through 28 in even voltages	2.5	5.00	4.37	6.00	8	B1	BX2N2.5 through BX28N2.5	137.00*	5.00	4.37	6.00	8	B1	BC2N2.5 through BC28N2.5	132.00*
2 through 10 in even voltages	5.0	5.25	5.00	6.00	11	C1	BX2N5 through BX10N5	184.00**	5.00	6.87	6.00	14	D1	BC2N5 through BC28N5	178.00**
12 through 28 in even voltages		5.00	6.87	6.00	14	D1	BX12N5 through BX28N5								
2 through 6 in even voltages	10.0	6.50	6.62	8.25	18	E3	BX2N10 through BX6N10	274.00**	6.50	7.75	8.25	25	F2	BC2N10 through BC28N10	265.00**
8 through 28 in even voltages		6.50	7.75	8.25	25	F2	BX8N10 through BX28N10								
2 through 14 in even voltages	20.00	6.75	8.00	15.00	42	G1	BX2N20 through BX14N20	395.00**	6.75	9.75	15.00	46	H1	BC2N20 through BC28N20	384.00**
16 through 28 in even voltages		6.75	9.75	15.00	46	H1	BX16N20 through BX28N20								

All models adjustable ±1 volt from nominal

*Add $20 for OVP **Add $30 for OVP

30 to 400VDC Modules — Both the BC (0.5% regulation) and the BX series (0.01% regulation) are offered in 22 voltage ranges to meet 30 to 400VDC precision requirements. The 11 ranges from 30 to 50VDC are available with 0.3, 1.2, 2.5, and 5.0A current ratings. Those from 60 to 100VDC are made with 0.1, 0.4, 0.6, and 1.2A ratings. An additional 0.2A rating is offered in the 100VDC range. The 150, 200, 250, 300, 350, and 400VDC range modules are rated 0.1, 0.2, 0.4, and 0.6A. Prices range from $82.00 to $282.00.

Dual Output Modules — ACDC's BX and BC series are also available to meet dual output requirements, in 25 ranges from ±2 to ±50VDC. Each range is offered in four current ratings from 300mA to 2.5A. From $154.00 to $275.00.

acdc electronics inc. Oceanside Industrial Center, Oceanside, California 92054 (714) 757-1880 TWX: 910-322-1470

RACK MOUNTING CAPABILITY

acdc
POWER SUPPLIES

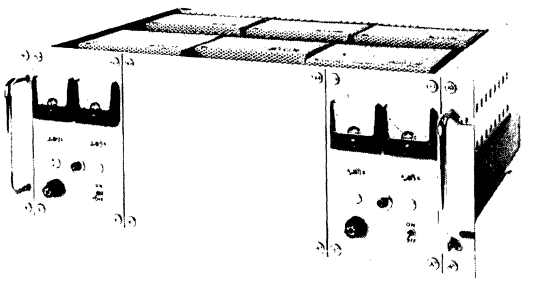
Universal 19″ rack adapters are available for mounting any ACDC power supply module. There are no holes to drill — just assemble the power supply mounting plates with the hardware furnished with each rack adapter.

The chassis is cadmium plated and the rear panel is prepunched for eight and ten terminal barrier strips to which cabling can be terminated.

A variety of front panels are also available. Blank panels, metered panels and switch panels are furnished in grey enamel. The 3½″ metered panels have two 1½″ meters for monitoring voltage and current, and the 5¼″ and 7″ panels are also equipped with two selector switches so that two outputs can be monitored. Switch panels contain a line switch, red pilot light and fuse holder.

When ordering, specify the desired rack adapter and power supply modules that will be mounted in the assembly. (We will then provide you with the required special hardware and installation drawing free with your order.) Then choose the front panels you need, a set of slides, and your ACDC rack mounted power supply assembly is complete!

The following chart lists the cases that can be accommodated in each rack adapter. Contact your ACDC representative or the factory for the exact total module capacity once the required combination is chosen.



ACDC Rack Assemblies will accept all of the new OEM series modules.

	3.50″ rack will accommodate A1, J1, J2, M1, K1, R1, R2		5.25″ rack will accommodate all the models listed for the 3.50″ rack plus B1, C1, D1, L1, N1, P1, R3, R4, R5		7.00″ rack will accommodate all the models listed for the 3.50″ rack and the 5.25″ rack plus E3, F2, G1, H1	
BASIC RACK ADAPTER 14″	RA3X14	$50.00	RA5X14	$50.00	RA7X14	$55.00
BASIC RACK ADAPTER 21″	RA3X21	60.00	RA5X21	60.00	RA7X21	65.00
BLANK FRONT PANEL (FULL)	RP3XF	9.00	RP5XF	9.00	RP7XF	9.50
BLANK FRONT PANEL ¾	RP3X3	8.00	RP5X3	8.00	RP7X3	8.50
BLANK FRONT PANEL ½	RP3X2	6.50	RP5X2	6.50	RP7X2	7.00
BLANK FRONT PANEL ¼	RP3X1	5.00	RP5X1	5.00	RP7X1	5.50
BARRIER STRIP 8 TERMS	RH8		$ 1.90			
BARRIER STRIP 10 TERMS	RH10		1.90			
CURRENT SHUNT (SPECIFY)	RT (AMPS)		15.00			
CHASSIS SLIDES FOR 14″	RS1X14		48.00 per pair			
CHASSIS SLIDES FOR 21″	RS1X21		52.00 per pair			

Voltmeters are readily available with the following full scale ranges: 10v, 30v, 50v, 100v, 500v. (Other ranges on special order)

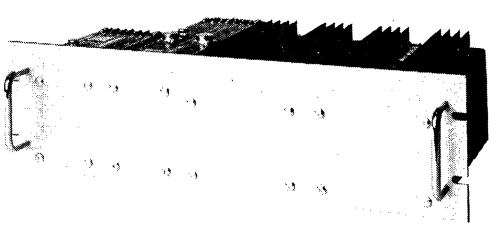
Ammeters are readily available with the following full scale ranges: .25A, .5A, 1A, 3A, 5A, 10A.

Ammeters that require a shunt are also available for the following ranges: 15A, 25A, 50A, 100A, 150A.

All applications where a single ammeter monitors 2 outputs requires one meter and 2 shunts.

Refer to the ACDC Catalog #371 or consult factory for additional ordering information.

PANEL MOUNTING CAPABILITY



A simple and economical way to rack mount ACDC's modular power supplies. It is ideally suited for mounting the OEM Series where the weight is carried close to the panel, and the barrier strip projects toward the rear for easy wiring into other rack drawers.

Standard panels are funished in 18 Ga Steel (.119) cadmium plated and painted light grey. Handles are 5/16″ round brass, nickel plated. You may order panels with handles either blank, or drilled to mount ACDC power supply modules, or custom drilled to your specifications. Complete assemblies with power supply modules mounted and wired can also be furnished.

Pick out the ACDC power supply modules you need and we'll show you the panel configuration that meets your requirements.

Panel size	Blank Panel Model Number	Blank Panel Price	Custom Drilled Panel Model Number*	Custom Drilled Panel Price
3½″x19″	PM-3	$9.60	PM-3X- _____	Depends on required hole pattern
5¼″x19″	PM-5	$10.80	PM-5X- _____	
7″x19″	PM-7	$12.60	PM-7X- _____	

The picture shows one R1, and R2 and two R3 OEM supplies mounted in a 5¼″ rack. Consult ACDC for a full list of the many other combinations of OEM supplies that can be mounted in standard panels.

*add description, drawing, or previously 5 digit number assigned ACDC. Consult ACDC for detailed mounting information for your choice of power supply modules. We will provide part numbers, price and delivery.

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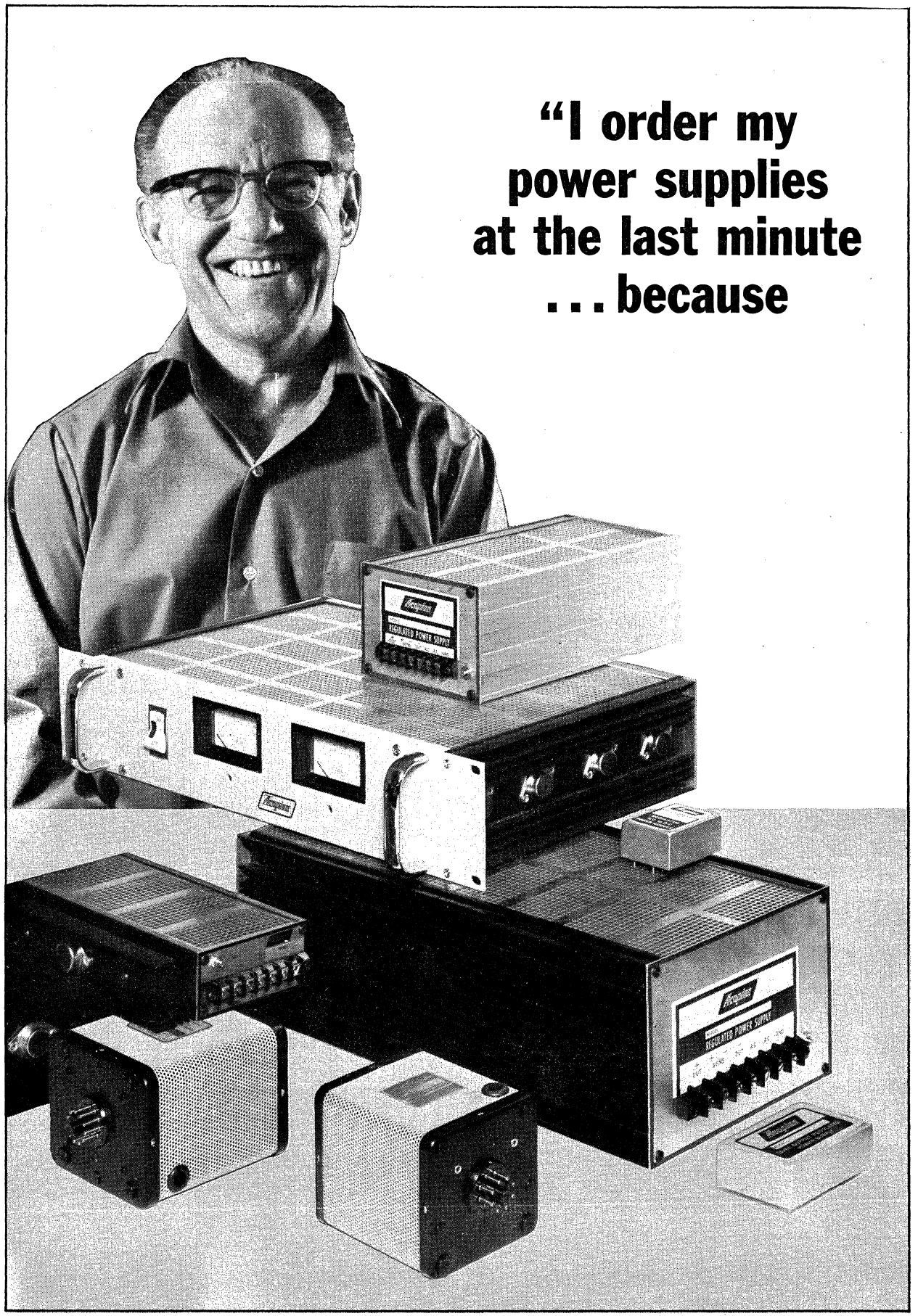
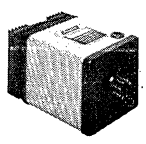

"I order my
power supplies
at the last minute
... because
REGULATED POWER SUPPLY
REGULATED POWER SUPPLY

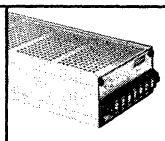
Acopian always ships them *in just 3 days!"*

With Acopian, you can wait until the last minute... until you're sure of your exact power needs. Because your power supply order, for any of the 92,000 different models listed in our 1971 catalog, will be shipped to you in just 3 days. We guarantee it.

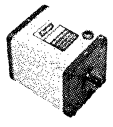
ACOPIAN CAN PROVIDE YOU WITH:



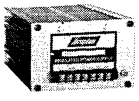
Plug-In Power Supplies with either single or dual outputs, for industrial or MIL applications.



Low Profile Power Supplies with high performance characteristics.

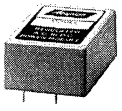


High Isolation Power Supplies for powering strain gage or transducer bridges.



Barrier Strip Power Supplies, both regulated and unregulated, with current ratings to 32 amperes. Unregulated models also available.

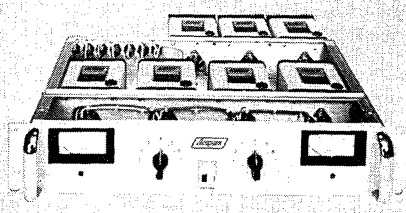
Unregulated Power Supplies for lamps, relays, NIXIE tubes – fixed and adjustable, to 900 volts.



Miniature Power Supplies with a wide range of single and dual outputs, for soldering directly to p-c boards.

To order Acopian power supplies, or to obtain your 1971 Acopian catalog, contact your local Acopian representative or write: Acopian Corp., Easton, Pa. 18042. Telephone: (215) 258-5441. And remember, every Acopian power supply is shipped with this tag...

SPECIAL MULTI-OUTPUT POWER SYSTEMS



Need a special multiple output power system? Just call the Acopian Power System Hotline – (215) 258-5441. We'll work out your design with you and quote a firm price, on the phone. Then we'll ship your power system, completely wired and tested, in just 9 days. You'll get the same high quality and fine workmanship that made Acopian the leading supplier of power modules.

Call for full information:

MAINE, N.H., VT., CONN. (EXCEPT FAIRFIELD CO.), MASS., R.I.
Measurement Equipment Co.
591 North Ave., Wakefield, Mass. 01880
Tel: (617) 245-4870
P.O. Box 8192, E. Hartford, Conn. 06108
Tel: (203) 528-8192

NEW YORK STATE (EXCEPT METRO)
L-Tron Corp.
P.O. Box 147, Skaneateles, N.Y. 13152
Tel: (315) 685-6172
P.O. Box 114, Latham, N.Y. 12110
Tel: (518) 785-5032
140 Keller St., Rochester, N.Y. 14609
Tel: (716) 436-4410

METRO N.Y., LONG ISLAND, N.J. (NORTH), FAIRFIELD CO., CONN.
J. N. Sweeney & Co., Inc.
#5 Fox Meadow Court, Woodbury, N.Y. 11797
Tel: (516) 692-4222

METRO PHILA., N.J. (SOUTH), DELAWARE
Martin Electric Co.
118 Valley Road, Ardmore, Pa. 19003
Tel: (215) 649-6332

PENNA. (EAST)
Beil & Whitaker, Inc.
3623 Jacksonwald Ave.
Reading, Pa. 19606
Tel: (215) 779-2610
5610 Akron Drive, Harrisburg, Pa. 17109
Tel: (717) 652-0184
849 W. Foxcroft Dr., Camp Hill, Pa. 17011
Tel: (717) 233-1254

PENNA. (WEST), OHIO, KENTUCKY, MICHIGAN
J. C. Hofstetter Co.
3300 S. Dixie Dr., Dayton, Ohio 45439
Tel: (513) 298-0662
5168 Valley View Dr., Medina, Ohio 44256
Tel: (216) 241-4880
700 Maple East, Birmingham, Michigan 48011
176 Reed Dr., Pittsburgh, Pa. 15205

MD., VA., W.VA., WASH., D.C.
Doss Electronics Inc.
6660 Security Blvd., Baltimore, Md. 21207
Tel: (301) 944-1900

N.C., S.C., TENN.
Jake Rudisill Associates, Inc.
1225 Harding Pl., Charlotte, N.C. 28204
Tel: (704) 377-6901

FLA., GA., ALA., MISS., LA. (EAST FROM VIDALIA TO FRANKLIN)
Gentry Associates, Inc.
550 N. Bumby Ave., Orlando, Fla. 32803
Tel: (305) 841-7740
P.O. Box 13513, Sta. K
Atlanta, Georgia 30324
Tel: (404) 233-3816
Room 422, 2109 W. Clinton Ave.
Huntsville, Alabama 35805
Tel: (205) 534-9771 or 536-5306

IND., ILL. (NORTH), WISC.
Potter-Mac Co.
6778 Northwest Hwy., Chicago, Ill. 60631
Tel: (312) 775-6626

MINN., N.D., S.D.
Kirkeby & Associates, Inc.
621 Second Ave. N., Minn., Minn. 55405
Tel: (612) 377-3239

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Maury E. Bettis Co.
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Shawnee Mission, Kansas 66202
Tel: (913) 362-0772
423 N. Fountain, Wichita, Kansas 67208
Tel: (316) MU5-7441
9103 Bessemer, St. Louis, Mo. 63134
Tel: (314) HA9-2099

COLO., UTAH, N.MEX., ARIZ., IDAHO (SOUTH), MONT. (EAST), EL PASO CTY., TEXAS
Compar Rocky Mountain
P.O. Box 1607, Scottsdale, Ariz. 85252
Tel: (602) 947-4336
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Denver, Colo. 80222
Tel: (303) 757-7621
2125 San Mateo Blvd. N.E.
Albuquerque, N.M. 87110
Tel: (505) 265-1020

CALIFORNIA (SOUTH), NEVADA
Product Data Company
3760 Orange Ave., Long Beach, Calif. 90807
Tel: (213) 595-1777
10457 Roselle St., San Diego, Calif. 92121

CALIFORNIA (NORTH)
Held & Mollard, Inc.
175 So. San Antonio Rd., Suite 218
Los Altos, California 94022
Tel: (415) 941-6041

TEXAS (EXCLUDING EL PASO CTY.), OKLA., ARKANSAS, LOUISIANA (WEST FROM VIDALIA TO FRANKLIN)
Norvell Associates, Inc.
10210 Monroe, Dallas, Texas 75229
Tel: (214) 357-6451
6440 Hillcroft, Houston, Texas 77036
Tel: (713) 774-2568

WASHINGTON AND OREGON
Datacom Associates
2207 Fairview East, No. 12
Seattle, Washington 98102
Tel: (206) 329-2989

PUERTO RICO, VIRGIN ISLANDS, TRINIDAD, BARBADOS, JAMAICA, LESS ANTILLES, DOM. REP.
Southern International Sales Corp.
GPO Box 1896, San Juan, P.R. 00936
Tel: (804) 724-0600

CANADA
Ahearn & Soper Ltd.
844 Caledonia Road, Toronto 19, Ont., Canada
Tel: (416) RU9-4325

A-MP* SOLID STATE HIGH VOLTAGE POWER CONVERSION

FOR COMMERCIAL AND MILITARY APPLICATIONS

The CAPITRON Division of AMP Incorporated has complete in-house facilities for designing and manufacturing power assemblies, including metal forming, printed circuit board fabrication, magnetics winding, encapsulating, and environmental testing. In addition, the use of AMPLIFILM* capacitor products enables CAPITRON engineers to design higher power into smaller packages for both military and commercial applications.

Solid state and conventional units are characterized by tight regulation, low ripple voltage, and dense, rugged construction. All are pre-engineered to specific customer requirements.

The rack and panel mounted multiple output supply shown is intended for use in normal office environments. All output voltages and current are read from a single panel meter. All voltages are short-circuit proof and a system malfunction will turn off the 17 KV output until it is reset.

A unique feature is the operation of the "power present" indicators: Low input line voltage turns off logic circuits, all supplies and indicators; high output voltage from any supply turns off logic, but not output power; overcurrent from any supply turns off its logic and its indicator.

SPECIFICATIONS:

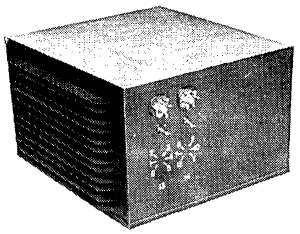
Adjustable outputs	17 KV, 1 KV
Fixed output	400 V
Current ranges	0.1 to 1 ma
Regulation	.01% to 1%
Ripple	.05%

Also available are special purpose power supplies for CRT, Energy Storage, Laser, Traveling Wave Tube and Programmable applications. The CAPITRON Division is equipped to satisfy special design requirements on short notice.

*Trademark of AMP Incorporated

MORE POWER TO

LOW VOLTAGE POWER SUPPLIES



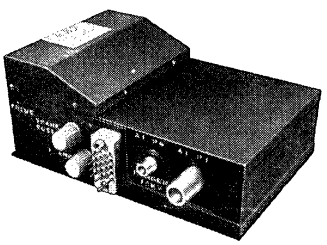
A typical multiple output type, this unit is not only short circuit proof between any output and ground, and between all outputs, but provides automatic over-voltage / undervoltage shutdown and output current limitation to 150% of rated value. All outputs are isolated with respect to the input, and the unit meets RFI requirements of MIL-I-6181.

Input: 20-29 VDC
Outputs:
300 VDC ±2% @ 70 ma.
250 VDC ±2% @ 150 ma.
55 VDC ±2% @ 220 ma.
22 VDC ±2% @ 800 ma.
6 VDC ±2% @ 10 ma.
−0.5 VDC nom. @ 10 ma.
(ext. adj. from +.0.2 to −1.4 VDC)
−20 VDC ±2% @ 25 ma.
−150 VDC ±2% @ 180 ma.

Regulation:
±1.0% line and load
Ripple: 0.017% pk-pk
Altitude:
10,000 ft. (operational)
Temperature:
−54° to +55° C
Shock Vibration:
MIL-E-5400
Size: 8″ x 8″ x 5″
Weight: 19 lb. max.

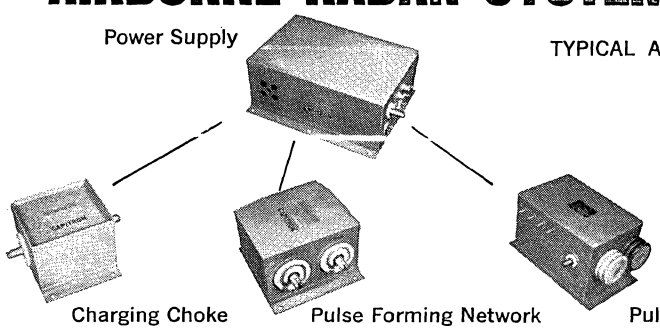
HEADS-UP CRT POWER SUPPLIES

Ripple: .05%
Regulation: ±0.1%
Volume: less than 50 cu. in.
Weight: 3¼ lbs.
Temperature:
−55°C to 110°C
MIL-E-5400



Input: 115 V, 400 cps MIL-STD-704
Outputs:
15 KVDC, 400 μa pk.
1.7 KV (adj. 1.4 to 2.0 KV), +30 μa to −30 μa
300 VDC, +15 μa to −15 μa

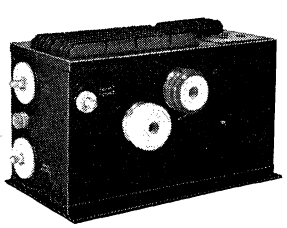
AIRBORNE RADAR SYSTEMS AND COMPONENTS



TYPICAL AIRBORNE RADAR POWER CONVERSION SYSTEM

A compact 4-module pulse system with extremely good heat sinking and klystron filament voltage regulation between 7.35 and 7.75 volts at 2 to 2½ amps. Maximum pulse ripple is only 1.0%. The largest unit is approximately ½ cu. ft. in size and weighs less than 12 lbs.

Pulse Modulator for Airborne Radar



This oil-filled pulse modulator is designed to drive the V-24 klystron family. Offering maximum power (300 KW peak) for minimum size, it has excellent square wave characteristics, providing pulses of long duration for the required repetition rate. A unique heat sinking technique effectively removes 400 watts of heat, permitting operation at 107°C ambient temperature. The package also supplies klystron input voltage variation tightly regulated to 9 +.5V/−0V with variations in temperature from −7 to 107°C, filament power from 107.5 to 119.5 volts, load current from 2 to 2.5 amps, and input frequency from 380 to 420 cps.

Performance Specifications
Input: 5 KVDC ±.25 KVDC @ 510 ma.
Output: 40 KV @ 7½ amps. 1800 pps for search followed by 2235 pps. for indefinite duration
Pulse: 2.1 μsec. read at 100% amplitude; 0.5 μsec. rise time; 0.9 μsec. fall time; 1.5% max. ripple; 10% max. backswing
Ambient Temperature: −7° C to +107° C (operational); −60° C to 121° C (storage)
Size: 10¼″ x 4¾″ x 5⅞″
Weight: 26 lbs. max.

YOU, FROM

CAPITRON DIVISION, AMP INCORPORATED
155 PARK STREET, ELIZABETHTOWN, PA. 17022.
TWX: 510-657-4561 • PHONE: 717-367-1105.

AMP INCORPORATED

NOTE: See other CAPITRON High Voltage products under Catalog Sections 2100 and 1500.

AC-DC REGULATED CONVERTER

115 VAC 50-500 Hz to single or multiple DC Outputs

ARNOLD
MAGNETICS CORPORATION

FEATURES:

- MINIATURE SIZE
- LIGHT WEIGHT
- WIDE OUTPUT VOLTAGE CHOICE
- MULTIPLE OUTPUTS STANDARD
- FULLY ENCAPSULATED
- MEETS MIL-E-5272C
- SHORT CIRCUIT & TRANSIENT PROTECTED

SPECIFICATIONS:

INPUT: 108 - 130 VRMS, 1ϕ, 50-500 Hz

OUTPUT: 3 VDC through 2000 VDC, 30 Amps and below up to four outputs

OUTPUT REGULATION AND RIPPLE: See Notes 1 and 2

OPERATING TEMPERATURE: −10° to 71°C at case

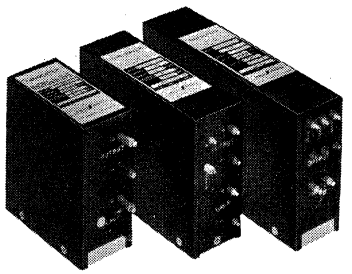
COOLING: Primary cooling by conduction through base plate

ENVIRONMENTAL: Per MIL-E-5272C

EMI/RFI: Filtering in all models

OPTIONS: (See Table I)

A — REMOTE EXTERNAL VOLTAGE ADJUSTMENT
CT — CENTER TAP OUPUT
E — INPUT VOLTAGE ALTERATION
G — FLEXIBLE LEADS
I — RFI QUALIFIED (MIL-I-6181D CERTIFICATION)
S — SHORT TERMINALS
V — "CROWBAR" OVERVOLTAGE PROTECTION



SINGLE OUTPUT MODELS

Output Voltage (Volts)	Output Current (Amps)	Notes	Case Size (See table II)	Model Number	Price (1 pc)
2	5.00	(1) LED	A	PHU-2	$220
3	5.00	(1)	A	PHU-3	220
5	5.00	(1) Logic Power	A	PHU-5	220
5	7.00	(2) Logic Power	B	PIB-5	260
5	10.00	(1) LED Display	C	PHO-5	280
5	15.00	(1) Logic Power	P	MAP-5	355
6	5.00	(1) Filament Power	A	PHU-6	220
10	4.00	(1)	A	PHU-10	235
12	3.30	(1) MOS	A	PHU-12	235
12	6.60	(1)	C	PHO-12	295
12	12.00	(1) High Freq. Mag. Amp.	P	MAP-12	355
15	2.00	(2) OP AMP, Tight Reg.	B	PIB-15	260
15	2.60	(1)	A	PHU-15	235
15	5.20	(1) OP AMP	C	PHO-15	295
15	10.00	(1)	P	MAP-15	355
18	2.20	(1)	A	PHU-18	235
22	1.80	(1)	A	PHU-22	235
24	1.40	(2) Tight Reg.	B	PIB-24	260
24	1.60	(1) MOS	A	PHU-24	235
24	3.20	(1)	C	PHO-24	295
24	6.00	(1) High Eff. Mag. Amp.	P	MAP-24	430

Output Voltage (Volts)	Output Current (Amps)	Notes	Case Size (See table II)	Model Number	Price (1 pc)
28	1.40	(1) MOS	A	PHU-28	$235
28	2.80	(1)	C	PHO-28	295
28	5.20	(1) 28 VDC	P	MAP-28	355
30	1.00	(2) Analog Amp. Tight Reg.	B	PIB-30	260
30	1.30	(1)	A	PHU-30	230
30	2.60	(1)	C	PHO-30	295
30	5.00	(1)	P	MAP-30	355
50	0.80	(1)	A	PHU-50	235
50	2.40	(1)	D	PHP-50	355
100	0.30	(2) Vacuum Tubes, Tight Reg.	B	PIB-100	285
100	0.40	(1)	A	PHU-100	235
180	0.20	(2) Display, Tight Reg.	B	PIB-180	285
200	0.20	(1) Display	A	PHU-200	235
300	0.13	(1) Vacuum Tubes	A	PHU-300	235
300	0.26	(1)	C	PHO-300	295
500	0.08	(1	A	PHU-500	235
750	0.05	(1)	A	PHU-750	235
1000	0.03	(1)	A	PHU-1000	245
1500	0.01	(1)	A	PHU-1500	350
2000	0.01	(1) Laser Power	A	PHU-2000	350

MULTIPLE OUTPUT MODELS

Output Voltage (Volts)	Output Current (Amps)	Notes	Case Size (See table II)	Model Number	Price (1 pc)
15 5	1.00 3.00	(2) Tight Reg.	C	PIG-15-5	$310
15 5	1.00 2.50	(1)	A	PHU-15-5	265
15 −15	1.00 1.00	(2) Op Amp, Tight Reg.	C	PIG-30-CT	310
15 −15	1.30 1.30	(1) Op Amp, Small Size	A	PHU-30 CT	265
15 −15	2.60 2.60	(1)	C	PHO-30 CT	325
−24 −12	0.80 1.50	(1) MOS	A	PHU-24-15	265
−24 −12	1.60 3.00	(1)	C	PHO-24-15	325
28 5	0.50 3.00	(2) Memory System Power	B	PIG-28-5	310
28 5	1.00 5.00	(1)	C	PHO-28-5	325
180 5	0.10 3.00	(1) Display & Logic Power	A	PHU-180-5	265
180 5	0.20 5.00	(1)	C	PHO-180-5	325
15 −15 5	0.50 0.50 2.00	(1) Op Amp & Logic	A	PHU-30CT-5	315
15 −15 5	0.50 0.50 4.00	(2) Op Amp and Logic Tight Regulation	C	PIL-30CT-5	360

Output Voltage (Volts)	Output Current (Amps)	Notes	Case Size (See table II)	Model Number	Price (1 pc)
−24 −14 5	0.50 0.50 3.00	(2) MOS and Logic	C	PIL-24-15-5	$360
180 15 −15	0.03 0.30 0.30	(1) Display & Op Amp	A	PHU-180-30CT	315
180 15 −15	0.05 0.60 0.60	(2) Display & Op Amp Tight Regulation	C	PIL-180-30CT	360
180 15 −15	0.05 0.60 0.60	(2) Display & Op Amp Tight Regulation	C	PIL-180-30CT	360
750 150 5	0.01 0.10 1.00	(1) Vacuum Tubes and Logic	A	PHU-750-150-5	355
15 −15 5 −5	0.30 0.30 1.00 1.00	(1) Op Amp & Logic	A	PHU-30CT-10CT	355
−24 15 −15 5	0.10 0.30 0.30 2.00	(1) MOS, Op Amp and Logic	A	PHU-24-30CT-5	355
180 15 −15 5	0.03 0.30 0.30 2.00	(1) Display, Op Amp and Logic	A	PHU-180-30CT-5	355

HOW TO ORDER:

1. Standard models: Use model numbers listed. Add option letters as required per Table I.
2. Special models: Use three letter model number followed by voltage (volts)/current (amps). Use standard model of highest voltage for output power rating and price.

EXAMPLE: PHU-5.5V/5 has output of 5.5 VDC at 5 amps. "Crowbar" overvoltage option is included. Price in 1 pc. quantity $220.00 plus $35.00 for crowbar option.

NOTES:

(1) Load Reg. (½ FL-FL) 2% Max., Line Reg. .3%, adjust ±5% of nominal output, ripple .3%. Options Available: A, CT, E, F, G, I, L, R, S, V, WW.

(2) Load Reg. (NL-FL) .05% Max., Line Reg., .05% Max., ripple .2%. Options Available: A, E, F, G, S, V.

ARNOLD MAGNETICS

ARNOLD MAGNETICS CORPORATION

P.O. Box K • Culver City, California 90230
Phone: (213) 870-7014 • TWX 910-343-6468

AC-DC REGULATED POWER SUPPLIES

115 VAC 50-500 Hz to single and dual DC Outputs

ARNOLD
MAGNETICS CORPORATION

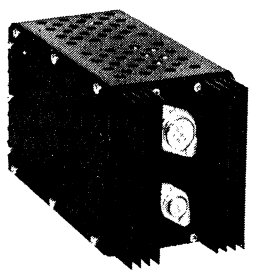
FEATURES: • COMPACT SIZE • LOW COST • "CROWBAR" OVERVOLTAGE PROTECTION • AUTOMATIC CURRENT LIMITING • LOGIC CONTROL TURN ON/OFF OPTION • OUTPUT VOLTAGE STATUS LOGIC SIGNAL OPTION • EXTENDED TEMPERATURE RANGE OPTION

SPECIFICATIONS:

INPUT: 105 - 130 VRMS, 1ϕ, 57-500 Hz. Derate output current 12% for 47-500 Hz operation.
OUTPUT: ????
VOLTAGE RANGE: 3.6 VDC through 200 VDC, Adjustable ±5% of nominal regulation
REGULATION:
LINE: ±.05% (105 - 130 VRMS)
LOAD: ±.05% (NL-FL)
TEMP. COEFFICIENT: .015%/°C
RIPPLE & NOISE: 0.5% VRMS Max.
OVERVOLTAGE PROTECTION: "Crowbar" type set to trip at 130% Max. of nominal output. See Table I for other settings
REMOTE SENSING: 5% Range on nominal output
OPERATING TEMPERATURE: −10°C to +90°C (71°C derate current 50%)
COOLING: Primary cooling by convection through heat radiator

OPTIONS: (See Table I)

A — REMOTE EXTERNAL VOLTAGE ADJUSTMENT
CT — CENTER TAP OUTPUT
E — INPUT VOLTAGE ALTERATION
J — OUTPUT VOLTAGE STATUS LOGIC SIGNAL PROVIDES LOGIC SIGNAL WHEN OUTPUT REACHES MINIMUM VOLTAGE. TRIP POINT ADJUSTABLE ±5% OF NOMINAL OUTPUT VOLTAGE ON: +4.0 to +5.5 VDC. OFF: 0 to +0.5 VDC. TO SPECIFY ADD "J" TO MODEL NUMBER AND $25.00 TO BASE PRICE.
T — LOGIC CONTROL TURN ON/OFF (COMMON TO $-E_o$) TURN ON: 0 to +0.5 VDC. TURN OFF: +1.5 to +5.0 VDC.



SINGLE OUTPUT MODELS

Output Voltage (Volts)	Output Current (Amps)	Notes	Case Size (See table II)	Model Number	Price (1 pc)
3.6	1.00	Low-Voltage Logic	R	POC-3.6	$ 80
3.6	2.50	LED Power	S	POE-3.6	100
3.6	5.00		T	POG-3.6	135
3.6	10.00		U	POI-3.6	185
3.6	20.00		V	POK-3.6	250
5	0.50		O	PCA-5	89
5	1.00	Logic Power	R	POC-5	80
5	2.50	LED Display Power	S	POE-5	100
5	5.00		T	POG-5	135
5	10.00		U	POI-5	185
5	20.00		V	POK-5	250
6	0.90	Linear Amp Power	R	POC-5	80
6	2.20		S	POE-5	100
6	4.40		T	POG-5	135
6	9.00		U	POI-5	185
6	17.00		V	POK-5	250
12	0.50	MOS Power	R	POC-12	80
12	1.40	Linear Amp Power	S	POE-12	100
12	2.70	Relay Power	T	POG-12	135
12	5.50		U	POI-12	185
12	11.00		V	POK-12	250
15	0.50	Op Amp Power	R	POC-15	80
15	1.20	Linear Amp Power	S	POE-15	100

Output Voltage (Volts)	Output Current (Amps)	Notes	Case Size (See table II)	Model Number	Price (1 pc)
15	2.40		T	POG-15	$135
15	4.50		U	POI-15	185
15	9.00		V	POK-15	250
18	0.40	Linear Amp Power	R	POC-18	80
18	1.00		S	POE-18	100
18	2.00		T	POG-18	135
18	3.70		U	POI-18	185
18	7.60		V	POK-18	250
24	0.30	MOS Power	R	POC-24	80
24	0.70	Linear Amp Power	S	POE-24	100
24	1.50		T	POG-24	135
24	3.00	24 VDC	U	POI-24	185
24	6.00		V	POK-24	250
28	0.30	Linear Amp Power	R	POC-28	80
28	0.70	MOS Power	S	POE-28	100
28	1.30	Relay Power	T	POG-28	135
28	2.50		U	POI-28	185
28	5.20		V	POK-28	250
30	0.10	Linear Amp Power	O	PCA-30	89
180	0.30	Display Tube Power	R	POC-180	96
180	0.10	Vacuum Tube Power	S	POE-180	120
180	0.18		T	POG-180	210

MULTIPLE OUTPUT MODELS

Output Voltage (Volts)	Output Current (Amps)	Notes	Case Size (See table II)	Model Number	Price (1 pc)
5 5	0.50 0.50	Dual Isolated Outputs	R	POC-5-5	$105
5 5	2.00 2.00	Dual Isolated Outputs	T	POG-5-5	160
5 5	4.00 4.00	Dual Isolated Outputs	U	POI-5-5	210
15 −15	0.10 0.10	Op Amp Power	O	PCA-30CT	110
15 −15	0.20 0.20	Op Amp Power	R	POC-30CT	105
15 −15	0.50 0.50	Op Amp Power	S	POE-30CT	125
15 −15	1.00 1.00	Op Amp Power	T	POG-30CT	160
15 −15	2.00 2.00	Op Amp Power	U	POI-30CT	210
15 −15	4.00 4.00	Op Amp Power	V	POK-30CT	275
28 5	0.05 0.20	Linear Amp and Logic Power	O	PCA-28-5	110

Output Voltage (Volts)	Output Current (Amps)	Notes	Case Size (See table II)	Model Number	Price (1 pc)
28 5	0.10 0.40	Linear Amp and Logic Power	R	POC-28-5	$105
28 5	0.20 1.00	Linear Amp and Logic Power	S	POE-28-5	125
28 5	0.50 4.00	Linear Amp and Logic Power	T	POG-28-5	160
28 5	1.00 5.00	Linear Amp Logic Power	U	POI-28-5	210
28 5	2.00 10.00	Power Amp and Logic Power	V	POK-28-5	275
−28 −14	0.04 0.06	MOS Power	O	PCA-28-14	110
180 5	0.02 0.10	Display and Logic Power	R	POC-180-5	125
180 5	0.04 0.50	Display and Logic Power	S	POE-180-5	145
180 5	0.10 1.00	Display and Logic Power	T	POG-180-5	180
180 5	0.10 5.00	Display and Logic Power	U	POI-180-5	230

HOW TO ORDER: 1. Standard models: Use model numbers listed. Add option letters as required.
2. Special models: Consult factory. Models available with up to 6 outputs.

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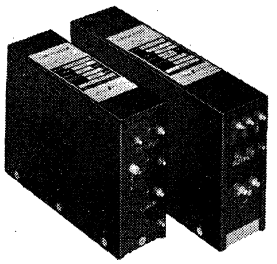
AC-DC REGULATED POWER SUPPLIES

115 VAC 400 Hz to single or multiple DC Outputs

ARNOLD
MAGNETICS CORPORATION

FEATURES: • EMI/RFI FREE • TIGHT REGULATION • SMALL SIZE • SHORT CIRCUIT & TRANSIENT PROTECTED • FULLY ENCAPSULATED • MULTIPLE OUTPUT STANDARD • MIL-STD-704 POWER INPUT



SPECIFICATIONS:
INPUT: 105 - 125 VAC, 1ϕ, 380 to 420 Hz.
OUTPUT: Up to three outputs. 3 VDC to 200 VDC set to ±2% of nominal voltage.
REGULATION:
LINE: ±.02% (105-125 VRMS)
LOAD: ±.05% (NL-FL)
TEMP. COEFFICIENT: −.15%/°C
RIPPLE: .1% or 2 MV Min.
SHORT CIRCUIT PROTECTED.

OPERATING TEMPERATURE: −10°C to +85°C at case.
COOLING: Primary cooling by conduction through base plate.

OPTIONS: (See Table I)
A — REMOTE EXTERNAL VOLTAGE ADJUSTMENT
E — INPUT VOLTAGE ALTERATION
G — FLEXIBLE LEADS
S — SHORT TERMINALS
V — "CROWBAR" OVERVOLTAGE PROTECTION

SINGLE OUTPUT MODELS

Output Voltage (Volts)	Output Current (Amps)	Notes	Case Size (See table II)	Model Number	Price (1 pc)
3	7.00		E	PEB-3	$195
5	1.00	Hermetic Case	O	PCM-5	89
5	2.50	Logic Power	A	PEA-5	165
5	7.00	Logic Power	E	PEB-5	195
5	12.00	Logic Power	F	PEC-5	255
6	1.00	Filament Power	O	PCM-6	89
10	0.50	Hermetic Case	O	PCM-10	89
12	0.50	MOS Power	O	PCM-12	89
12	1.00	Linear Amp Power	A	PEA-12	165
12	3.00	12 VDC	E	PEB-12	195
12	6.00		F	PEC-12	255
15	0.40	Op Amp Power	O	PCM-15	89
15	1.00	Op Amp Power	A	PEA-15	165
15	2.30	Op Amp Power	E	PEB-15	195
15	5.00	Op Amp Power	F	PEC-12	255
18	0.30	MOS Power	O	PCM-18	89
18	4.00		F	PEC-18	255
22	0.27	22 VDC	O	PCM-22	89
22	1.50	Linear Amp Power	E	PEB-22	195
24	0.25	MOS Power	O	PCM-24	89
24	0.60	MOS Power	A	PEA-24	165

Output Voltage (Volts)	Output Current (Amps)	Notes	Case Size (See table II)	Model Number	Price (1 pc)
24	1.40	24 VDC	E	PEB-24	$195
24	2.90		F	PEC-24	255
28	0.20	Clock Power	O	PCM-28	89
28	0.53	Linear Amp Power	A	PEA-28	165
28	1.20	28 VDC	E	PEB-28	195
28	2.50		F	PEC-28	255
30	0.20	Analog Power	O	PCM-30	89
30	0.50	30 VDC	A	PEA-30	165
30	1.10		E	PEB-30	195
30	2.30	Linear Amp Power	F	PEC-30	255
50	0.12	Bias Power	O	PCM-50	99
50	0.30		A	PEA-50	175
50	0.70	50 VDC	E	PEB-50	205
50	1.40		F	PEC-50	265
100	0.06	Vacuum Tube Power	O	PCM-100	99
100	0.15		A	PEA-100	175
100	0.35	100 VDC	E	PEB-100	205
100	0.70		F	PEC-100	265
200	0.03	Display Power	O	PCM-200	109
200	0.07		A	PEA-200	185
200	0.17	200 VDC	E	PEB-200	220
200	0.35	Vacuum Tube	F	PEC-200	275

MULTIPLE OUTPUT MODELS

12 5	0.10 0.80	Linear Amp and Logic	O	PCM-12-5	$110
12 5	1.00 4.00	Linear Amp and Logic	E	PEG-12-5	245
15 5	0.10 0.80	Linear Amp and Logic	O	PCM-15-5	110
15 5	1.00 4.00	Linear Amp and Logic	E	PEG-15-5	245
15 −15	0.20 0.20	Op Amp Power	O	PCM-30CT	110
15 −15	0.50 0.50	Op Amp Power	A	PEF-30CT	205
15 −15	1.10 1.10	Op Amp Power	E	PEG-30CT	245
15 −15	2.30 2.30	Op Amp Power	F	PEH-30CT	315
−24 −12	0.10 0.20	MOS Power	O	PCM-24-12	110
28 5	0.10 0.60	Comb. Logic Power	O	PCM-28-5	110
28 5	0.50 4.00	Linear Amp and Logic	E	PEG-28-5	245
28 5	1.00 7.00	Linear Amp and Logic	F	PEH-28-5	315

−28 −14	0.10 0.20	MOS Power	O	PCM-28-14	$110
48 5	1.00 4.00	Comb. Logic Power	F	PEH-48-5	315
180 5	0.03 1.50	Display and Logic Power	A	PEF-180-5	220
180 5	0.10 3.00	Display and Logic Power	E	PEG-180-5	270
180 5	0.20 6.00	Display and Logic Power	F	PEH-180-5	340
15 −15 5	0.20 0.20 1.50	Op Amp and Logic Power	B	PEK-30CT-5	245
15 −15 5	0.50 0.50 4.00	Op Amp and Logic Power	E	PEL-30CT-5	295
15 −15 5	1.00 1.00 6.00	Op Amp and Logic Power	F	PEM-30CT-5	375
−24 −14 5	0.50 0.50 3.00	MOS and Logic Power	E	PEL-24-14-5	295
180 28 5	0.05 0.50 2.00	Display, Linear Amp and Logic Power	E	PEL-180-28-5	320

HOW TO ORDER: 1. Standard models: Use model numbers listed. Add option letters as required per Table I.
2. Special models: Use three letter model number followed by voltage (volts)/current (amps). Use standard model of highest voltage for output power rating and price.
EXAMPLE: PEC-11/6 has output of 11 VDC at 6 amps with 1 pc. price of $255.00.

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Phone: (213) 870-7014 • TWX 910-343-6468

DC-DC REGULATED CONVERTERS

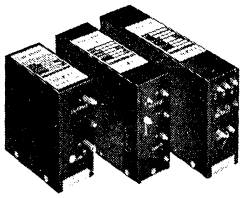
5, 12, 28, 48, or 115 VDC to single or multiple DC Outputs

ARNOLD
MAGNETICS CORPORATION

FEATURES:
- WIDE CHOICE OF INPUT VOLTAGE
- SMALL SIZE
- POLARITY REVERSAL PROTECTION
- EMI/RFI FILTERING
- HIGH RELIABILITY

SPECIFICATIONS:
See notes for individual model specifications.

OPTIONS: (See Table I)
A — REMOTE EXTERNAL VOLTAGE ADJUSTMENT
CT — CENTER TAP OUTPUT
E — INPUT VOLTAGE MODIFICATION
G — FLEXIBLE LEADS
V — "CROWBAR" OVERVOLTAGE PROTECTION



SINGLE OUTPUT MODELS 28 VDC TO DC REGULATED CONVERTERS

Output Voltage (VDC)	Output Current (Amps)	Output Line Reg.%	Output Load Reg.%	Output Ripple (%V RMS)	Notes	Case Size (See Table II)	Model Number	Price (1 pc)
2	0.75	0.3	2.0	0.3	(1) LED Power	M	SMU-.002	$200
3	0.75	0.3	2.0	0.3	(1)	M	SMU-.003	200
3	5.00	0.3	2.0	0.1	(2)	A	SHU-3	195
5	.50	0.3	2.0	0.3	(1) Logic Power	M	SMU-.005	190
5	.50	0.05	0.05	0.1	(3) Hermetic Seal	N	PCE-5	110
5	4.00	0.2	1.00	0.1	(5) Sw. Reg.	A	SEP-5	195
5	5.00	0.3	2.0	0.1	(2)	A	SHU-5	195
5	7.00	0.03	0.05	0.1	(3) Logic Power	B	STB-5	220
5	8.00	0.3	2.0	0.3	(2) Small Size	A	SHU-5 WW	265
5	8.00	0.3	2.0	0.1	(4) High Eff. 75%	W	SLA-5	295
5	10.00	0.3	2.0	0.1	(2) Logic Power	C	SHO-5	255
5	15.00	0.3	2.0	0.1	(4) High Eff. 70%	P	MAD-5	315
6	0.50	0.3	2.0	0.3	(1) Filament Power	M	SMU-.006	190
6	5.00	0.3	2.0	0.1	(2)	A	SHU-6	195
10	0.30	0.3	2.0	0.3	(1) 10 VDC	M	SMU-.010	185
10	4.00	0.3	2.0	0.1	(2)	A	SHU-10	195
12	0.25	0.3	2.0	0.3	(1)	M	SMU-.012	185
12	0.25	0.05	0.05	0.1	(3)	N	PCE-12	110
12	3.33	0.3	1.50	0.1	(2)	A	SHU-12	195
12	6.66	0.3	1.50	0.1	(2) 12 VDC	C	SHO-12	255
12	12.00	0.3	1.50	0.1	(4) Linear Amp	P	MAD-12	315
15	0.20	0.3	2.00	0.3	(1)	M	SMU-.015	180
15	0.20	0.05	0.05	0.1	(3) Hermetic Seal	N	PCE-15	$110
15	2.00	0.05	0.05	0.1	(3) Tight Reg.	B	STB-15	220
15	2.66	0.3	1.50	0.1	(2) Op Amp	A	SHU-15	195
15	3.00	0.2	1.00	0.1	(5) Sw. Reg.	A	SEP-15	195
15	3.50	0.3	1.50	0.1	(4) High Eff. 80%	W	SLA-15	295
15	5.30	0.3	1.50	0.1	(2) Op Amp	C	SHO-15	255
15	10.00	0.3	1.50	0.1	(4) High Eff.	P	MAD-15	315
24	0.12	0.05	0.05	0.1	(3) Tight Reg.	N	PCE-24	110
24	1.66	0.3	1.50	0.1	(2) 24 VDC	A	SHU-24	195
24	3.30	0.3	1.50	0.1	(2) Linear Amp	C	SHO-24	255
24	6.00	0.3	1.50	0.1	(4)	P	MAD-24	315
28	0.11	0.3	1.50	0.3	(1)	M	SMU-.028	180
28	1.42	0.3	1.50	0.1	(2) Power Amp	A	SHU-28	195
28	5.20	0.3	1.50	0.1	(4)	P	MAD-28	315
30	0.10	0.05	0.05	0.1	(3) MOS	N	PCE-30	110
30	1.20	0.05	0.05	0.1	(3) Tight Reg.	B	STB-30	220
30	1.34	0.3	1.50	0.1	(2)	A	SHU-30	195
30	1.60	0.3	1.50	0.1	(4) High Eff. 80%	W	SLA-30	295
30	2.68	0.3	1.50	0.1	(2) Linear Amp	C	SHO-30	255
30	5.00	0.3	1.50	0.1	(4) High Eff.	P	MAD-30	315
50	0.06	0.3	1.5	0.3	(1)	M	SMU-.050	180
50	0.80	0.3	1.5	0.1	(2)	A	SHU-50	195
100	0.03	0.3	1.5	0.3	(1) Vacuum Tubes	M	SMU-.100	$180
100	0.03	0.05	0.05	0.1	(3)	B	STB-100	245
100	0.40	0.3	1.5	0.1	(2)	A	SHU-100	200
150	0.02	0.3	1.5	0.3	(1)	M	SMU-.150	180
150	0.26	0.3	1.5	0.1	(2)	A	SHU-150	200
180	0.20	0.05	0.05	0.1	(3) Display Tubes	B	STB-180	245
180	0.44	0.3	1.5	0.1	(2)	C	SHO-180	260
250	0.16	0.3	1.5	0.1	(2) Vacuum Tubes	A	SHU-250	200
300	0.01	0.3	1.5	0.3	(1) Photo Diodes	M	SMU-.300	190
300	0.13	0.3	1.5	0.1	(2)	A	SHU-300	200
500	0.006	0.3	1.5	0.3	(1) Vacuum Tubes	M	SMU-.500	195
500	0.08	0.3	1.5	0.1	(2)	A	SHU-500	215
750	0.004	0.3	1.5	0.3	(1) Klystrons	M	SMU-.750	200
750	0.053	0.3	1.5	0.1	(2)	A	SHU-750	215
1000	0.003	0.3	1.5	0.3	(1) Photomultiplier	M	SMU-1	245
1000	0.040	0.3	1.5	0.1	(2)	A	SHU-1000	$230
1500	0.002	0.3	1.5	0.3	(1) BWO	M	SMU-1.5	250
1500	0.026	0.3	1.5	0.1	(2)	A	SHU-1500	260
2000	0.0015	0.3	1.5	0.3	(1) TWT	M	SMU-2	260
2000	0.020	0.3	1.5	0.1	(2)	A	SHU-2000	305
2500	0.0012	0.3	2.0	0.3	(1) CRT	M	SMU-2.5	270
2500	0.016	0.3	2.0	0.1	(2) Laser Power	A	SHU-2500	330
3000	0.001	0.3	2.0	0.3	(1) ION Pump	M	SMU-3	330
3000	0.013	0.3	2.0	0.1	(2)	A	SHU-3000	345
3500	0.0008	0.3	2.0	0.3	(1) CRT	M	SMU-3.5	370
3500	0.011	0.3	2.0	0.1	(2)	A	SHU-3500	360
4000	0.0007	0.3	2.0	0.3	(1) Photomultiplier	M	SMU-4	370
4000	0.010	0.3	2.0	0.1	(2)	A	SHU-4000	375
5000	0.0006	0.3	2.0	0.3	(1) CRT	M	SMU-5	420
5000	0.0003	0.3	2.0	0.1	(2) Laser Power	A	SHU-5000	390

28 VDC TO DC REGULATED CONVERTERS MULTIPLE OUTPUT MODELS

Output Voltage (VDC)	Output Current (Amps)	Output Line Reg.%	Output Load Reg.%	Output Ripple (%V RMS)	Notes	Case Size (See Table II)	Model Number	Price (1 pc)
15 5	.06 .40	0.05	0.05	0.1	(3) PC Mtg.	N	PCE-15-5	$160
15 5	1.00 3.00	0.20	1.00	0.1	(5) Switch Reg. High Efficiency	A	SEP-15-5	245
15 5	1.00 3.00	0.05	0.05	0.1	(3) Tight Reg.	C	STG-15-5	270
15 5	1.00 2.50	0.20	2.00	0.1	(2) Small Size	A	SHU-15-5	245
15 −15	0.12 0.12	0.05	0.05	0.1	(3) Op Amp Power	N	PCE-30CT	160
15 −15	1.00 1.00	0.05	0.05	0.1	(3) Analog Power	C	STG-30CT	270
15 −15	1.00 1.00	0.20	2.00	0.1	(2)	A	SHU-30CT	245
15 −15	1.50 1.50	0.30	2.00	0.1	(4) High Efficiency 19-32 VDC In	W	SLA-30CT	345
15 −15	2.00 2.00	0.20	2.00	0.1	(2) Op Amp Power	C	SHO-30CT	305
−24 −12	0.04 0.16	0.05	0.05	0.1	(3) PC Mtg.	N	PCE-24-12	160
−24 −12	0.80 1.50	0.20	2.00	0.1	(2) MOS	A	SHU-28-12	245
28 5	0.03 0.40	0.05	0.05	0.1	(3) Hermetic Case	N	PCE-28-5	160
28 5	0.50 3.00	0.05	0.05	0.1	(3) Linear Amp and Logic Power	C	STG-28-5	270
28 5	0.50 2.50	0.20	2.00	0.1	(2) Memory System Power	A	SHU-28-5	245
28 5	1.00 4.00	0.30	2.00	0.1	(4) High Efficiency 19-32 VDC In	W	SLA-28-5	345
180 5	0.10 3.00	0.05	0.05	0.1	(3) Display and Logic Power	C	STG-180-5	295
180 5	0.10 3.00	0.20	2.00	0.1	(2) Small Size	A	SHU-180-5	250
180 5	0.20 5.00	0.20	2.00	0.1	(2) Display and Logic Power	C	SHO-180-5	310
15 −15 5	0.50 0.50 2.00	0.20	3.00	0.1	(2) Op Amp and Logic	A	SHU-30CT-5	275
15 −15 5	0.50 0.05 4.00	0.05	0.05	0.1	(3) Tight Regulation Op Amp and Logic	C	STL-30CT-5	320
15 −15 5	0.50 0.50 6.00	0.30	3.00	0.1	(4) High Efficiency Op Amp & Logic 19-32 VDC In	W	SLA-30CT-5	395
−24 −14 5	0.50 0.50 3.00	0.05	0.05	0.1	(3) Tight Reg. MOS & Logic	C	STL-24-14-5	345
−24 −14 5	1.00 1.00 6.00	0.20	3.00	0.1	(2)	D	SHP-24-14-5	415
180 15 −15	0.03 0.30 0.30	0.20	3.00	0.1	(2) Display and	A	SHU-180	275
180 15 −15	0.05 0.60 0.60	0.05	0.05	0.1	(3) Tight Reg. Display and Op Amp	C	STL-180-30CT	345
180 15 −15 5	0.03 0.30 0.30 2.00	0.20	3.00	0.1	(2) Logic, Display Op Amp Power	A	SHU-180-30CT-5	330

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DC-DC REGULATED CONVERTERS *Cont.*

5, 12, 28, 48, or 115 VDC to single or multiple DC Outputs

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12 VDC TO DC POWER CONVERTERS

Output Voltage (VDC)	Output Current (Amps)	Line Reg.%	Load Reg.%	Ripple (%V RMS)	Notes	Case Size (See Table II)	Model Number	Price (1 pc)
5	2.00	0.05	0.05	0.1	(6) Logic	A	SHM-5	$175
5	8.00	0.05	0.05	0.1	(6)	B	SGU-5	220
6	20.00	Unreg.	5.00	0.3		A	SGT-6	195
12	1.00	0.05	0.05	0.1	(6)	A	SHM-12	175
12	5.00	0.05	0.05	0.1	(6)	B	SGU-12	220
12	10.00	Unreg.	5.00	0.3	Isolation	A	SGT-12	195
15	0.80	0.05	0.05	0.1	(6) Op Amp	A	SHM-15	175
15	1.30	0.05	0.05	0.1	(6)	B	SGU-15	220
24	5.00	Unreg.	5.00	0.3		A	SGT-24	195
30	0.40	0.05	0.05	0.1	(6) Analog Amp.	A	SGM-30	175
30	2.00	0.05	0.05	0.1	(6)	B	SGU-30	220
48	2.50	Unreg.	5.00	0.3		A	SGT-48	195
50	0.40	0.20	1.00	0.1	(2)	A	SHU-50EE	230
100	0.20	0.20	1.00	0.1	(2)	A	SHU-100EE	235
115	1.00	Unreg.	5.00	0.3		A	SGT-115	195
250	0.08	0.20	1.00	0.1	(2) Vacuum Tube	A	SHU-250EE	230
500	0.04	0.20	1.00	0.1	(2)	A	SHU-500EE	250
750	0.02	0.20	1.00	0.1	(2)	A	SHU-750EE	250
1000	0.02	0.20	1.00	0.1	(2) Photo Tubes	A	SHU-1000EE	275
1500	0.01	0.20	1.50	0.1	(2)	A	SHU-1500EE	295

Output Voltage (VDC)	Output Current (Amps)	Line Reg.%	Load Reg.%	Ripple (%V RMS)	Notes	Case Size (See Table II)	Model Number	Price (1 pc)
2000	0.01	0.20	2.00	0.1	(2) Laser	A	SHU-2000EE	340
2500	0.01	0.20	2.50	0.2	(2) CRT	A	SHU-2500EE	365
15	0.40	0.05	0.05	0.1	(6) Op Amp	A	SHM-30CT	205
−15	0.40							
15	2.00	0.05	0.05	0.1	(6)	B	SGU-30CT	255
−15	2.00							
24	0.20	0.05	0.05	0.1	(6) MOS	A	SHM-24-12	205
12	0.40							
24	1.00	0.05	0.05	0.1	(6)	B	SGU-24-12	255
12	2.00							
180	0.05	0.20	1.50	0.1	(2) Display Logic	A	SHU-180	285
5	2.00							
15	0.20	0.05	0.05	0.1	(6) Op Amp Logic	A	SHM-30CT-5	235
−15	0.20							
5	1.00							
−24	0.10	0.05	0.05	0.1	(6) MOS	A	SHM-24-12-5	235
−12	0.20							
5	1.00							
180	0.02	0.20	2.00	0.1	(2) Display Op Amp Logic	A	SHU-180-30CT-5	365
15	0.20							
−15	0.20							
5	1.00							

4.75 TO 5.24 VDC INPUT

Output Voltage (VDC)	Output Current (Amps)	Line Reg.%	Load Reg.%	Ripple (%V RMS)	Notes	Case Size (See Table II)	Model Number	Price (1 pc)
5	1.00	Unreg.	5.0	0.1	Logic Volt Isolation	N	PCD-5	$110
12	0.40	Unreg.	5.0	0.1		N	PCD-12	110
15	0.35	Unreg.	5.0	0.1		N	PCD-15	110
28	0.18	Unreg.	5.0	0.1		N	PCD-28	110
180	0.02	Unreg.	5.0	0.1	Display Power	N	PCD-180	110
15	0.16	Unreg.	5.0	0.1	Op Amp	N	PCD-30CT	150
−15	0.16							
24	0.10	Unreg.	5.0	0.1	MOS Power	N	PCD-24-12	150
12	0.15							
180	0.01	Unreg.	5.0	0.1	Display and Isolated Logic	N	PCD-180-5	150
5	0.50							

43 TO 52 VDC INPUT

Output Voltage (VDC)	Output Current (Amps)	Line Reg.%	Load Reg.%	Ripple (%V RMS)	Notes	Case Size (See Table II)	Model Number	Price (1 pc)
5	2.50	0.2	2.0	0.1	Logic Power	A	SHU-5E(43-52)	$230
30	0.65	0.2	1.5	0.1		A	SHU-30E(43-52)	230
250	0.08	0.2	1.5	0.1	Vacuum Tube	A	SHU-250E(43-52)	235
500	0.04	0.2	1.5	0.1		A	SHU-500E(43-52)	250
1000	0.02	0.2	1.5	0.1	Photomultiplier	A	SHU-1000E(43-52)	265
15	0.60	0.2	1.5	0.1	Op Amp	A	SHU-30CT(43-52)	260
−15	0.60							
180	0.05	0.2	1.5	0.1	Display and Logic	A	SHU-180-5E(43-52)	260
5	2.00							

95 TO 130 VDC INPUT

Output Voltage (VDC)	Output Current (Amps)	Line Reg.%	Load Reg.%	Ripple (%V RMS)	Notes	Case Size (See Table II)	Model Number	Price (1 pc)
5	5.00	0.2	2.0	0.1	Logic Power	A	SHU-5E(95-130)	$230
5	10.00	0.2	2.0	0.1	Logic Power	C	SHO-5E(95-130)	290
5	15.00	0.3	2.0	0.1	Logic Power	P	MAD-5E(95-130)	350
12	3.20	0.2	1.5	0.1		A	SHU-12E(95-130)	230
12	12.00	0.2	1.5	0.1	12 VDC	P	MAD-12E(95-130)	350
24	1.60	0.2	1.5	0.1		A	SHU-24E(95-130)	230
24	3.20	0.2	1.5	0.1	24 VDC	C	SHO-24E(95-130)	290
24	6.00	0.3	1.5	0.1		P	MAD-24E(95-130)	350
30	1.30	0.2	1.5	0.1		A	SHU-30E(95-130)	230
48	1.60	0.2	1.5	0.1	48 VDC	C	SHO-48E(95-130)	290
48	3.00	0.3	1.5	0.1		P	MAD-48(95-130)	350
500	0.08	0.2	1.0	0.1	Vacuum Tube	A	SHU-500E(95-130)	250
1000	0.04	0.3	1.5	0.1		A	SHU-1000E(95-130)	265
15	0.65	0.2	1.5	0.1	Op Amp	A	SHU-30CT E (95-130)	260
−15	0.65							
15	0.50	0.2	1.5	0.1	Op Amp and Logic	A	SHU-30CT-5E (95-130)	310
−15	0.50							
5	2.00							

NOTES:

(1) Input 26-30 VDC or 11-14 VDC, Load Reg. (½ FL-FL), Adjust. 90% to 105% of nominal output, operating case temp. −55 to +100°C. Options available: A, CT, D, E, F, I, P, S, Z.

(2) Input 26-30 VDC or 11-14 VDC, Load Reg. (½ FL-FL), Adjust. 40% to 105% of nominal output, operating case temp. −55 to +100°C. Options available: E, CT, E, F, G, I, L, P, R, W, WW.

(3) Input 26-30 VDC or 11-14 VDC, Load Reg. (NL-FL), Overload/short circuit protected operating case temp. −10 to +85°C. Options available: A, E, F, G, I, P, V.

(4) Input 19-32 VDC, Load Reg. (½ FL-FL), isolated output, high efficiency, operating case temp. −10 to +85°C. Options available: A, E, G, P.

(5) Input 19-32 VDC, Load Reg. (NL-FL), common for input and output, operating case temp. −10 to +71°C. Options available: A, E, G, P.

(6) Input 11-14 VDC, Load Reg. (NL-FL), Overload/short circuit protected, operating case temp. −10 to +71°C. Options available: A, E, G, P.

(7) Load Reg. (½ FL-FL), operating case temp. −10 to +85°C. Options available: E, G.

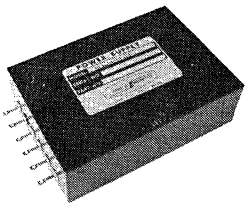
HOW TO ORDER:

(1) Standard models: Use model numbers listed. Add option letters as required per Table I.

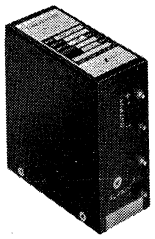
(2) Special models: Use three letter model number followed by voltage (volts)/current (amps). Use standard model of highest voltage for output power rating and price.
EXAMPLE: SHU-44CT has output of ±22 VDC at 0.80 Amps with a 1 pc. price of $225.00.

DC-DC SWITCHING REGULATOR

ARNOLD MAGNETICS CORPORATION



Output Voltage (Volts)	Output Current (Amps)	Efficiency (% at f.l.)	Notes	Case Size (See Table II)	Model No.	Price (1 pc)
3.6	4.0	72	Low Level Logic	A	Sep-3.6	$195
4.0	4.0	75		A	SEP-4	195
5.0	4.0	78	Logic Power	A	SEP-5	195
10.0	3.5	79		A	SEP-10	195
12.0	3.0	80		A	SEP-12	195
15.0	3.0	80	Op Amp Power	A	SEP-15	195
12.0	1.5	77	Dual Output	A	SEP-12-5	295
5.0	2.0					
15.0	1.5	77		A	SEP-15-5	295
5.0	2.0					



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DC-SINE WAVE INVERTER

28 VDC to 400 Hz Sine Wave Output

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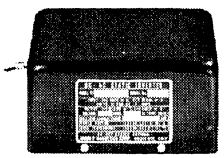

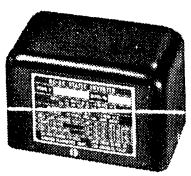

FEATURES

- Miniature Size
- Closely Regulated Output Voltage
- Low Harmonic Distortion
- Meets MIL-E-5272 & MIL-STD-709A
- Closely Regulated output frequency
- Generates NO RFI-EMI

SPECIFICATIONS

Input: 24-30 VDC or 10-14 VDC for SKB & SKD

Output: Voltage: 28 or 115 VRMS, Isolated from, case and input. (Other voltages 6-440 VRMS available.)

Frequency: 400 Hz (Other frequencies 360 to 10 KHZ available.)

Wave Shape: Sine Wave with maximum distortion of 6%

Regulation: Output Voltage: ±.5% line, ±2% load

Output Frequency: ±.3% line, ±.2% load

Temp. Coefficient: ±.05%/°C

Input (VDC)	Output (VRMS)	Output Power (VA)	Case	Model Number	Price 1 pc.
11-14	115	20	K	SKB-12-115-400-20	$270
11-14	115	40	L	SKD-12-115-400-40	479
11-14	28	20	K	SKB-12-28-400-20	270
10-14	28	40	L	SKD-12-28-400-40	479
24-30	115	50	K	SKB-28-115-400-50	270
24-30	115	100	L	SKD-28-115-400-100	479
24-30	28	50	K	SKB-28-28-400-50	270
24-30	28	100	L	SKD-28-28-400-100	479

HOW TO ORDER:

1. **Standard Units:** Use model numbers listed.
2. **Special Units:** Specify SKB (50VA), SKD (100VA) - Nominal Input Voltage - Output Voltage - Frequency - Output Power (VA).

   EXAMPLE: SKB-26-100-800-40 operates on a nominal 26 VDC input and deliver 100 VRMS at 800 Hz with output power of 40 VA.

OPTIONS FOR POWER CONVERTERS*

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OPTION LETTER	OPTION	SPECIFICATIONS	USE ON MODELS	PRICE (1 pc)
A	External (Remote) Adjustment of Output Voltage	Two (2) flexible leads for external 5 K pot. All performance specifications unchanged	SHU, SHO, SMU, PHU, PHO	$25
(CT)	Center Tapped Outputs	Put "CT" in parenthesis for center tapped output. Example: SHU-30(CT) provides ±15 VDC @ 1.3A. Output voltage available to 500 volts except 50 volts for SMU	SHU, SHO, SMU, PHU, PHO	30
D	Output Adjust on Side	Output voltage adjustment control located on the side for convenience of adjustment when units are stacked together	SMU	25
E	Input Voltage Alteration	Permits operation over specified range of input voltage: E_L to E_H Output power and adjustment range are affected. Consult factory for maximum values. When $E_H - E_L$ exceeds 4v, observe case temperature closely Specify lowest and highest input voltage (E_H & E_L). Example: SHU-30E(20-30) will deliver 30 volts @ .87A at any input from 20 to 30 VDC	ALL MODELS	35
EE	12 Volt Nominal Input	Derate output current 50% Input: 11 - 14 VDC Max. Output: 2500 VDC	SHU, SMU	35
G	Flexible Leads	Leads per MIL-W-16878 where applicable Lead length 10 Inches minimum	ALL MODELS	15
I	EMI/RFI Qualified	Conducted and radiated noise below spec. Level of MIL-I-26600, Class I and MIL-I-6181D. Qualification is by similarity PHU and SHU to MIL-I-6181D only case size B SMU case size Q.	SHU, SMU, PHU	75
L	Tighter Load Regulation	See individual product literature for specifications which vary with output voltage	SHU, SHO, PHU, PHO	25
P	Programmable Output Voltage	Output varies directly with 9 ±4 VDC applied between negative input terminal and control lead (violet). Input resistance to control Lead: 2K ohm approx. Output voltage range: 50% to 105% (Min. of rated output). Linear deviation will not exceed 5%	SHU, SMU, SHV, SMV	
R	Tighter Line Regulation	See individual product literature for specifications	SHU, SHO, PHU, PHO	25
S	Short Terminals	⅜ inch maximum terminal length. Sleeving will be required for high voltage outputs	SHU, SHO, SMU, STB, STG, STL, PHU, PHO, PEA, PEB, PEC, PEF, PEG, PEH, PEL, PEM, PEK, PIB, PIG, PIL	10
V	Overvoltage Protection	"Crowbar" shorts the output upon overvoltage Remains "crowbar" state until overvoltage removed and input power interrupted. Set to 120 ±10% of nominal output Other settings may be specified 115 to 200% of nominal output by V (crowbar voltage). Example: PHU-5V(8) will crowbar at 8 volts.	PHU, PHO, PIB, PIG, PIL, STB, STG, STL, PEA, PEB, PEC, PEF, PEG, PEH, PEL, PEM, PEK, SLA, MAP	35
W	Higher Power Output	Increased output current rating up to 50% For input less than 26 VDC see factory. Derate output power .5 W/°C above 60°C base temperature. 2 through 500 VDC output only	SHU	35
Z	Broaded Adjustment Range	Adjustment range 40 to 105% of nominal output voltage.	SMU	10

* **NOTES:** 1. The following modification combinations cannot be made: **A.** for SHU: E with EE — **B.** for SMU: I with A, I with P 2. Options A and P are excluded from warranty

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CASE SIZES FOR POWER CONVERTERS

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Case Size	W (Width)	H (Height)	L (Length)	Mounting Holes			Size	Dwg. Fig.	Weight (Oz.)
				M	N	No. Holes			
A	1⅝	3⅝	3½	1.125	2.750	4	6-32NC ¼" Min.	1	27
B	1⅝	3⅝	5	1.125	4.250	4	6-32NC ¼" Min.	1	38
C	1⅝	3⅝	7	1.125	5.500	6	6-32NC ¼" Min.	1	54
D	1⅝	3⅝	10½	1.125	9.000	6	6-32NC ¼" Min.	1	81
E	2⅛	4½	5	1.625	4.250	4	8-32NC ¼" Min.	1	53
F	2⅛	4½	7	1.625	5.500	6	8-32NC ¼" Min.	1	76
G	2⅛	4½	10	1.625	8.500	6	8-32NC ¼" Min.	1	106
K	2½	2½	4	2.000	3.500	6	6-32NC ¼" Min.	2	28
L	4	2½	5	3.420	4.420	6	8-32NC ¼" Min.	2	56
M	21/32	2¾	1⅞		1.590	2	6-32NC ¼" Min.	3	4
N	2 5/16	¾	2 5/16	2.190	2.190	2	6-32NC ¼" Min.	4	5
O	2 5/16	1	2 5/16	2.190	2.190	2	6-32NC ¼" Min.	4	11
P	1⅝	4⅝	8½	1.125	3.000	6	6-32NC ¼" Min.	5	56
Q	¾	4 5/16	1 15/16		1.590	2	6-32NC ¼" Min.	3	8
R	2¾	3	5	1.125	2.120	4	6-32NC ¼" Min.	6	32
S	3	3¾	6	1.182	2.370	4	8-32NC ¼" Min.	6	48
T	3½	4¼	7	2.500	2.800	4	8-32NC ¼" Min.	6	64
U	4⅜	5¼	8½	1.625	4.000	4	10-32NC ¼" Min.	6	128
V	4⅝	5½	10	2.250	4.500	4	10-32NC ¼" Min.	6	224
W	2⅞	1¼	4⅛	2.375	3.625	4	4-40NC ¼" Min.	7	32

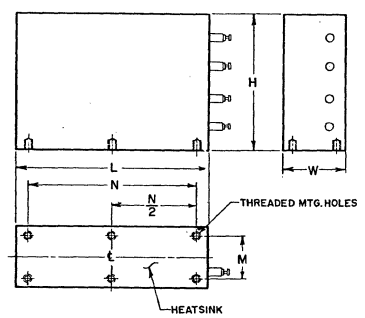


FIG. 1

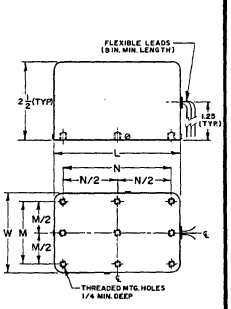


FIG. 2

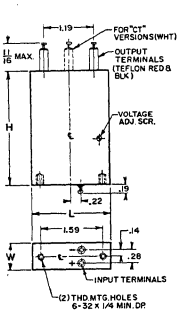


FIG. 3

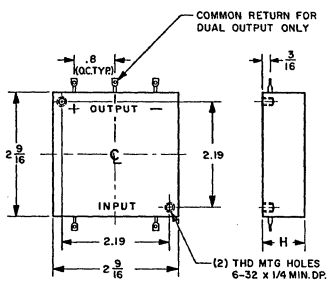


FIG. 4

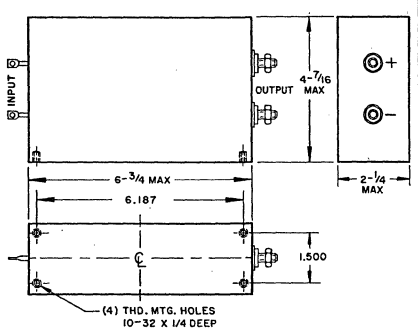


FIG. 5

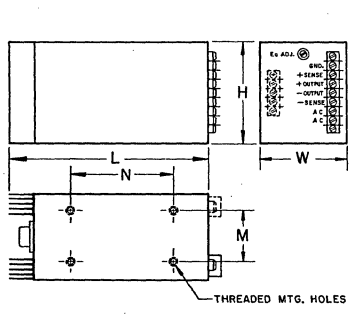


FIG. 6

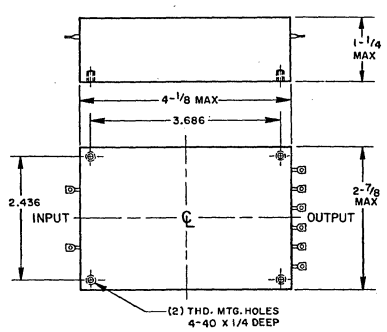


FIG. 7

ARNOLD MAGNETICS CORPORATION
P.O. Box K • Culver City, California 90230
Phone: (213) 870-7014 • TWX 910-343-6468

TRANSFORMERS, FILTERS, INDUCTORS, ETC.

ARNOLD
MAGNETICS CORPORATION

MINIATURE POWER TRANSFORMERS

Series	Max. Power Watts	Size L W H	Max. Output Voltage	Max. No. of Terminals	Weight (Oz.)	Outline Fig.
TTA	1.0	1 1/16 O.D. 1/2	100	8	.5	10
TTH	20	1 5/8 O.D. 1 1/8	1000	8	4	10
TNA	50	2 5/16 x 1 x 2 7/8	1000	10	13	11
TNB	120	2 1/4 x 1 3/16 x 3	1750	10	15	11
TND	235	2 1/2 x 1 1/2 x 3 1/8	1750	10	23	11
TNE	335	3 x 1 1/2 x 4	1750	10	38	11
TEA	160	2.4 x 2 x 2	3000	14	22	12
TEB	100	2.4 x 1.7 x 1.7	3000	14	11	12
TEF	32	1.8 x 1.4 x 1.4	2000	10	8	12
TEH	21	1.5 x 1.3 x 1.2	2000	10	4.5	12
TEM	8	1.1 x 1.2 x .9	850	8	2.0	12
TEQ	4.6	1.1 x .9 x .9	370	8	1.2	12

Input: 115V 400 Cycles 1 phase
Temp.: 55°C to 100°C
Environment: Encapsulated to meet MIL-E-5272D or MIL-T-27A
Output: Up to three windings

HOW TO ORDER:

EXAMPLE:
TBN - 115 - 26/3.8 - 5/3 - FE
Series No. | Primary VRMS | Secondary #1 VRMS/AMPS | Secondary #2 VRMS/AMPS | Terminations

FE—Flattened & Pierced Pins
HS—Hooked Pins
SE—Straight Pins
LS—Flexible Leads

MINIATURE INDUCTORS

Series	Inductance (MH)	Max. "Q"	Max. "Q" Freq. (KC)	Size (See Fig. 10) O.D. H
ITV	1 to 17000	175 to 52	15 to 1.7	1.44 x .75
ITW	1 to 17000	240 to 50	40 to 2.5	1.44 x .75
ITR	1 to 7000	145 to 55	19 to 3	1.06 x .47
ITS	.1 to 500	168 to 50	100 to 13	1.06 x .47
ITU	1 to 3000	190 to 50	40 to 5	1.06 x .47

HOW TO ORDER:
EXAMPLE: ITV (Series No.) 15 (Inductance (MH)) HS (Termination)
HS - Hook Pins
SE - Straight Pins

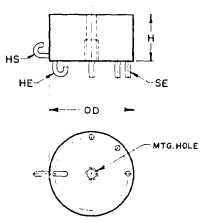


FIG. 10

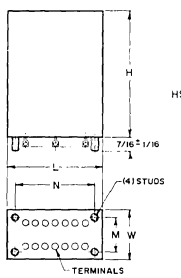


FIG. 11

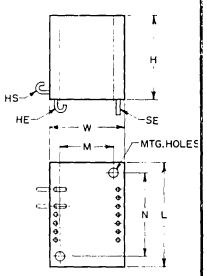
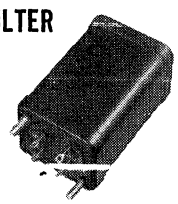


FIG. 12

LINE SPIKE FILTER
MODEL FLD

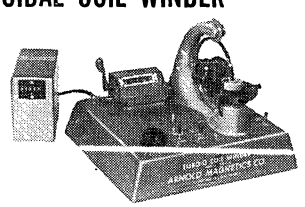


Missile and aircraft applications
VOLTAGE: to 35 VDC
CURRENT: to 4 AMPS
CONSTRUCTION: Steel can with mounting studs and pin terminals on bottom
TEMPERATURE: −25°C to +85°C
ENVIRONMENT: MIL-T-27A
ATTENUATION: Of transient current & voltages
0 - 1.2 KC: 3 db min.
1.2 - 2.4 KC: 10 db min.
2.4 KC - UP: 27 db min.
WEIGHT: 8 Oz.
PRICE: 1 pc. $45.00

LOW PASS FILTER
MODEL FLU

Reduce Ripple in Converter Output
VOLTAGE: 5 to 5000 VDC
CURRENT: 8 MADC to 4 ADC
ATTENUATION: 40 DB @ 3 KHZ
For use with PHU, PHO, PHP and SHU Converters
SIZE: 1 3/8" x 1 7/8" x 3 5/16"
HOW TO ORDER: EXAMPLE: Specify FLU-output Voltage, FLU-30 is 30 Volt Filter
DELIVERY: Stock to 4 weeks ARO

TOROIDAL COIL WINDER



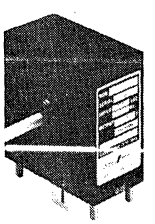
Sets up quickly . . . easy to operate . . . takes wide range of wire sizes

• Min. finished hole size: .18 in. • Max. finished toroid O.D.: 4.0 in. • Winding speed: 1500 turns/min. • Wire range: AWG 44 to AWG 26 • Dual, self-checking turns counting system • Loading (wire length) counter • Core range: 3/32" I.D. to 4" O.D. to 1 1/2" high.

LABORATORY USE — Change wire and core size in 45 sec. • **PRODUCTION USE** — 1500 turns per minute • Insert core and load in 20 sec.

Model WTA — $890.00 includes all rings, counters and accessories • **Model WTB — $750.00** without mechanical counter or extra rings.

HIGH GAIN POWER CONTROL DEVICE
MODEL ROA



FEATURES
- Power Gain of 10^{14} possible
- Combines Best Advantages of Magnetic Amplifiers and SCR's
- Zero Crossing Control for Low Noise
- Delivers Full Power Cycles
- Sums any Number of Isolated Control Signals
- Control or Interrupt low Frequency Power (60 or 400 CPS)
- 8 Amps to 100 Amps

APPLICATIONS
- Heat Controller: Thermister, Thyristor, Thermocouple or other Transducer Control. Direct Thermocouple Control
- Power Supply Protection
  Overcurrent or Undercurrent Control or AC primary — Control completely isolated
- Helix Protection for TWT
- Direct Power Control with Independent "Wired" in Programs
- Delivery: Stock to 12 weeks.
- Price: 1 pc $97.00

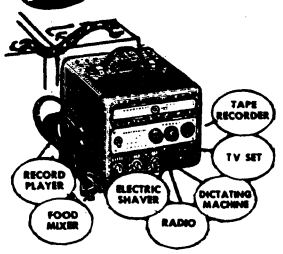
Send for new 17 page Application Bulletin ROA-110

ARNOLD MAGNETICS
ARNOLD MAGNETICS CORPORATION
P.O. Box K • Culver City, California 90230
Phone: (213) 870-7014 • TWX 910-343-6468

INVERTERS, VIBRATORS, "A" ELIMINATORS, ETC.

ATR ELECTRONICS, INC.

Tel. (612) 222-3791 • 300 East Fourth St., St. Paul, Minnesota 55101



DC TO AC UNIVERSAL INVERTERS

New, universal inverters for operating 110-v., 60 cycle AC equipment from DC voltages in autos, buses, trucks, boats, trains, planes and DC districts. Designed especially for standard 110-volt AC tape recorders, TV sets, radios, PA systems, electric razors, test equipment, etc. Units are carefully engineered and ruggedly constructed to provide long life operation. All feature complete RF interference suppression and exceptional frequency stability. Have operating efficiency in excess of 75%. Four-point voltage regulator corrects output voltage for minimum and maximum loads, and also helps compensate for input voltages lower or higher than normal. Inverters are recommended for use with loads having power factors in excess of 70%. Built-in toggle switch selects most efficient operation for use with TV sets or tape recorders. Inverters are not recommended for use with large motor driven appliances such as refrigerators, washing machines, etc. All have On-Off switches. Housed in attractive brown hammerloid metal cabinet with convenient leather carrying strap. Sizes: Standard Model RSF, 8½x9⅞x5¼"; Heavy-Duty Model RHG, 6⅞x11¼x 8½"; Extra-Heavy-Duty Model HSJ, 6½x12⅞x8½". With battery clips for instant connection to power source. Models with "P" suffix equipped with adapter cord for use in auto cigarette lighter receptacles. *Recommended for 24 volt battery operation. **Before ordering, check wattage of equipment with which inverter will be used.**

Stock No.	Mfr's Type	DC Input Volts	AC Output 60 Cycles (volts)	Output Watt. Int.	Output Watt. Cont.	Shipping Wt. (Lbs.)	List Price	Net Price
	6U-RSF	6	110	100	80	22	$119.50	**$ 79.66**
	6U-RSF-P	6	110	100	80	22	119.50	**79.66**
	6U-RHG	6	110	150	125	27	155.25	**103.50**
	6U-HSJ	6	110	175	150	37	187.55	**125.00**
	12U-RSF	12	110	150	125	22	99.00	**66.00**
	12U-RSF-P	12	110	150	125	22	99.00	**66.00**
	12U-RHG	12	110	200	175	27	131.25	**87.50**
	12U-HSJ	12	110	250	225	37	170.75	**113.82**
	*28U-RSF	28	110	125	100	22	119.50	**79.66**
	*28U-RHG	28	110	175	150	27	145.00	**96.66**
	*28U-HSJ	28	110	250	200	37	187.55	**125.00**
	32U-RSF	32	110	150	100	22	119.50	**79.66**
	32U-RHG	32	110	200	180	30	145.00	**96.66**
	32U-HSJ	32	110	325	225	37	187.55	**125.00**
	50U-RSF	50	110	150	100	22	119.50	**79.66**
	50U-RHG	50	110	225	200	27	155.25	**103.50**
	110U-RSF	110	110	250	150	22	99.00	**66.00**
	110AU-RHG	110	110	325	250	27	131.25	**87.50**
	110BU-RHG	110	110	450	350	30	155.25	**103.50**
	110U-HSJ	110	110	600	400	37	187.55	**125.00**
	220U-RSF	220	110	250	150	22	109.50	**73.00**
	220U-RHG	220	110	325	250	27	155.25	**103.50**
	220U-HSJ	220	110	500	300	37	187.55	**125.00**

PORTABLE PLUG-IN TYPE INVERTERS

Specially Designed for Operating Standard AC Dictating Machines, Record Players, Incandescent Lamps, Electric Razors, Electronic Test Equipment, and other Small Electrical and Electronic Devices from DC Voltages in Automobiles, Buses, Trucks, Boats, Planes, Trains, and DC Districts.

Lightweight inverters for operating 110 v. AC equipment from DC voltage sources. Feature excellent frequency stability and high efficiency. 6 and 12-volt units plug into cigarette lighter receptacle of any vehicle; others are equipped with standard 2-prong plugs. All are designed especially for use with dictating machines; record players, electric razors, test equipment, etc. Not recommended for large tape recorders and motor driven appliances such as refrigerators, washing machines, etc. Brown Hammerloid case with leather carrying strap. Sizes: DME, 5¼x4¾x2¾"; RME and RMF, 8⅜x8x 3¾". *Recommended for 24-volt operation. **Check wattage rating of equipment before ordering. RMF/RME Model Inverters equipped with voltage regulator.**

Stock No.	Mfr's Type	DC Input Volts	AC Output 60 Cycles (volts)	Output Watt. Int.	Output Watt. Cont.	Shipping Wt. (Lbs.)	List Price	Net Price
	6-DME[1]	6	110	40	30	5	$36.85	**$24.55**
	6C-DME[1]	6/12	110	40	30	5	42.25	**28.15**
	6-RMF[2]	6	110	80	60	12	72.35	**48.15**
	6C-RMF[2]	6/12	110	80	60	12	79.69	**53.15**
	12-DME[1]	12	110	50	40	5	32.97	**21.98**
	12T-RME-12[3]	12	110	125	110	14	69.25	**46.15**
	*28-RME[2]	28	110	100	80	12	82.45	**54.95**
	32-RME[2]	32	110	100	80	12	82.45	**54.95**
	110-RME[2]	110	110	150	100	12	78.95	**52.60**
	220-RME	220	110	150	100	12	82.45	**54.95**

[1] These Inverters primarily recommended for Edison VP dictating machines. May also be used with Model 200 Soundscriber (with engine of car not running).
[2] Primarily recommended for Dictaphone's Time Master, DeJur Stenorette, and Gray Audograph dictating machines or other similar types. Also recommended for use with Norelco tape recorder Model EL-3516 and Geloso Model G 255-S Tape Recorder.
[3] **This Inverter specially designed and recommended also for use with portable TV set.**

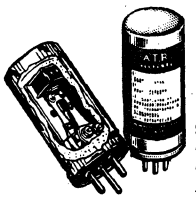
SOLID STATE INVERTERS

Specially Designed to Provide 117 Volt 60 Cycle AC Power for the Operation of Tape Recorders, VTR Equipment, Public Address Systems, TV Sets, Ham Gear, Small Portable Tools and Aupliances, Test Instruments, Closed Circuit TV, Scientific Laboratory and Hospital Equipment, Small AC-DC Universal Motors, Fluorescent and Incandescent Lamps from 12 Volt DC Storage Battery Power in Automobiles, Buses, Trucks, Campers, Mobile Homes, Boats, and Aircraft.

ATR SOLID STATE Inverters are Universal Type Inverters recommended for the applications as listed above plus hundreds more! These Inverters are very well filtered and feature quick starting, frequency stability with varying load and input voltage, rugged heavy-duty construction, reverse polarity protection, and built-in power factor corrector utilizing a simple toggle switch. With ATR Inverters, the need for special equipment is eliminated. They are designed for quiet, long-life operation at high efficiency and maximum reliability. All models indicated here are equipped with heavy duty power transistors and plug-in frequency reed for automatic frequency control. These Inverters also come equipped with four-point voltage regulators which make possible the correct output voltage for minimum to maximum loads and also help compensate for input voltages which are lower or higher than normal. The operating efficiency is approximately 80%. To figure approximate current consumption from storage battery, divide the rated input wattage of the load being operated by the storage battery voltage, and further divide this answer by .80 which will give the approximate current consumption from the battery based on the actual load being operated. These Inverters are recommended primarily for use with loads having power factors in excess of 70%. Inverters come complete with battery cables ready for operation.

Type	DC Input Volts	AC Output 60 Cycles (volts)	Output Wattage Int.	Output Wattage Cont.	Net Price
12U-S2A	12	117	300	275	$139.50
*12U-S2A-P	12	117	300	275	139.50
12U-S4G	12	117	450	400	198.45
12U-S6M	12	117	650	600	249.75

"-P" model is equipped with cigarette lighter cord set to plug into dash receptacle. Caution — Do not load beyond 150 watts due to possible damage to cigarette receptacle wiring.
All ATR Inverters are housed in attractively finished brown-hammerloid metal cabinets and are complete with battery cables ready for operation.
For Inverters having larger or smaller output capacities, or for operation on other DC input voltages from 6 volts to 220 volts, please consult available ATR Inverter catalog sheets.



VIBRATORS

For All Auto Radio Sets Since 1954 Use One of the ATR Vibrators Listed Below.

ATR Vibrators Feature:
Ceramic Stack Spacers with Two-Bolt Stack construction. Instant Starting — as a result of highly efficient magnetic circuit with formed base for more uniform operation on both high and low voltages.
Large Oversize Tungsten Contacts having Full Wiping Action — for greater reliability and longer life.
Perforated Reed of Highest Quality Swedish Spring Steel.
Highest Precision Construction and Workmanship — practically all parts used are held to within a tolerance of 0.0005 of inch.
Value Plus — as readily evidenced by the Larger Contacts, Ceramic Spacers and Precision Construction and Workmanship. Available in TEN-PAK.

ATR No. 1400 (Bulk), 4-Prong, 6-Volt For All 6-Volt Sets Since 1954.

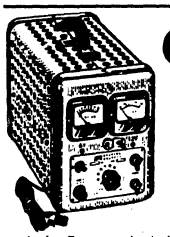
ATR No. 1843 (Bulk), 3-Prong, 12-Volt For All 12-Volt General Motors Since 1954.
ATR No. 1843 also used in following automobiles: 1956 Ford (Philco), Lincoln (Bendix), and Mercury (Bendix); 1956 Chrysler (Philco); 1955-57 Packard; 1956-57 Plymouth (Philco); 1956 Studebaker (Philco) and 1957 Mercury (Philco).

ATR No. 1840 (Bulk), 4-Prong, 12-Volt For 12-Volt Cars other than GM Since 1954.

SHAV-PAKS

Every man should have this lightweight ATR Inverter in his car for that "Keep Clean-Shaved Look." Will operate standard AC Electric Shavers from your CAR or Boat. Complete with 3 ft. cord set. Plugs into cigarette lighter receptacle. Fuse protected, rugged construction, and attractively housed in grey hammerloid-finish steel case. Size: 4x2⅝x2¾". Ship. wt., 2½ lbs.

Model 6-SPB (6 volt) ..... Net **$16.50**
Model 12-SPB (12 volt) ..... Net **14.25**



"A" BATTERY ELIMINATOR

For Demonstrating and Testing Transistor or Vibrator - Type Auto Radios. Designed for testing DC Electrical Apparatus on regular 110 volt AC lines — equipped with full-wave dry disc-type rectifier, assuring noiseless, interference - free operation. Fully Automatic and Fool-Proof; has voltmeter, ammeter, and 8-position voltage control. Fuse protected and housed in heavy gauge brown hammerloid-finish metal case. 6 ft. cord set included. Size: Model 610C-ELIF, 6½x9⅛x8½", ship. wt., 22 lbs.; Model 620C-ELIT, 6½x12⅞x8½", ship. wt., 33 lbs.

Ideal as a Power Supply for Model Railroad Trains, Radio Sets, Electro Plating Outfits, and other 6 or 12 Volt, DC Equipment. May also be used as a Battery Charger.

Model 610C-ELIF (6 volt at 10 amps. or 12 volt at 6 amps.) ..... Net **$65.80**
Model 620C-ELIT (6 volt at 20 amps. or 12 volt at 10 amps.) ..... Net **$87.75**

EMERGENCY LIGHTING AND POWER UNIT

Illustrates ATR Emergency Lighting and Power Unit, Model ETS complete with lamps.
Completely Automatic Standby-Power Units Specially Designed to Permit the Instantaneous Continued Operation of Critical Lighting Equipment, PA Systems, Amplifiers, Intercom Systems, Burglar Alarms, Fire Alarms, Synchronous Electric Clocks, Electric Time and Recording Clocks, Incubators, Gas Valves, Telephone and Test Equipment, and Similar Critical Devices in the Event of 115 Volt AC Commercial Power Line Failure. For Use: In Hospitals, Banks, Hotels, Theatres, Factories, Office Buildings, Schools, Homes and Other Areas of Operation.

Type	*Storage Battery Input (volts)	AC Output 60 Cycles (volts)	Output Wattage Int.	Output Wattage Cont.	Net With Lamps
661-ETM	6	110	80	60	**$231.75**
662-ETS	6	110	100	80	**253.50**
663-ETH	6	110	150	125	**275.50**
1232-ETS	12	110	125	100	**247.50**
1233-ETH	12	110	175	150	**267.00**
1234-ETJ	12	110	250	200	**287.25**

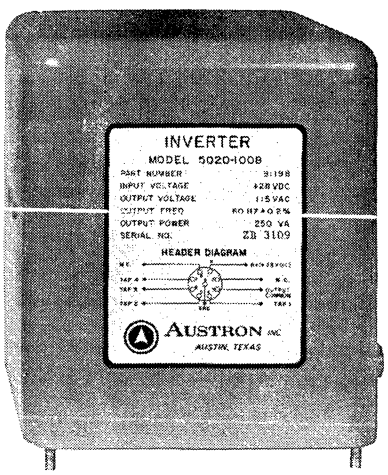
For Units Without Lamps Deduct **$37.50** Net.

ALL ATR INVERTERS LISTED ABOVE ARE FREQUENCY STABLE AND HAVE AUTOMATIC FREQUENCY CONTROL

AUSTRON

inverter/converter power supplies

series 5020 square-wave inverters



DESCRIPTION

The Series 5020 is a frequency controlled square-wave inverter which has been designed for applications requiring small size and high efficiency. Inherent reliability has been designed into the unit under all load and line conditions. The performance advantages of the 5020 Series are superior to any inverter of this type and size on the market.

The all-silicon circuit utilizes a fixed or adjustable internal clock for controlling the output frequency. The stability of the clock can be selected from ±1% to ±.005%.

Special design steps were taken to insure that the unit operates well below secondary breakdown conditions. Also zener protection is included to guarantee against adverse load conditions.

ADVANTAGES

Small size
Low Output Impedance
High Efficiency
High Reliability
Low Standby Current
High Temperature
All-Silicon Design
Reverse Voltage Protection
Transient Protection
Fail-Safe for Battery Run-Down

SQUARE WAVE INVERTER SERIES 5020

Model	1031	1040	1024	1008	1032	1027
Output Power (VA)**	25	50	120	250	500	750
Output Voltage (rms)	*115Vac Nominal					
Input Voltage DC	+22 to 32 V					
Output Taps	Four Taps, 10% Steps					
Output Frequency	*60 Hz					
Temperature Range	−20°C to +65°C					
Efficiency	>80%			>90%		
Size (Inches)	5.06x4x3.5	5.06x4.4x3.9	5x5.34x4.78	6.16x5.34x4.78	8x10x5	8x10x6
Weight (Lbs.)	<2	<4	<9	<11	<25	<40
Fuse Requirements	2A	4A	8A	12A	25A	35A
Frequency Stability	*±1%					
Cost	$145	$200	$300	$400	$700	$1000
Options	01-$5.00 02-$10.00 03-$10.00		04-$25.00 05-$50.00 06-$80.00	07-$100.00 08-$30.00		

**At 28Vdc

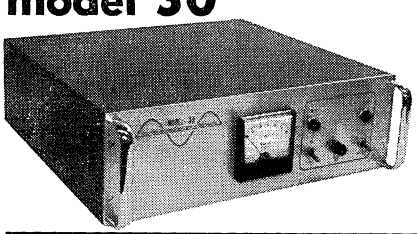
(Models 1031 and 1040 are not available in Option 06 & 07)

Prices and Technical Specifications subject to change without notice.

*OPTIONS AVAILABLE:

01 220Vac Output
02 400 Hz Output Frequency
03 ±0.2% Frequency Stability
04 ±.05% Frequency Stability
05 ±.02% Frequency Stability
06 ±.01% Frequency Stability
07 ±.005% Frequency Stability
08 50 Hz Output Frequency

model 30

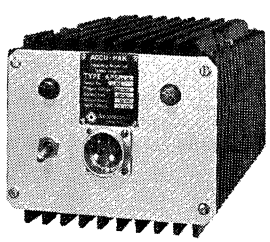


Unregulated 55-70 cps or 340-460 cps AC input from shipboard, diesel generator, REA lines, etc., is regulated by the AUSTRON Model 30 Power Module to either 60 or 400 cps (or any required frequency) with an output frequency tolerance of as much as 5×10^{-7} and output power of 250 va.

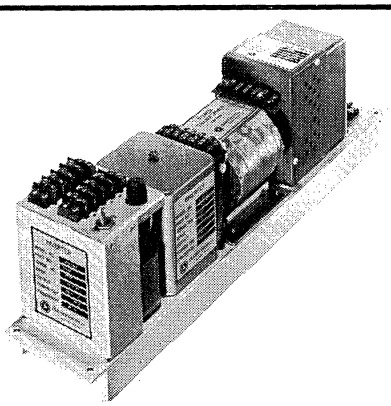
AUSTRON Model 30 Modules are used as frequency controlled power sources for all types of synchronous motors, instrumentation, tape recorders, remote clocks, depth recorders, etc.

AUSTRON crystal oscillator frequency standards are combined with the latest silicon solid state circuitry to achieve precise frequency and voltage stability at useful power loads.

model APS-14AB



model 5020-1020



AUSTRON is active in the following areas of POWER SUPPLIES:

- MODULAR DC-DC CONVERTERS — microwatts to 750 watts.
- MODULAR SWITCHING MODE REGULATOR — integrated circuit power regulator.
- MODULAR DC-AC INVERTERS — 25VA to 750VA.
- STANDBY POWER SYSTEMS — battery charger and inverter system.

Austron power supplies feature all silicon semiconductors. Extremely high efficiency allows for high temperature operation, permits full MIL environmental certification.

AUSTRON INC. • 10214 NORTH INTERREGIONAL HIGHWAY, AUSTIN, TEXAS 78753 • TELEPHONE (512) 836-3523

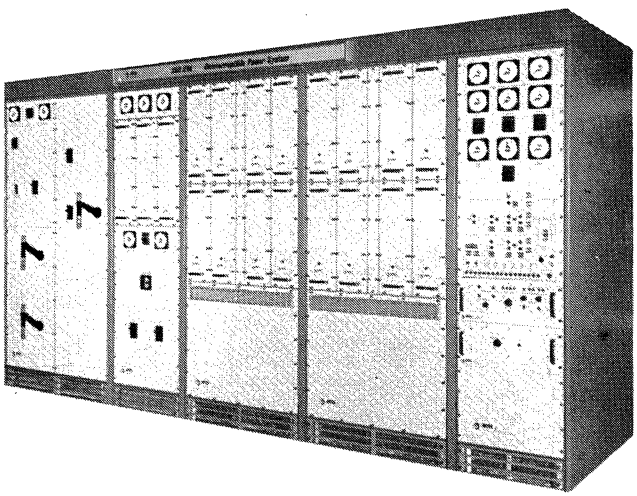
UPS UNINTERRUPTIBLE POWER SYSTEMS

AVTEL

On-line solid state AC power systems which guarantee uninterrupted, transient-free power to your critical equipment, regardless of power line conditions.

CONDITIONED POWER

AVTEL's Uninterruptible Power Systems (UPS) offer the maximum in reliability and efficiency for applications where even a momentary power failure or disturbance cannot be tolerated. High mean-time-between-failure (MTBF) coupled with modular construction for low mean-time-to-repair (MTTR) make Avtel UPS the most practical systems for continuous on-line operation.



1.25 KVA Mini-UPS to Systems Over 1000 KVA

AVTEL UPS ARE DESIGNED TO PROVIDE THESE OUTSTANDING ADVANTAGES:

True Sinewave Output: The maximum harmonic distortion under the worst combination of conditions is less than 2%. Under normal operating conditions, less than 1.5% is typical.

Tight Frequency Control: The output frequency is completely unaffected by load and line variations. If desired, the output frequency can be phase-locked to the commercial line or other reference source. 0.5% stability is standard.

Minimum Maintenance: Modular construction throughout permits quick access to and exchange of any component. A MTTR of less than 30 minutes is typical. Cleaning the air filter is the only required preventive maintenance, other than battery watering. In non-redundant systems, the by-pass switch is used to supply power to the critical load directly from the commercial lines during maintenance.

Low Cost of Ownership: Avtel's low maintenance, high efficiency and trouble-free operation yield substantial savings over other approaches to uninterruptible power. This advantage becomes increasingly significant with time, and savings of over 50 percent overall in ten years ownership are not improbable.

Silent Operation: Unlike rotary systems which produce substantial noise and vibration, these compact and silent units can be installed in close proximity to the load with which they are associated thereby avoiding expensive installations.

High Power Density: These systems are the smallest and lightest yet offered in these power ranges. For example, a 125 KVA system occupies only 35 square feet of floor space, exclusive of batteries.

Unprecedented Efficiency: Operating efficiencies frequently exceed 85%. This low dissipation allows laboratory operation without special cooling considerations.

RFI Suppression: Careful and effective filtration of both the input and output lines, together with ample shielding afford RFI attenuation far superior to other uninterruptible systems.

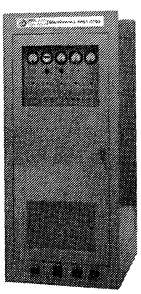
Choice of Outputs: Avtel's UPS can be ordered in standard 460 V, 60 Hz models or 50 Hz versions at voltage levels found in overseas installations. A complete line of 400 Hz models is also available.

Rapid Response Time: Regulation response time is typically faster than 9 ms at nominal line conditions for a 100% step load change.

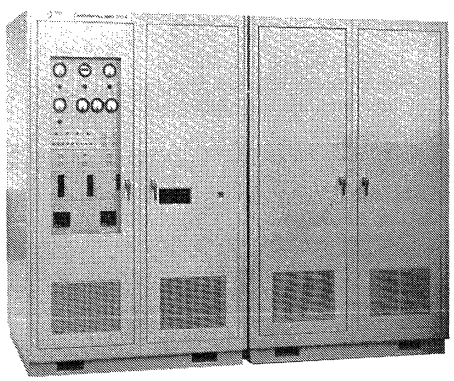
Standard Models, 45-66 Hz (Detail Specifications Similar to the CR Series Described on the Following Pages)

Model	Output Power (KVA)	Phases	Size (W x D x H)
UPS .1*	1.25	1	17 x 22 x 10.5
UPS 2*	2.5	1	17 x 22 x 17.5
UPS 5*	5	1	17 x 22 x 35
UPS 5-3	5	3	24 x 36 x 60
UPS 7	7.5	1/3	24 x 36 x 60
UPS 10	10	3	24 x 36 x 84
UPS 15	15	3	48 x 36 x 84
UPS 20	20	3	48 x 36 x 84
UPS 25	25	3	48 x 36 x 84
UPS 37	37.5	3	72 x 36 x 84
UPS 50	50	3	72 x 36 x 84
UPS 62	62.5	3	96 x 36 x 84
UPS 100	100	3	120 x 36 x 84
UPS 125	125	3	120 x 36 x 84
UPS 250	250	3	192 x 36 x 84

*Avtel's New "Mini-UPS" Series
Note: Consult the Factory for Systems Above 250 KVA



7.5 KVA UPS



62.5 KVA UPS

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AVTEL SOLID STATE TRANSFER SWITCH

Figure A

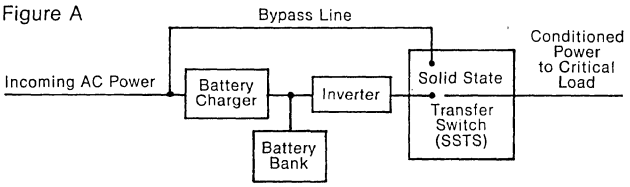


Figure B

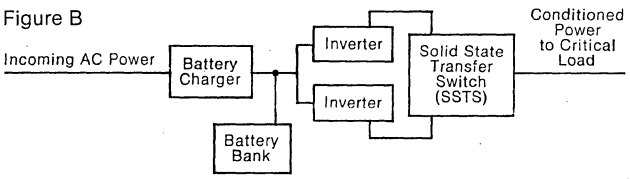
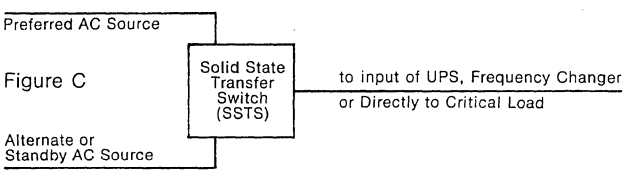


Figure C

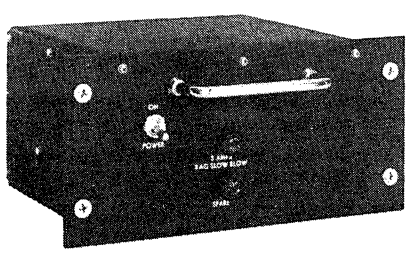


50 MICROSECOND TRANSFER TIME

Avtel's revolutionary solid state transfer switch (SSTS) represents a significant breakthrough in handling AC power. Available in single or three-phase configurations in power levels up to hundreds of KVA, Avtel's SSTS is capable of a complete power transfer between unsynchronized sources in typically 50 microseconds. 500 microseconds is worst-case under any conditions. Internally protected against overloads and short circuits, Avtel's SSTS has many applications. As an optional accessory for an Uninterruptible Power System or Frequency Changer (Figure A), the SSTS can be used as an automatic bypass to transfer power back to the input line in the event the inverter output exceeds specifications units. It can be used for paralleling inverter outputs in redundant system configurations (Figure B). In such systems the inverters are normally sharing the load but in the event of internal failure the faulted inverter is switched off line. If desired, this sort of system can be configured so that one or more inverters are on line and the others off line. The switch then selects on a preferred basis. The SSTS can also be used independently of an UPS (Figure C) for selecting between preferred (prime) and alternate (standby) power sources.

To effectively achieve transfer upon the degradation of on-line power without creating constant switching due to load transients and the like, Avtel has developed a unique high-speed sensor which is capable of distinguishing faults from normal line deviations yet triggering the SSTS whenever an actual problem occurs.

MILITARY ENVIRONMENT FREQUENCY CONVERTERS



Model: TRM 036-1
400 Hz, 1ϕ to 60 Hz, 1ϕ, 350 VA—Qualified to MIL-E-5400J, Airborne

UNIQUE FEATURES

Extremely Small Size: 8″ x 8″ x 5″—High packaging density saves critical space—Fits in many otherwise unusable areas.

Lightweight: Approximately 16 lbs. About half the weight of competitive models.

Rugged: All solid state. Meets Mil Spec MIL-T-5422 for shock.

Overload Protected: Internally protected against overloads and shorts.

High Efficiency: In excess of 80%.

MIL Qualified: All solid state, rugged construction. Qualified for sand, dust, vibration, fungus, humidity and salt atmosphere portion of MIL-E-5400J, and shock per MIL-T-5422.

NOTE: Many Avtel CR, TR, and UPS Series are available in military versions.

SPECIFICATIONS

Input:	115 VRMS, ±10%, 400 Hz, ±10% 1ϕ
Output Voltage:	115 VRMS, 1ϕ
Voltage Regulation:	±2% for all conditions of line, load, and temperature
Output Frequency:	60 Hz
Frequency Regulation:	±0.5% for all conditions of line, load, and temperature
Output Power:	350 VA
Output Configuration:	Single-phase sine wave
Distortion:	5% THD at rated load, 7% THD maximum for all conditions of line, load, and temperature
Output Power Factor:	0.75 leading to 0.75 lagging
Efficiency:	80%
MTBF:	In excess of 10,000 hours at 65°C, airborne per MIL-HDBK-217A
Operating Temperature:	−20°C to +65°C
Altitude:	Sea level to 50,000 feet
Relative Humidity:	To 95%
Other Environmental Considerations:	Qualified for sand and dust, vibration, fungus, humidity and salt atmosphere to MIL-E-5400J; shock per MIL-T-5422
RFI:	Qualified to MIL-I-6181D
Physical Size:	8″ x 8″ x 5″
Weight:	Approximately 16 pounds

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HIGH POWER SOLID STATE FREQUENCY CHANGERS

CR SERIES

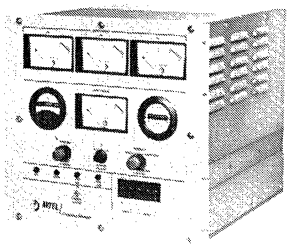
2.5 to 175 KVA. 45-66 and 400 Hz input. 45-66, 350-450, or 700-900 Hz output available.

Efficient, reliable and silent in operation, these completely solid state electronic systems are ideal for any application requiring AC power in the KVA ranges. In this series, there are 27 standard models in ten power ratings from 2.5 KVA to 175 KVA. Three output frequency bands are available from 45 to 66, 350 to 450, and 700 to 900 Hz. Most frequency and power ratings are available with either single or polyphase output. Unique electronic circuitry provides complete protection from overloads or short circuits.

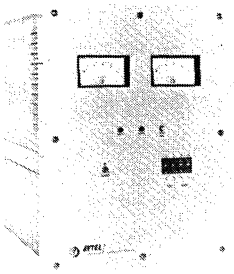
These highly versatile and rugged units are capable of fulfilling the majority of AC power source requirements. Twenty-six standard options are offered to meet virtually any special or unusual requirement for conditioned AC power.

The unique design of this equipment results in an AC source which is a direct replacement for motor alternator sets, but with the following superior characteristics:

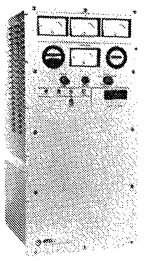
Output frequency unaffected by load.
Low acoustical noise.
Efficiencies approaching 90%.
Instant starting.
Sinewave output with less than 2% total harmonic distortion.
Ease of frequency variation.
No maintenance required.
Lightweight.
Impervious to overloads.
Remote sensing.
Remote programming.
Low cost of ownership.



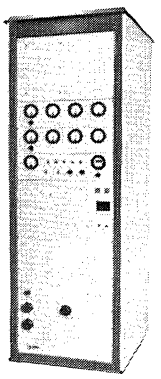
CR 074-3 7.5 KVA, 400 Hz, 3-Phase



CR 056-1 5 KVA, 60 Hz, 1-Phase



CR 204-3 20 KVA, 400 Hz, 3-Phase



CR 504-3 50 KVA, 400 Hz, 3-Phase

INPUT

Voltage: 187 to 242 for nominally 120/208 volt input units. Allows connection to 230 three wire without modification.
±10% of nominal for all other AC inputs. See Options B through G.

Power:

Output Frequency Band	Percent of Full Load Rating
45-66 Hz	116
350-450 Hz	125
700-900 Hz	135

Frequency: 45-66 Hz. See Option B, C & H.

OUTPUT

Voltage: Adjustable. See Options I & K.

Current: Adjustable. See Options J & L.

Power Rating: Based on continuous duty.

Frequency: Continuously adjustable over the entire operating band. See Options M through R.

Bands: 45-66, 350-450, 700-900 Hz.

Regulation:

Voltage:	±1% or 0.5 V
Current:	±1% or 1 ampere
Frequency:	±0.50% for variable frequency operation
	±0.010% for fixed frequency operation

Distortion: For linear loads, the output sinewave contains less than 2% total harmonic distortion. See Option U.

Power Factor: 0.7 lead to 0.7 lag for full rated power. Power factor loads to 0.2 are permissible with load ratings of 50%.

Phase Balance: 2% typical deviation for 50% load unbalance in any combination. 0.25% for any balanced load.

Transient Response: Typically 20 ms but may vary from 4 to 100 ms depending on model and options.

Incidental Modulation:

Amplitude:	Varies 0.1 to 1% peak to peak depending on model and options.
Frequency:	Less than 0.05% for variable frequency operation and negligible for fixed frequency operation.

CONTROLS

Input: Toggle-operated circuit breakers.

Output: Toggle switch drives regulator to zero output condition in standby position.

Voltage Control: Adjusts output voltage.

Current Control: Adjusts output current limit.

Frequency Control: Adjusts output frequency.

Frequency Selector: Selects discrete frequencies. Options P & R only.

Voltmeter Switch: Selects voltmeter circuit.

Function Switch: Selects operating mode. Options M through O only.

METERS & INDICATORS

Meter Accuracy: 2% of full scale.

Meter Functions: Input/output voltmeter. Independent ammeter for each output phase.

Indicators: Input power • Output power • Overload • Overheat • Phase sequence (3-phase units).

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AVTEL

SOLID STATE AC POWER FOR CRITICAL APPLICATIONS

AVTEL

PROTECTION CIRCUITS

Load: Widely adjustable current limiting capability can be set to the maximum normal requirements of the load. In the event of load malfunction, the unit will become a constant current source at the set limit.

Overload: The unit cannot be damaged by any overload or short circuit of transient or indefinite duration. Finite overloads are permitted for periods inversely proportional to the magnitude of the overload. When the permissible overload limitations are exceeded, the output voltage will reduce to such value as necessary to produce the load current limit set by the current adjust control. If the load instantaneously exceeds 150% of ratings, the output voltage will reduce to zero. If the load is gradually increased, the current will limit at 125% or the set point, whichever is lower. Reduction of the load to specification limits or current control settings will automatically reinstate normal operation.

Overheat: The output is interrupted by thermo-switches in the event of excessive internal temperatures. In such event, the cooling fan continues to operate and upon reduction of internal temperatures to specification limits, normal operation is automatically reinstated.

Backup Protection: The input power line is protected by a toggle-operated magnetic circuit breaker which doubles as the primary input and power switch. In the event of electronic protection circuitry malfunction or component failure in the power system, these breakers will prevent consequential damage to the unit, its load or the input power source.

ENVIRONMENTAL

Operating Temperature: 0 to 50°C, continuous operation.
Storage Temperature: −20 to +71°C.
Humidity: 0 to 95%. R.H., non-condensing.
Shock & Vibration: Normal transportation and handling.

ELECTROMAGNETIC INTERFERENCE

Constructed in accordance with Military EMI/RFI requirements.

CONSTRUCTION

Welded frame covered with easily removable non-structural dust covers. See Option X & Y.

OPTIONS

See last page.

PRICE

For price quotations, specify model number and options.

KVA	Output Volts	Phases	Input Volts	Rack Mount Dimensions			Unitized Dimensions			Weight†	Model No.*
				Height	Width	Depth	Height	Width	Depth		
350-450 or 700-900 Hz Output with 45-66 Hz, 3-Phase Input											
2.5	120/208	3	115/200	17.5	19	21	17.25	17	21	175	CR 024-3
2.5	120	1	115/200	17.5	19	21	17.25	17	21	185	CR 024-1
5	120/208	3	115/200	17.5	19	21	17.25	17	21	190	CR 054-3
5	120	1	115/200	17.5	19	21	17.25	17	21	205	CR 054-1
7.5	120/208	3	115/200	17.5	19	21	17.25	17	21	220	CR 074-3
7.5	120	1	115/200	31.5	19	24	31.25	17	24	240	CR 074-1
10	120/208	3	115/200	31.5	19	24	60	24	36	315	CR 104-3
10	120	1	115/200	31.5	19	24	60	24	36	330	CR 104-1
15	120/208	3	115/200	31.5	19	24	60	24	36	350	CR 154-3
20	120/208	3	115/200	47	19	24	60	24	36	430	CR 204-3
37.5	120/208	3	460	—	—	—	84	24	36	2000	CR 374-3
50	120/208	3	460	—	—	—	84	24	36	2200	CR 504-3
100	440	3	460	—	—	—	84	48	36	4400	CR 1004-3
150	440	3	460	—	—	—	84	72	36	6000	CR 1504-3
175	440	3	460	—	—	—	84	72	36	6500	CR 1754-3
45-66 Hz Output With 45-66 Hz, 3-Phase Input											
2.5	120/208	3	115/200	17.5	19	21	17.25	17	21	225	CR 026-3
2.5	120	1	115/200	17.5	19	21	17.25	17	21	245	CR 026-1
5	120/208	3	115/200	24.5	19	24	24.25	17	24	310	CR 056-3
5	120	1	115/200	24.5	19	24	24.25	17	24	355	CR 056-1
7.5	120/208	3	115/200	31.5	19	24	31.5	17	24	390	CR 076-3
7.5	240	1	115/200	31.5	19	24	31.5	17	24	435	CR 076-1
10	120/208	3	115/200	47	19	24	60	24	36	1100	CR 106-3
10	240	1	115/200	47	19	24	60	24	36	1175	CR 106-1
15	120/208	3	115/200	47	19	24	60	24	36	1200	CR 156-3
15	240	1	115/200	47	19	24	60	24	36	1400	CR 156-1
20	120/208	3	460	—	—	—	60	24	36	1700	CR 206-3
20	240	1	460	—	—	—	84	24	36	2000	CR 206-1
37.5	440	3	460	—	—	—	60	48	36	3600	CR 376-3
50	440	3	460	—	—	—	84	48	36	4500	CR 506-3
125 (and above) Various CR and UPS Models available. Consult the factory.											

*Third digit specifies frequency, for example: CR 024-3 = 400 Hz; CR 028-3 = 800 Hz.
†Weights given are for rack mount versions when available. Options frequently affect size and weight. Please consult the factory when ordering options.

Specifications subject to change without notice.

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LOW POWER SOLID STATE FREQUENCY CHANGERS

AVTEL

TR SERIES

250-2000 VA—45 to 450 Hz Input. 50/60, 400, 800, or 1600 Hz Output available on most models.

The low power Avtel TR Series Frequency Changers are all transistorized sources of conditioned AC power. Available in 20 standard models from 250 VA to 2000 VA, the TR Series supplies output frequencies in four different bands: 45-66 Hz, 350-450 Hz, 700-900 Hz, and 1500-1700 Hz.

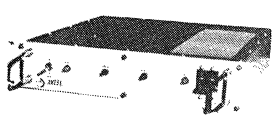
The unique design of TR Frequency Changers ensures that output waveform and frequency are unaffected by changes in the load. The unit is quiet, maintenance free, and impervious to overloads and short circuits. Avtel's TR Series Frequency Changers are the ultimate solution to smaller load applications where well-regulated AC power is essential.

Specifications for Standard Units (less options)

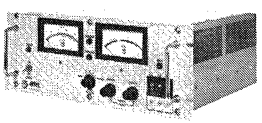
Output			19" Rack Mount			
VA	Volts	Phases	Height	Depth	Weight	Model No.*
45-66 Hz Output With 115 V, 45-450 Hz, 1-Phase Input						
250	120/208	3	5.25	17	45	TR 026-3
250	120	1	5.25	17	60	TR 026-1
500	120/208	3	7.0	17	75	TR 056-3
500	120	1	7.0	17	85	TR 056-1
1000	120/208	3	8.75	22	125	TR 106-3
1000	120	1	8.75	22	140	TR 106-1
1500	120/208	3	10.05	22	150	TR 156-3
1500	120	1	10.5	22	160	TR 156-1
2000	120/208	3	12.25	22	175	TR 206-3
2000	120	1	12.25	22	190	TR 206-1
350-450 or 700-900 Hz Output With 115 V, 45-450 Hz, 1-Phase Input						
250	120/208	3	3.5	17	40	TR 024-3
250	120	1	3.5	17	45	TR 024-1
500	120/208	3	3.5	17	55	TR 054-3
500	120	1	3.5	17	55	TR 054-1
1000	120/208	3	7.0	17	95	TR 104-3
1000	120	1	7.0	17	95	TR 104-1
1500	120/208	3	8.75	17	115	TR 154-3
1500	120	1	8.75	17	125	TR 154-1
2000	120/208	3	10.5	17	150	TR 204-3
2000	120	1	10.5	17	160	TR 204-1

*Third (and fourth) digit specifies frequency, for example: TR 024-3 = 400 Hz; TR 028-3 = 800 Hz; TR 0216-3 = 1600 Hz.

Specifications subject to change without notice.



TR 054-3 (System)
500 VA, 400 Hz, 3-Phase



TR 104-3 (Lab)
1000 VA, 400 Hz, 3-Phase

The TR Series systems version is designed for continuous unattended optration. It has limited controls on the front panel (status indicators, breaker, and standby switch) with adjustments located on the rear of the unit. The laboratory version is fully metered, with frequency, voltage, and current adjustments on the front panel. This model is ideally suited for use as precision test equipment.

INPUT

Voltage: 115 volts ±10% is standard. See Options B, E, F, G & H.

Frequency: 45-450 Hz. See Options A and H. 45 to 1200 Hz also available upon request.

OUTPUT

Voltage: 120 VRMS. Lab models, 95-130 VRMS.

Current: 75-120% of full rating with automatic voltage-current crossover, adjustable on lab models.

Frequency: ±0.5% fixed frequency is standard on system models. Crystal controlled output with 0.01% regulation at 50, 60, 400, 800, or 1600 Hz available. Continuously adjustable frequency over the respective band on lab models.

Bands: 45-66, 350-450, 700-900, 1500-1700 Hz.

Regulation:
Voltage: ±1%
Current: ±2%
Frequency: ±0.5% for variable frequency
±0.01% for fixed frequency, Option Q

Distortion: ±2% THD maximum for linear loads.

Power Factor: 0.7 lead to 0.7 lag.

PROTECTION

Automatic protection and recovery from overloads, short circuits and overheating.

SYSTEM VERSION—CONTROLS AND INDICATORS

Input: Circuit breaker.

Standby: "Standby" toggle switch.

Voltage Control: Rear mounted screwdriver adjustment for output voltage.

Current Control: Read mounted screwdriver adjustment for current limit.

Frequency Control: On variable frequency units only.

Indicators: Front panel indicators for input power, output power, overload and overheat.

LAB VERSION—CONTROLS AND INDICATORS

Input and Standby: Identical to system version.

Indicators: Same as system version.

Voltage, Frequency and Current Controls: Front panel knobs provided.

Voltmeter: Input/output voltmeter.

Ammeter: Output ammeter.

Frequency Meter: On variable frequency models only, Option S & T.

Voltmeter-Ammeter Switch: Used to select input or output phase.

ENVIRONMENTAL

Operating Temperature: 0 to 50°C.

Storage Temperature: −20 to +71°C.

Humidity: 0 to 95% R.H., non-condensing.

Shock and Vibration: Normal transportation and handling.

ELECTROMAGNETIC INTERFERENCE

Constructed in accordance with Military EMI/RFI requirements.

CONSTRUCTION

Rack mount packaging is standard. Connectors are rear-mounted with mating connectors provided.

OPTIONS

See last page.

PRICE

For price quotations, specify model number, options and system or lab version.

AVTEL CORPORATION 1130 East Cypress Street, Covina, California 91722
Division of Airtronics, Inc. Phone (213) 331-0661 TWX (910) 584-1311

CONDITIONED AC POWER FOR ANY APPLICATION

OPTIONS FOR STANDARD MODELS

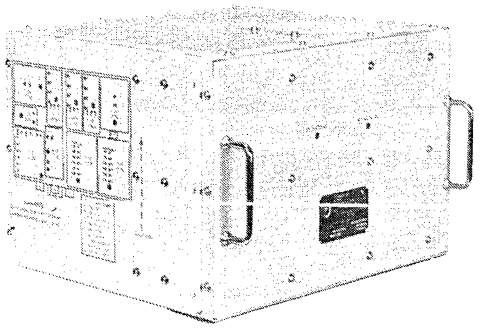
Options A through G available on most models. Options H through Z available on all models.

Option	Description
A.	Switchable delta/wye output with dual-range meter scales and front panel mode indicator.
B.	105-140 VDC input (to 2 KVA).
C.	210-280 VDC input (above 2 KVA).
D.	115 V, single-phase input.
E.	230 V, single-phase input.
F.	115/200, three-phase input.
G.	380, 410, 440, 460 or 480 V three-phase input (please specify).
H.	115/200, 45-450 Hz three-phase input (460 V for above 20 KVA).
I.	Output voltage adjustable from 0 to 135 VRMS via front panel control for CR, 10 to 130 VRMS for TR.
J.	Output current limit adjustable from 10-125% of rated output via front panel control.
K.	Output voltage adjustable from 95 to 135 VRMS via front panel control for CR, 95 to 130 VRMS for TR.
L.	Output current limit adjustable from 75-125% of rated current via front panel control.
M.	External synchronization from pulse, sine or complex waveform sources.
N.	Output phase lock for parallel on-line operation.
O.	Phase lock and load coupler for parallel operation of 2 or more units. This option has provisions for alarm and automatic shut-down of a malfunctioning unit.
P.	Fixed frequency operation in addition to standard variable frequency selectable by front panel switch. The fixed frequency has a tolerance of 0.01% for the combined effects of line, load and environmental extremes and can be supplied at any frequency within the band.
Q.	Single fixed frequency operation in lieu of variable frequency. (0.01% tolerance.)
R.	Multiple fixed frequency operation, switch-selected. No variable frequency. (±0.01% tolerance.)
S.	Frequency meter, dial and pointer type—specify range and accuracy.
T.	Frequency meter, Reed type. Covers full range of unit.
U.	Output waveform—1% THD maximum.
V.	Qualified to MIL-I-6181, MIL-STD-826 or MIL-STD-461.
W.	Running time meter, 0-9999 hours. Recycles at 10,000 hours.
X.	Unitized construction for application where rack-mounting is not intended.
Y.	Unitized construction, mounted on rubber-tired, full castering wheels. (CR models only.)
Z.	120 V Delta output (three-phase models only).

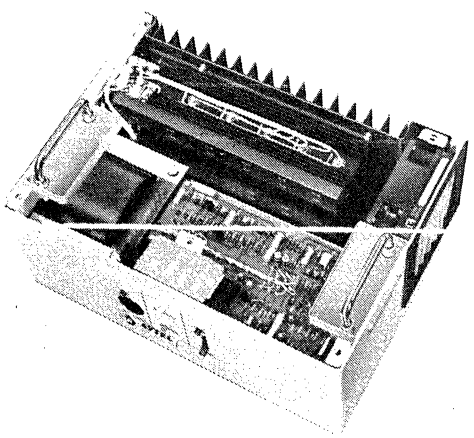
Note: Certain options effect equipment size and weight. When specifying options, please check with the factory for equipment physical characteristics.

UNPARALLELED RELIABILITY

Avtel's design practices incorporate maximum derating of critical components, modular construction and minimum components consistent with performance. Add the minimum 200-hr burn-in all Avtel equipment receives prior to shipment, and you can be assured of maximum availability of continuous, transient-free, conditioned power.



Military Power Source
50-400 Hz input, 28 VDC, 5A and 1 KVA, 400 Hz, 3-phase output.



Strain Gauge Power Supply
This unit, developed for a research rocket aircraft, is one-third size and weight of the equipment it replaces.
Input: 115 Volts AC, 400 Hz, 3-phase.
Output: 12 Volts DC at 10 Amperes.
Voltage Regulation: 0.1% for combined effects of line, load and temperature variations.

Twelve years ago, Avtel specialized in solid state power conversion equipment and has concentrated its efforts in this area ever since. Whatever your individual power conversion requirements may be, you are assured that our technical staff will give them prompt and skillful analysis. With over 200 custom designs and years of systems experience, these power conversion specialists appreciate the value of timely recognition and consideration of potential problem areas associated with integrating power sources into complex systems. In the interest of precluding systems interface problems, Avtel offers the assistance of its applications engineers to study your requirements and formulate suitable specifications.

Note: Avtel also manufactures subcarrier oscillators. Consult your local representative.

AVTEL CORPORATION 1130 East Cypress Street, Covina, California 91722
Division of Airtronics, Inc. Phone (213) 331-0661 TWX (910) 584-1311

BULOVA AC POWER SUPPLIES

Features

All new . . . with more VA per output per dollar . . . Bulova AC Power features Fully Regulated Sine Wave—All Solid-State Design—Up to 2500 VA Output—Protected Input/Output

Performance Specifications:

OUTPUT:

Frequency Output: 50 or 60 Hz (standard)—any other specific frequency custom

Frequency Accuracy: ±1%, ±.015% or ±.005%

Temperature Range: 0°C to +50°C

Wave Shape: Sine Wave, 3% Distortion max.

Output Voltage: 115 or 230 V AC nominal

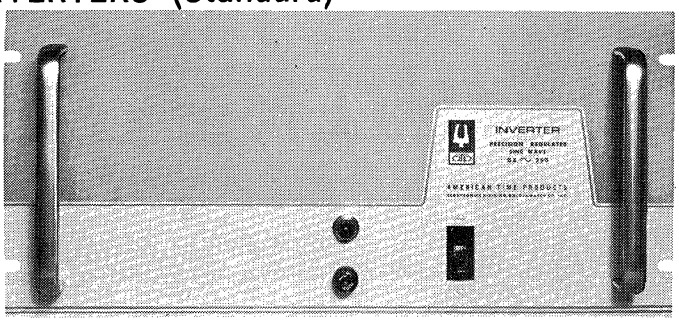
Voltage Regulation: ±1% any combination of full line and load change

INPUT:

115V AC or 230V AC, ±10%; 22 to 30V DC Normal (11 to 15V DC, and 45 to 56V DC available)

Some models available from stock . . . custom designs to meet special needs for systems, equipment or laboratory use, up to 2500 VA and ±.005% frequency accuracy. Meters are optional.

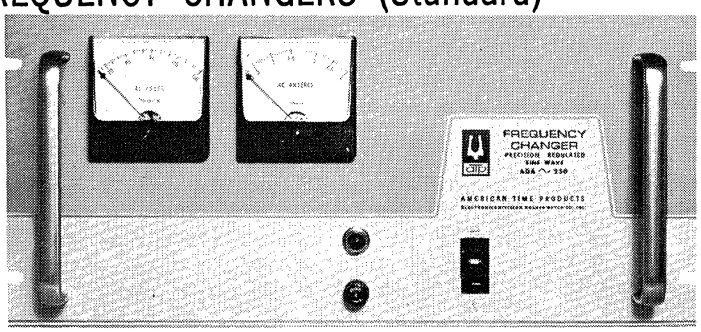
INVERTERS (Standard)



Type	Input VDC	Output VA	Output Freq. Hz	Output Volt	Wt. Lbs. (2)	Dimensions (For 19" Rack) H	Dimensions (For 19" Rack) D
DA-100S	22-30	100	50 or 60	115 (1)	65	5¼"	13"
DA-250S	22-30	250	50 or 60	115 (1)	70	8¾"	13"
DA-500S	22-30	500	50 or 60	115 (1)	130	10½"	15"
DA-1000S	22-30	1000	50 or 60	115 (1)	170	14"	24"

(1) 230 Volt Available (2) For 50 Hz, add about 5 lbs.

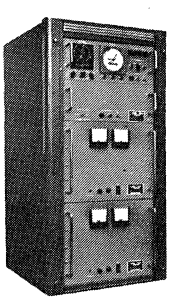
FREQUENCY CHANGERS (Standard)



Type	Input VAC. ±10%	Input Freq. Hz	Output VA	Output Freq. Hz	Output Volt	Wt. Lbs. (2)	Dimensions (For 19" Rack) H	Dimensions (For 19" Rack) D
ADA-100S	115/230	47-65	100	50-60	115	75	5¼"	13"
ADA-250S	115/230	47-65	250	50 or 60	115 (1)	80	8¾"	13"
ADA-500S	115/230	47-65	500	50 or 60	115	130	10½"	15"
ADA-1000S	115/230	47-65	1000	50 or 60	115	170	14"	24"

(1) 230 Volt Available (2) For 50 Hz, add about 5 lbs.

MASTER TIME-OF-DAY SYSTEMS



ATP has a new series of frequency stabilized master time-of-day systems. Systems are available to drive up to 500 synchronous clocks. Features include:

- Accuracy up to ±1 second per year
- Automatic switchover to batteries in case of power failure
- Modular construction for expansion
- Semi-automatic correction of clocks with .1 second accuracy

NON-INTERRUPTIBLE POWER SYSTEMS

ATP offers a line of non-interruptible power systems up to 1000VA. These systems can be supplied as non-redundant or redundant systems. Typical features include:

- Voltage Stability: ±5% from no-load to full load
- Frequency Accuracy: up to .0005%
- Modular construction for expansion
- Maintains AC power to load without interruption

Manufacturer of the widest range of Frequency Control Components: Crystals ● Crystal Oscillators ● Crystal Filters ● LC Filters ● Tuning Forks ● Fork Oscillators ● Ovens ● Coils ● Servo Amplifiers

BULOVA atp

BULOVA AMERICAN TIME PRODUCTS

ELECTRONICS DIVISION
OF BULOVA WATCH COMPANY, INC.

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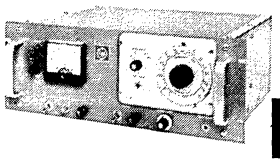
WOODSIDE, N. Y. 11377 • 212 335-6000

CML MACARR, INC.
subsidiary of Tenney Engineering, Inc

single phase AC power supplies

NS series 70VA to 350VA

OUTPUT VOLTAGE: Adjustable 0-125 Volts; full power available at output of 110-125 Volts.



MODEL NS175-7A-V

MODEL	OUTPUT POWER VOLT-AMPERES	*DIMENSIONS H x W x D	WEIGHT (APPROX.) LBS.
NS70	70	7" x 19" x 14"	53
NS120	120	7" x 19" x 14"	57
NS175	175	7" x 19" x 14"	60
NS350	350	8¾" x 19" x 20¾"	115

* Dimensions apply to standard rack mount models. Add ¾" to height if bench adapters are included.

NS Series Oscillators**

	OUTPUT FREQUENCY	FREQUENCY STABILITY ±0.25%	±0.1%	±0.01%	±0.001%
		SUFFIX #			
Fixed	400 Hz	—4A	—4B	—4E	—4G
Fixed	800 Hz	—8A	—8B	—8E	—8G
Fixed	50 Hz	—1A	—1B	—1E	Special
Fixed	60 Hz	—2A	—2B	—2E	Order
	Selectable 50/60/400/800 Hz	—9A	—9B	X	X
Adjustable	350-450 Hz	—5A	—5B	X	X
Adjustable	45-70 Hz	—3A	—3B	X	X
Adjustable	300-2,000 Hz	—6A	—6B	X	X
Adjustable	45-6,000 Hz	—7A	X	X	X

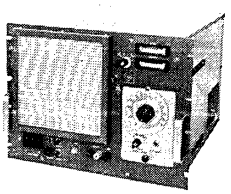
**AUDIO AMPLIFIER ONLY: Each model is also available as an audio power amplifier only (without a built-in oscillator) with a full power range of 45-6,000 Hz. All standard models include an input signal jack for use with external signal source. Specify the Basic Power Supply Model and Suffix # (—JA) if oscillator is not required.

NA series 500VA to 15KVA

OUTPUT VOLTAGE: Adjustable 0-125 Volts; full power available at output of 110-125 Volts.

MODEL	OUTPUT POWER—VA	INPUT	*DIMENSIONS H x W x D	WT. APPROX. LBS.
N500A	500	115V, 1φ 47-65 Hz	8¾ 19 21	175
N750B	750	115V, 1φ 47-65 Hz	8¾ 19 21	180
N750A	750	208/230V, 3φ, 47-65 Hz	14 19 20½	260
N1000A	1,000	208/230V, 3φ, 57-65 Hz	14 19 20½	270
N1500A	1,500	208/230V, 3φ, 47-65 Hz	14 19 20½	315
N1500B	1,500	208/230V, 3φ, 57-65 Hz	14 19 20½	315
N2000A	2,000	208/230V, 3φ, 47-65 Hz	14 19 20½	325
N2000B	2,000	208/230V, 3φ, 57-65 Hz	14 19 20½	325
N5000A	5,000	208/230V, 3φ, 57-65 Hz	51 24 24	850
N15000A	15,000	208/230V, 3φ, 57-65 Hz	47 68 24	1600

* 500VA to 2000VA units are standard rack mount models. Add ¾" to height if bench adapters are included. 5000VA and 15000VA units are cabinet models. Model N5000A includes casters.



MODEL N1000A
With SG-17A Plug-in Oscillator

NA Series Oscillators***

	OUTPUT FREQUENCY	FREQUENCY STABILITY ±0.25%	±0.1%	±0.01%	±0.001%
		MODEL #			
Fixed	400 Hz	SG-14A	SG-14B	SG-14E	SG-14G
Fixed	800 Hz	SG-18A	SG-18B	SG-18E	SG-18G
Fixed	60 Hz	SG-12A	SG-12B	SG-12E	Special
Fixed	50 Hz	SG-11A	SG-11B	SG-11E	Order
	Selectable 50/60/400/800 Hz	SG-19A	SG-19B	X	X
Adjustable	350-450 Hz	SG-15A	SB-15B	X	X
Adjustable	45-70 Hz	SG-13A	SG-13B	X	X
Adjustable	300-2,000 Hz	SG-16A	SG-16B	X	X
Adjustable	45-6,000 Hz	SG-17A	X	X	X
	45-6,000 Hz	EXTERNAL SIGNAL ADAPTER Model SA-2			

***All Plug-in-Oscillators are provided with a jack for external signal drive.

- Fixed or Adjustable Output Frequencies between 45 & 6000 Hz
- Each model can be operated either as a precision AC Power Supply or as Regulated Audio Power Amplifier
- Minimum package sizes . . . 2000 VA in 14" rack height, 750 VA in 8¾" rack height
- Instantaneous Overload Protection
- Interchangeable Plug-in Oscillators Frequency Stabilities to 0.001%
- Constant Voltage Output, 0.5% regulation — response time less than 50 microseconds
- Low Distortion Sinewave Output, less than 1% 300 to 1000 Hz, less than 3% 45 to 6000 Hz
- Full Rated Output into Load Power Factors of 0.7 Lead or Lag to Unity

Write or Call for Complete Specifications

CML MACARR, INC.

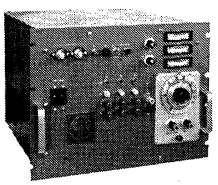
167 National Road, Edison, New Jersey 08817 / (201) 287-2810 • TWX 710-998-0560 • FMC 00062

CML MACARR, INC.
subsidiary of Tenney Engineering, Inc

three phase AC power supplies

- **Minimum Package Sizes** . . . 2500 VA in 14" rack height.
- **Interchangeable Plug-in Oscillators** . . . 23 standard oscillators are available—to provide fixed or adjustable output frequencies between 45 and 6,000 Hz and stabilities to ±0.001%.
- **Instantaneous Overload Protection** . . . An overload of any one phase causes complete output shutdown, protecting 3 phase load.
- **Dual Output Voltage for △ or Y Loads** . . . Adjustable voltages 0-125 volts line-to-line as well as 0-217 volts line-to-line are presented at output terminals; output is isolated for maximum versatility.
- **Constant Voltage Output** . . . 0.5% regulation for no load to full load change.
- **Response time less than 50 microseconds.**
- **Output Voltage** unaffected by unbalanced loads.

TA series 150VA to 20KVA



Model T2500A with SG-36B oscillator

Three Phase Amplifiers

MODEL	3φ OUTPUT POWER—VA	INPUT	DIMENSIONS H x W x D			WT. APPROX. LBS.
T150A	150	115V, 1φ, 47-65 Hz	7	19	17	105
T300B	300	115V, 1φ, 47-65 Hz	12¼	19	20	180
T500B	500	115V, 1φ, 47-65 Hz	12¼	19	20	190
T750A	750	208/230V, 3φ, 47-65 Hz	14	19	20½	275
T1200A	1,200	208/230V, 3φ, 57-65 Hz	14	19	20½	285
T1750A	1,750	208/230V, 3φ, 47-65 Hz	14	19	20½	365
T1750B	1,750	208/230V, 3φ, 57-65 Hz	14	19	20½	355
T2500A	2,500	208/230V, 3φ, 47-65 Hz	14	19	20½	365
T2500B	2,500	208/230V, 3φ, 57-65 Hz	14	19	20½	355
T5000A	5,000	208/230V, 3φ, 47-65 Hz	45	24	24	950
T15000A	15,000	208/230V, 3φ, 57-65 Hz	78	35	36	1700
T20000A	20,000	208/230V, 3φ, 57-65 Hz	78	35	36	1900

Single Phase & Two Phase Output

Standard 3 phase amplifiers may be used to provide a 2 phase output at ⅔ of rated output power. Special plug-in oscillators are available with selectable 90° or 120° phase separation for 2 phases or 3 phase operation respectively.
Standard 3 phase amplifiers may be used to provide a single phase output at 57% of rated output power over an adjustable voltage range of 110-125 volts.

Write or Call for Complete Specifications

Specifications

OUTPUT CONFIGURATION: Three Phase, 4 wire wye, neutral floating.

OUTPUT VOLTAGE: 0-125 Volts line-to-line and 0-217 Volts line-to-line; both sets of terminals are presented at output. Full power available at output of 110-125 volts and 190-217 volts. Master gain control and phase 2 and 3 trim controls provided on front panel.

OUTPUT POWER: Rated output power for each model is shown in chart. Maximum power per phase is ⅓ of 3φ output.

LOAD POWER FACTOR: 0.7 lead or lag to unity at rated output; wider power factor range with slight derating.

FREQUENCY RANGE: Each amplifier model is rated at full power 45-6,000 Hz except for the models T15000A and T20000A which have a 300-500 Hz full power range. The operating output frequency range is determined by the particular plug-in oscillator which is used.

HARMONIC DISTORTION: Less than 3% over the entire 45-6,000 Hz amplifier range; less than 1%, 300-1000 Hz.

HUM AND NOISE: 60 db below maximum output voltage.

OUTPUT PHASE SEPARATION: 120 ±1° for fixed frequency models as well as 350-450 Hz models. 120 ±2° for 45-70 and 300-2,000 Hz models. 120 ±3° for 45-6,000 Hz models.

CONSTRUCTION: Models rated 150VA to 2500VA are standard 19" rack mount units with full dust covers. Bench adapters available as accessories for these models; specify suffix (—C). Side support is recommended for rack mount models. Slides are available as optional accessories; specify suffix (—S). 5KVA-20KVA models are furnished complete in cabinet enclosure. 5KVA model includes casters.

Plug-in Oscillators

	3φ OUTPUT FREQUENCY	FREQUENCY STABILITY ±0.25%	±0.1%	±0.01%	±0.001%
		MODEL #			
Fixed	400 Hz	SG-34A	SG-34B	SG-34E	SG-34G
Fixed	800 Hz	SG-38A	SG-38B	SG-38E	SG-38G
Fixed	60 Hz	SG-32A	SG-32B	SG-32E	Special Order
Fixed	50 Hz	SG-31A	SG-31B	SG-31E	Special Order
Adjustable	Selectable 50/60/400/800 Hz	SG-39A	SG-39B	X	X
Adjustable	350-450 Hz	SG-35A	SG-35B	X	X
Adjustable	45-70 Hz	SG-33A	SG-33B	X	X
Adjustable	300-2,000 Hz	SG-36A	SG-36B	X	X
Adjustable	45-6,000 Hz	SG-37A	X	X	X

CML MACARR, INC.

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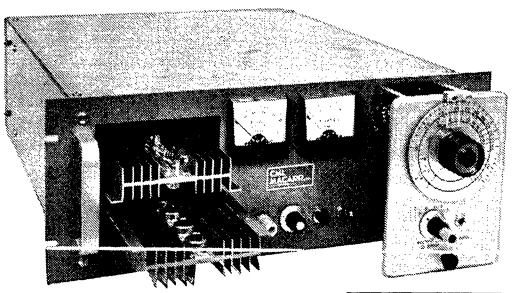
CML MACARR, INC.
subsidiary of Kennedy Engineering, Inc

solid state power amplifiers/ AC power sources

ST & TT series 1ø & 3ø output, 500VA to 6KVA



Model ST-500
WITH STG17A OSCILLATOR

- Solid State - High Reliability
- Rack Mount Construction
- Versatility — may be used as a Power Amplifier or Precision AC Power Source
- Four Adjustable Output Voltage Ranges: 0-32 VAC, 0-65 VAC, 0-135 VAC, 0-270 VAC, L-N.
- Wide Output Frequency Range: 45-5,000 Hz at Full Rated Output
- Plug-in Power Transistor Assemblies

Single-Phase Power Amplifiers

MODEL	OUTPUT POWER	INPUT SERVICE
ST-500	500 VA	115/230 VAC, 1ϕ, 47-65 Hz
ST-1000	1000 VA	115/230 VAC, 1ϕ, 47-65 Hz
ST-1500	1500 VA	208/230 VAC, 3ϕ, 47-65 Hz
ST-2000	2000 VA	208/230 VAC, 3ϕ, 47-65 Hz
ST-2500	2500 VA	208/230 VAC, 3ϕ, 47-65 Hz

OUTPUT CONFIGURATION: Single phase 3 wire floating for the ST series and three phase 4 wire Y (wye) for the TT series.

OUTPUT FREQUENCY RANGE: 45-5,000 Hz.

SIGNAL INPUT VOLTAGE: 1 volt RMS for rated output.

DISTORTION: Less than 1%.

Three-Phase Power Amplifiers

MODEL	OUTPUT POWER	INPUT SERVICE
TT-1003	1000 VA	208/230 VAC, 3ϕ, 47-65 Hz
TT-1503	1500 VA	208/230 VAC, 3ϕ, 47-65 Hz
TT-3003	3000 VA	208/230 VAC, 3ϕ, 47-65 Hz
TT-4503	4500 VA	208/230 VAC, 3ϕ, 47-65 Hz
TT-6003	6000 VA	208/230 VAC, 3ϕ, 47-65 Hz

VOLTAGE REGULATION: Less than ±0.5% from no load to full load change.

METERING: Output voltmeter and output ammeter.

COOLING: Forced air cooling.

OUTPUT VOLTAGE: 0-32, 0-65, 0-135, and 0-270 VAC for the ST series and 0-55, 0-110, 0-230 and 0-460 VAC Line to Line for the TT series.

The ST and TT Series become Precision Power Supplies with the incorporation of a CML-MACARR Plug-In Oscillator.

Output Frequency	PLUG-IN OSCILLATORS							
	SINGLE PHASE Frequency Stability				THREE PHASE Frequency Stability			
	±0.25%	±0.1%	±0.01%	±0.001%	±0.25%	±0.1%	±0.01%	±0.001%
	MODEL NUMBER				MODEL NUMBER			
Fixed 50 Hz	STG-11A	STG-11B	STG-11E	Special	STG-31A	STG-31B	STG-31E	Special
Fixed 60 Hz	STG-12A	STG-12B	STG-12E	Order	STG-32A	STG-32B	STG-32E	Order
Fixed 400 Hz	STG-14A	STG-14B	STG-14E	STG-14G	STG-34A	STG-34B	STG-34E	STG-34G
Fixed 800 Hz	STG-18A	STG-18B	STG-18E	STG-18E	STG-38A	STG-38B	STG-38E	STG-38G
Fixed 50/60/400/800 Hz	STG-19A	STG-19B	STG-19E	Special Order	STG-39A	STG-39B	STG-39E	Special Order
Adj. 45-70 Hz	STG-13A	STG-13B	X	X	STG-33A	STG-33B	X	X
Adj. 350-450 Hz	STG-15A	STG-15B	X	X	STG-35A	STG-35B	X	X
Adj. 300-2,000 Hz	STG-16A	STG-16B	X	X	STG-36A	STG-36B	X	X
Adj. 45-5,000 Hz	STG-17A	X	X	X	STG-37A	X	X	X
45-5,000 Hz	STA-2	EXTERNAL SIGNAL ADAPTER			X	X	X	X

Write or Call for Complete Specifications

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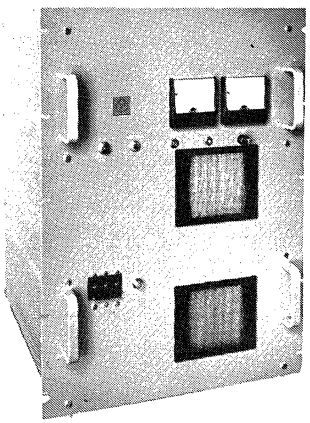
CML MACARR, INC.
subsidiary of Penney Engineering, Inc

solid state frequency converters

105-125 V RMS, 400 Hz single phase output



model CRS-2000A

MODEL	OUTPUT VA	45-65 Hz INPUT SINGLE ϕ VOLTS	DIMENSIONS H x W x D	WEIGHT (APPROX.) LBS.
CRS-50A	50	105-125	3½ x 19 x 14	24
CRS-100A	100	105-125	3½ x 19 x 14	26
CRS-150A	150	105-125	5¼ x 19 x 10	30
CRS-250A	250	105-125	5¼ x 19 x 15	65
CRS-500A	500	105-125	10½ x 19 x 16	88
CRS-1000A	1000	105-125	15¾ x 19 x 16	135
CRS-2000A	2000	200-240V 3ϕ	26¼ x 19 x 20	260

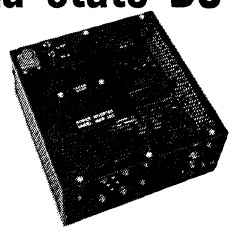
105-125 V RMS, 60 Hz single phase output

MODEL	OUTPUT VA	*45-65 Hz INPUT SINGLE ϕ VOLTS	DIMENSIONS H x W x D	WEIGHT (APPROX.) LBS.
LRS-250A	250	105-125	5¼ x 19 x 15	80
LRS-500A	500	105-125	10½ x 19 x 16	100
LRS-1000A	1000	105-125	21 x 19 x 16½	220

*350-450 Hz input also available; specify suffix -H (example: Model LRS-250A-H).

- 50 to 2000 VA — Single Phase Output
- 0.5% Frequency Regulation
- 1% Voltage Regulation
- Harmonic Distortion less than 1% at 400 Hz, less than 3% at 60 Hz
- High Efficiency Switched Mode Operation

solid state DC to AC power inverters



model MNS-100

DRS series 400 Hz

Output: 115 Volts rms. Single Phase.
Input: 22-30 Volts D.C. **Voltage & Frequency Regulation** 0.5%.

MODEL	OUTPUT VA	DIMENSIONS H x W x D	NET WT. LBS.(APPROX.)
DRS-50	50	5 x 11 x 8	25
DRS-100	100	5 x 11 x 8	26
DRS-500	500	8 x 14 x 16	70
DRS-1000	1000	14 x 17 x 18	160

MNS series 60 Hz

Output: 105/115/125 Volt rms. Single Phase.
Input: 22-30 Volts D.C. **Frequency Regulation: 0.5%.**

MODEL	OUTPUT VA	DIMENSIONS H x W x D	NET WT. LBS.(APPROX.)
MNS-50	50	5 x 11 x 11	28
MNS-100	100	5 x 11 x 11	28
MNS-500	500	8 x 14 x 14	80
MNS-1000	1000	14 x 17 x 19	162

MRS series 60 Hz

Output: 115 Volts rms. Single Phase.
Input: 22-30 Volts D.C. **Voltage & Frequency Regulation** 0.5%.

MODEL	OUTPUT VA	DIMENSIONS H x W x D	NET WT. LBS.(APPROX.)
MRS-500	500	12 x 14 x 14	150
MRS-1000	1000	14 x 17 x 19	175
MRS-2000	2000	17 x 17 x 22	300

- 50 to 2000 VA — Single Phase Output
- 0.5% Frequency Regulation
- 0.5% Voltage Regulation (DRS & MRS Series)
- Harmonic Distortion less than 1% at 400 Hz, less than 3% at 60 Hz
- High Efficiency Switched Mode Operation

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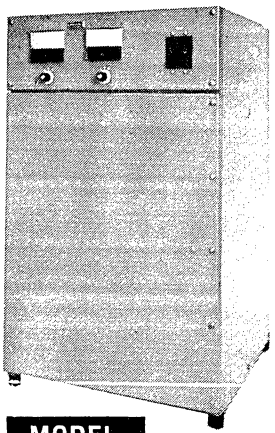
5KVA-7.5KVA-10KVA-20KVA solid state three phase frequency converter-inverters



MODEL TG-5002

FREQUENCY CONVERTERS: 60Hz/400Hz and 350Hz to 450Hz Adj.

MODEL NO.	OUTPUT VA	INPUT	OUTPUT
TG 5002	5000 VA	120/208 VAC, 3φ, 60 Hz	120/208 VAC, 3φ, 60 Hz
TG 5004	5000 VA	120/208 VAC, 3φ, 60 Hz	120/208 VAC, 3φ, 400 Hz
TG-5005	5000 VA	120/208 VAC, 3φ, 60 Hz	120/208 VAC, 3φ, 350-450 Hz
TG 7502	7500 VA	120/208 VAC, 3φ, 60 Hz	120/208 VAC, 3φ, 60 Hz
TG 7504	7500 VA	120/208 VAC, 3φ, 60 Hz	120/208 VAC, 3φ, 400 Hz
TG 7505	7500 VA	120/208 VAC, 3φ, 60 Hz	120/208 VAC, 3φ, 350-450 Hz
TG 10002	10000 VA	120/208 VAC, 3φ, 60 Hz	120/208 VAC, 3φ, 60 Hz
TG 10004	10000 VA	120/208 VAC, 3φ, 60 Hz	120/208 VAC, 3φ, 400 Hz
TG 10005	10000 VA	120/208 VAC, 3φ, 60 Hz	120/208 VAC, 3φ, 350-450 Hz
TG 20002	20000 VA	120/208 VAC, 3φ, 60 Hz	120/208 VAC, 3φ, 60 Hz
TG 20004	20000 VA	120/208 VAC, 3φ, 60 Hz	120/208 VAC, 3φ, 400 Hz
TG 20005	20000 VA	120/208 VAC, 3φ, 60 Hz	120/208 VAC, 3φ, 350-450 Hz

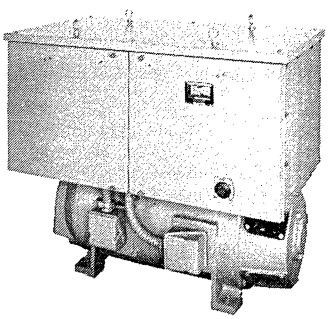
Voltage Regulation: ±2% **Frequency Stability:** ±0.1%

INVERTERS: Inverter input voltage 260 VDC ±10%. Specifications as listed above. To order, change Model No. prefix from TG to TDG.

motor generator controllers 5KW to 200KW commercial and military

Complete Motor-Generator Power Systems Designed by CML-MACARR

- Meets Mil-M-19633A, M-19097, M-19160 specifications.
- **Voltage Regulation:** ±0.5% — line and load variations ±2% with full load phase unbalance.
- **Frequency Regulation:** ±0.5% — line and load variation.



MODEL NO.	OUTPUT KW	INPUT	OUTPUT
MG 5004	5 KW	440 VAC, 3φ, 60 Hz	120 VAC, 3φ, 400 Hz, 3 wire
MG 10004	10 KW	440 VAC, 3φ, 60 Hz	120 VAC, 3φ, 400 Hz, 3 wire
MG 15004	15 KW	440 VAC, 3φ, 60 Hz	120 VAC, 3φ, 400 Hz, 3 wire
MG 30004	30 KW	440 VAC, 3φ, 60 Hz	450 VAC, 3φ, 400 Hz, 3 wire
MG 60004	60 KW	440 VAC, 3φ, 60 Hz	450 VAC, 3φ, 400 Hz, 3 wire
MG 100004	100 KW	440 VAC, 3φ, 60 Hz	450 VAC, 3φ, 400 Hz, 3 wire
MG 200004	200 KW	440 VAC, 3φ, 60 Hz	450 VAC, 3φ, 400 Hz, 3 wire
MG 5002 DC	5 KW	115 VDC	120 VAC, 1φ, 60 Hz
MG 15004 DC	15 KW	230 VDC	120 VAC, 3φ, 400 Hz, 4 wire

UPS uninterrupted power systems

From our wide range of standard power sources, CML-MACARR will custom combine battery chargers and inverters into an Uninterrupted Power System to satisfy your critical power need requirements. CML-MACARR power engineers will analyze your requirements and determine the lowest cost system meeting your specifications. For further information contact the factory or your area representative.

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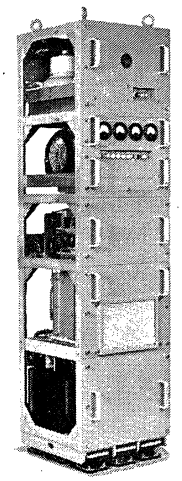
wide band power amplifiers for audio and ultrasonic testing

SPG series 1KVA to 200KVA.



MODEL S5K PASSES THROUGH A STANDARD SUBMARINE HATCH

MODEL	OUTPUT POWER KVA	LOAD POWER FACTOR RANGE AT RATED KVA	STANDARD OUTPUT IMPEDANCE TAPS OHMS	DIMENSIONS* H x W x D (APPROX.) INCHES	WEIGHT (APPROX.) LBS.	TYPE OF COOLING
A1K	1	±0.4 to Unity	4/16/36/64/144/576	22¾x19x20½	345	FORCED AIR
A2K	2	±0.4 to Unity	4/16/36/64/144/576	22¾x19x20½	400	
A3K	3	±0.1 to Unity	4/16/36/64/144/576	53x27x26	750	
S5K	5	±0.4 to Unity	16/64/256	62x17x17	800	
B5K	5	±0.1 to Unity	8/32/72/128/288/1152	45x24x24	850	
A10K	10	±0.1 to Unity	16/64/144/256/576/2304	47x68x24	1,700	
A20K	20	±0.3 to Unity	16/64/144/256/576	47x68x24	2,100	
VA30K	30	±0.1 to Unity	16/64/144/256/576	72x72x36	3,000	VAPOR COOLED
VA50K	50	±0.4 to Unity	16/64/144/256/576	72x72x36	4,200	
VA100K	100	±0.1 to Unity	16/64/144/256	2 sections, ea.: 90x72x57	9,400	
VA200K	200	±0.1 to Unity	16/64/144/256	3 sections, ea.: 90x72x57	14,100	

* Model A1K and A2K are standard 19" rack mount units; bench adapters available on special order. All other models are furnished complete in cabinet enclosures. Models A3K, S5K and B5K include casters.

Specifications:

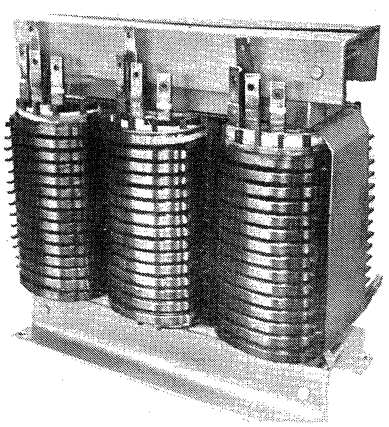
FREQUENCY RESPONSE: ±0.5 db, 100-10,000 Hz; model A3K ±0.5 db 200-15,000 Hz. Other frequency ranges between 5 Hz and 100 KHz available on a custom basis.

HARMONIC DISTORTION: Less than 3% over rated frequency range; less than 1.5% midband.

HUM & NOISE: At least 60 db below rated tap voltage.

- Full power into reactive loads.
- Low distortion.
- ±0.5 db frequency response.
- Ideal for CW and PULSED duty.
- Selectable output taps for matching wide range of load impedances.
- Rugged construction for marine or airborne installations.
- Applications: Sonar Testing; Vibration Testing; Industrial Process Control; High Intensity Acoustic Systems.

transformers and chokes—designed and manufactured for commercial, industrial and military applications.....



STANDARDS' developed from CML-MACARR's extensive field-tested design files and large specialized material stocks assure rapid service for your most rigorous needs.

CUSTOM DESIGN by an Engineering Staff that has satisfied unique transformer and choke needs for world-wide applications.

- **POWER LEVEL:** Up to 200 KVA.
- **VOLTAGE AND CURRENT LEVEL:** Almost any combination up to rated KVA.
- **CONSTRUCTION:** Open-Frame, Encapsulated, Hermetically Sealed, and Oil-Filled.
- **FABRICATION:** To both high grade commercial standards and Mil-E-917D.
- **TYPES:** Audio - Auto - Current - Filament - High Voltage - Impedance Matching - Isolation - Modulation - Multi-Phase - Plate - Power - Pulse - Transistor - Vibrator.

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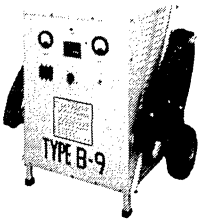
helicopter starting high current-low voltage DC supplies

MODELS 28-UP MOBILE POWER SUPPLIES FOR AIRCRAFT STARTING



- Mobile — extremely rugged and reliable.
- Good load regulation, low ripple. Meets RF interference requirements of Mil-I-26600.
- All units feature heavy intermittent load capability.
- Easily maneuvered . . . large units have pneumatic tires.
- Weatherproof construction for outdoor duty.

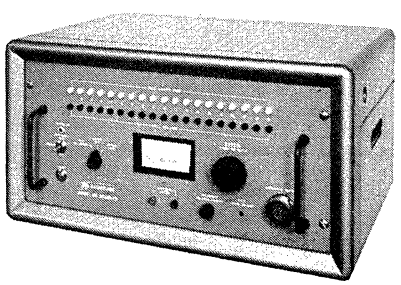
MODEL:		28-50 UP	28-100 UP	28-200 UP	28-300 UP	28-400 UPA	28-400 UPB	28-600 UP	28-800 UP	28-1000 UP
INPUT:	V	115/230	220/440	220/440	220/440	220/440	220/440	440	440	400
	ϕ	1	3	3	3	3	3	3	3	3
	A	20/10	10/5	20/10	30/15	40/20	40/20	30	40	50
NOMINAL OUTPUT	V	28	28	28	28	28	28	28	28	28
CONTINUOUS	A	50	100	200	300	400	400	600	800	1000
OUTPUT		3 min. 65A	3 min. 125A	3 min. 250A	3 min. 375A	3 min. 500A	3 min. 500A	3 min. 750A	3 min. 1200A	3 min. 1500A
INTERMITTENT:		3 sec. 200A	3 sec. 400A	3 sec. 800A	3 sec. 1200A	3 sec. 1600A	3 sec. 1600A	3 sec. 2400A	3 sec. 2900A	3 sec. 3500A

MODELS — 28-US GROUND SUPPORT POWER SUPPLIES FOR AIRCRAFT STARTING

Specifications listed in chart above. To order, change model suffix from UP to US.

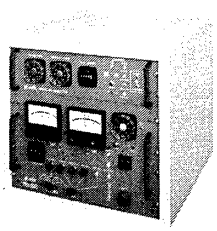
battery service and analysis equipment

MODEL 50 BATTERY CELL SCANNER for AUTOMATIC CELL TESTING



The Model 50 Battery Cell Scanner provides a simple economical and automatic method of testing individual battery cells under conditions of discharge, charge, float, etc.
The Model 50 is designed for a maximum of 19 cells, the Model 50A for a maximum of 23 cells. However, any number of cells can be accommodated utilizing the Models 50 or 50A in the required number of multiples.
During operation, white pilot lights indicate cells being scanned; a red light, which remains ON until manually reset, indicates which cell is at fault. Although scanning is completely automatic, the automatic cycle may be interrupted and a manual voltage check can be instituted at any time. For production testing of similar batteries, a battery-fixture may be used.

MODEL ANDAC 12-30-101 BATTERY CHARGER/DISCHARGER/ANALYZER



The Model ANDAC 12-30-101 automatically analyzes battery charge-discharge capacities, or can be operated as a manual charge or discharge unit. The equipment consists of two modules packaged in a single cabinet. The first is the basic power unit utilizing SCR rectifiers with associated termination controls, calibration, switching and indicating circuits. The second, or analyzer module consists of logic and timing circuitry that automates and switches the constant current charge, discharge, voltage and timing termination circuits of the power unit.

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CML MACARR, INC.
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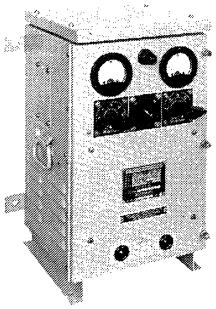
battery charging equipment
standard - custom - commercial - military

MODEL 40-30 BCN MULTIPLE PURPOSE BATTERY CHARGER

- Charges 6, 8, 12, 24 or 36 volt, 15 to 300 AH batteries, @ 2, 8, 15 or 30 Amp.
- Fully voltage-regulated, current limited. Suitable for lead-acid and nickel-cadmium batteries.
- Meets applicable U.S. Navy and U.S Army Mil Specs.

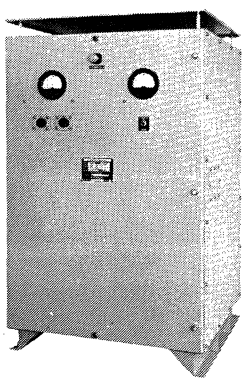


MODEL 40-30 BCN is an extremely flexible and reliable constant potential battery charger which meets the requirements of Mil-B-24095 (Naval Shipboard). It can charge a wide variety of batteries up to 36 volts nominal (18 cells) and 300 ampere hours.

The charger is a fully regulated, current limited stable source for float charging, utilizing SCR's with magnetic gating. A fully discharged battery can be safely recharged with this model. As an example of efficiency, a 130 AH battery can be recharged in 7 hours.

MODEL 30 NICKEL CADMIUM AIRCRAFT BATTERY CHARGER

- Designed specifically for 24 volt Nickel Cadmium Aircraft Batteries.
- Ideally suited for charging helicopter batteries . . . reduces battery maintenance.
- Most efficient charge method — constant current charge with topping mode. Charges battery to absolutely full capacity.
- Compact and lightweight . . . can be carried on the aircraft.
- Three selectable charge modes.
- Ideally suited for charging helicopter batteries.

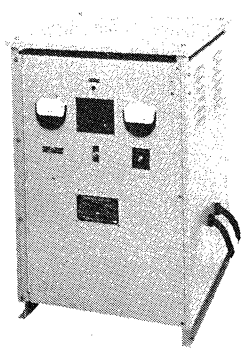


The Model 30 Battery Chargers cover charge current ratings from 6 to 30 amps for use on nickel cadmium aircraft batteries presently in common use. The chargers are uniquely suited to efficiently charge 24 volt aircraft batteries rated at up to 60 ampere hours.

The charger also features a constant current charge mode without topping as well as a float charge mode, to maintain battery at full charge during long periods of storage. The three charge modes are selectable by means of front panel selector switch.

MODEL 45-140BC FORK LIFT TRUCK BATTERY CHARGER

- Fast recharging. Will recharge 720 AH battery in less than 8 hours — smaller batteries in less time.
- Charges both lead-acid and nickel-iron batteries.
- Fully voltage regulated — current limited.



MODEL 45-140 BC is suitable for recharge of electric fork lift truck batteries of the sizes listed in specification W-C-260b. The unit is extremely rugged and reliable by virtue of its fully magnetic power circuitry (saturable reactors) and the solid state (controlled rectifier) regulating control. Recharge of fork lift truck batteries is extremely tough duty and the application of saturable reactors for control of the charge is ideal to its inherent current limiting characteristic and ability to withstand heavy loads.

The magnetically gated controlled rectifiers provide the regulation performance necessary to insure full recharge within the alloted time.

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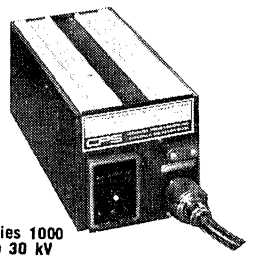
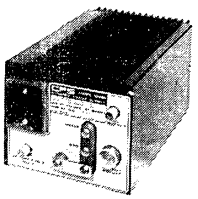
COMPUTER POWER SYSTEMS, INC.
722 EAST EVELYN AVENUE, SUNNYVALE, CALIFORNIA 94086
(408) 738-0530, Ext. 26: Sales Dept.

HIGH VOLTAGE

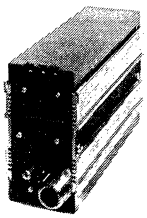
ULTRA STABLE — PROGRAMMABLE OPTIONS — UP TO 50 KV DC



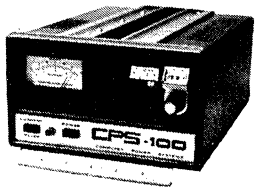
Series 1000 to 30 kV



Series 3000 to 7.5 kV



Series 5000 to 20 kV



Series 100 to 30 kV

MANY OPTIONS AVAILABLE. DOUBLE CURRENT, 5 PPM/°C T.C., Etc.

HIGH VOLTAGE SYSTEMS SUPPLIES GENERAL SPECIFICATIONS

CRT MULTIPLE HV ASSEMBLIES OUR SPECIALTY

OUTPUT PROTECTION — Completely short-circuit proof. Self restoring after short removal.

INPUT — 105-125 volts; 47-440 Hz (DC input available)

TEMPERATURE RANGE — Operating 0°C - 50°C

OUTPUTS — CPS provides mating connectors.

OUTPUT — Fixed with ±5% Vernier adjustment or programmable by resistance or voltage.

PROGRAMMABLE INPUT — Specify Option R (Price $25.00) and Select Programmer at bottom right of this page. Alternatively 0 to 10V can program unit from 0 to full output.

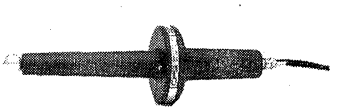
Model	Voltage Range kV	Current mA	Line Reg. %	Load Reg. %	Ripple P-P mV	Stability 1 hour %	Stability 8 hour %	Repeat-ability %	Temp. Coeff. ppm/°C	Price
100 (P or N)	1 to 30	0.5	0.001	0.001	200	0.005	0.01	0.01	25	$1725
100A (P or N)	1 to 30	1.0	0.001	0.001	200	0.005	0.01	0.01	25	1825
130 (P or N)	1 to 30	0.5	0.001	0.001	200	0.005	0.01	0.01	25	1550
130A (P or N)	1 to 30	1.0	0.001	0.001	200	0.005	0.01	0.01	25	1650
1100 (P or N)	5 to 10	0.50	0.001	0.001	100	0.005	0.01	0.01	25	795
1200 (P or N)	10 to 20	0.25	0.001	0.001	200	0.005	0.01	0.01	25	850
1300 (P or N)	20 to 30	0.125	0.001	0.001	300	0.005	0.01	0.01	25	1250

NOTE: 130 Series is a system version of the 100 Series supply which does not have meter or voltager controller.

Model	Single Output kV	Current mA	Line Reg. %	Load Reg. %	Ripple P-P %	Stability 1 hour %	Stability 8 hour %	Repeat-ability %	Temp. Coeff. ppm/°C	Price
2500 (P or N)	0.5 to 2.0	5	0.001	0.001	0.0005	0.005	0.01	0.01	25	$ 410
2100 (P or N)	1.0 to 3.0	3	0.001	0.001	0.0005	0.005	0.01	0.01	25	410
2200 (P or N)	2.0 to 5.0	2	0.001	0.001	0.0005	0.005	0.01	0.01	25	495
2400 (P or N)	4.0 to 7.5	1	0.001	0.001	0.0005	0.005	0.01	0.01	25	595
5001 (P or N)	0.3 to 20	5 @ 2KV .25 @ 20KV	.01	.01	0.01	.01	.05	.05	250	$199 to $550
CRT ELECTROSTATIC DYNAMIC FOCUS SUPPLY										
3030P	1 to 3	2	.005	.005	500	.01	.02	.01	50	$1110
3050P	2 to 5	2	.005	.005	500	.01	.02	.01	50	1110
3150P	1 to 5	2	.005	.005	2000	.02	.05	.02	100	765

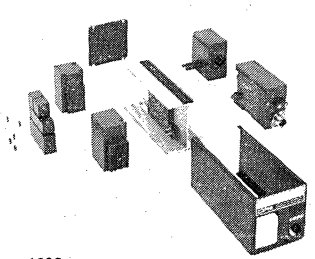
NOTE: 3030P and 3050P — The dynamic output is 0 to 250V peak to peak, at DC to 100 KHz.
3150P — The dynamic output is 0 to 60V peak to peak, at DC to 25 KHz.

HIGH VOLTAGE DIVIDER PROBE HVP-250



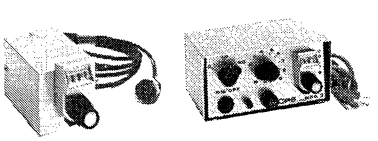
INPUT .....Up to 50 KV DC
RATIO .....1000:1 50 KV IN = 50 V OUT
INPUT .....250 MΩ
OUTPUT .....250 KΩ
RATIO ACCURACY .....0.01% up to 30 KV, 20-30°C
TEMPERATURE COEFFICIENT .....10 PPM/°C
LENGTH .....12 inches
PRICE $395

WIRELESS EPOXY CONSTRUCTION



1000 SERIES

REMOTE PROGRAMMING ASSEMBLIES



RPA-1: Encased 10 turn pot with knob .....**$ 75.00**
RPA-3: Encased assembly of step switches and vernier digital dial. AC power control is provided **245.00**
RPA-6: 22 turn panel mounted pot with screwdriver adjustment **45.00**
RPA-7: Small encased 10 turn pot with digital dial **150.00**

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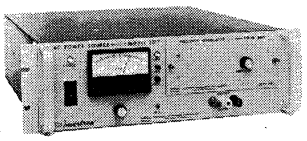
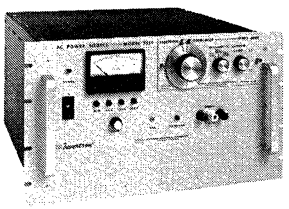
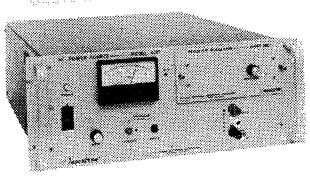
5150 Convoy Street, San Diego, Cal. 92111 / (714) 279-8620





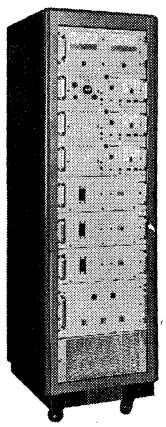


SOLID STATE *Invertron*®

THE MOST RESPECTED NAME IN AC POWER
ALL-SILICON SOLID-STATE POWER SOURCES

FEATURING

- **100 VA TO 6000 VA SINGLE-PHASE OUTPUT**
- **100 VA 2ϕ TO 10,000 VA 3ϕ OUTPUT**
- **FREQUENCY RESPONSES FROM 45Hz TO 20KHz**
- **SINE-WAVE WITH LOW HARMONIC DISTORTION**
- **EXCELLENT LINE AND LOAD REGULATION TO .01%**
- **SWITCHABLE OUTPUT VOLTAGE RANGES FOR FULL POWER AT LOWER VOLTAGES**
- **BROAD CHOICE OF INTERCHANGEABLE PLUG-IN OSCILLATORS**
- **OVERLOAD AND SHORT-CIRCUIT PROTECTION**
- **OPTIONAL INPUT VOLTAGES: 117 V 1ϕ TO 460 V 3ϕ**



Invertrons® have earned world-wide respect through their versatility, reliability, and outstanding performance. In addition to low distortion, high input stability and high power density, these silicon solid-state AC power sources use plug-in oscillators as frequency-determining elements and can be stacked electrically to provide one-, two-, or three-phase power. All Invertrons® fit a standard 19″ rack, or may be ordered with the appropriate cabinet for floor or bench use.

Output Power	ϕ*	Standard Output Voltage Ranges**	Frequency Range	Model Number
100VA	1	0-135 L to N	45Hz-10KHz	101T
100VA	2	0-30, 52, 130, 255 L-L	45Hz-20KHz	152T
150VA	3	0-30, 52, 130, 255 L-L	45Hz-20KHz	153T
200VA	2	0-135 L to N	45Hz-10KHz	200T/2-2
200VA	3D	0-135 L to N	45Hz-10KHz	200T/2-3D
250VA	1	0-30, 75, 135 L to N	45Hz-20KHz	251T
300VA	3	0-135 L to N	45Hz-10KHz	300T/3-3
500VA	1	0-30, 75, 130, 260 L-N	45Hz-10KHz	501T
500VA	2	0-30, 75, 135 L to N	45Hz-20KHz	500T/2-2
500VA	3D	0-30, 75, 135 L to N	45Hz-20KHz	500T/2-3D
500VA	3	0-30, 52, 130, 225 L-L	45Hz-10KHz	503T
750VA	1	0-30, 75, 130, 260 L-N	45Hz-10KHz	751T
1000VA	1	0-30, 75, 135, 270 L-N	45Hz-10KHz	1001T
1000VA	2	0-30, 75, 130, 260 L-N	45Hz-10KHz	1000T/2-2
1000VA	3D	0-30, 75, 130, 260 L-N	45Hz-10KHz	1000T/2-3D
1200VA	1	0-30, 75, 135, 270 L-N	45Hz-10KHz	1201T
1500VA	2	0-30, 75, 130, 260 L-N	45Hz-10KHz	1500T/2-2
1500VA	3D	0-30, 75, 130, 260 L-N	45Hz-10KHz	1500T/2-3D
1500VA	3	0-30, 75, 130, 260 L-N	45Hz-10KHz	1500T/3-3
1500VA	3	0-75, 135 L-N, 0-115, 208 L to L	45Hz- 5KHz	1503T

Output Power	ϕ*	Standard Output Voltage Ranges**	Frequency Range	Model Number
1750VA	3	0-75, 135 L-N, 0-115, 208 L to L	45Hz- 5KHz	1753T
2000VA	1	0-135 L to N	45Hz-10KHz	2000T/2-1
2000VA	2	0-135 L to N	45Hz-10KHz	2000T/2-2
2000VA	3D	0-135 L to N	45Hz-10KHz	2000T/2-3D
2400VA	1	0-135 L to N	45Hz-10KHz	2400T/2-1
2400VA	2	0-135 L to N	45Hz-10KHz	2400T/2-2
2400VA	3D	0-135 L to N	45Hz-10KHz	2400T/2-3D
3000VA	3	0-30, 75, 135, 270 L-N	45Hz-10KHz	3000T/3-3
3600VA	3	0-30, 75, 135, 270 L-N	45Hz-10KHz	3600T/3-3
5000VA	1	0-135 L to N	45Hz- 2KHz	5000T/5-1
6000VA	1	0-135 L to N	45Hz- 2KHz	6000T/5-1
6000VA	3	0-135 L to N	45Hz- 2KHz	6000T/6-3
7200VA	1	0-135 L to N	45Hz- 2KHz	7200T/6-1
7200VA	3	0-135 L to N	45Hz- 2KHz	7200T/6-3
9000VA	3	0-135 L to N	45Hz- 2KHz	9000T/9-3
10,800VA	3	0-135 L to N	45Hz- 2KHz	10800T/9-3

*Models designated "D" are open delta configuration; all others 4-wire wye.
**Other output ranges available on special order.

REMOTE-PROGRAMMABLE INVERTRONS®

behlman Invertrons® combined with 830T-Series Programmable Oscillators provide the most advanced programmable AC power sources available on the market today. Model 830T-Series Programmable Oscillators feature frequency, phase and independent amplitude programming, compatible with remote controllers such as a computer, punched tape, cards, etc. Models are available in single, two or three phase.

(See next page for other Plug-In Oscillators)

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800T-SERIES PLUG-IN OSCILLATORS

Companion Plug-in Oscillators are available in three types: (A) General-purpose, fixed-frequency; (B) Crystal-controlled, high-stability fixed-frequency; and (C) Continuously variable frequencies. All may be used with the Solid-State Invertrons® to create 1ϕ, 2ϕ, or 3ϕ custom AC power sources tailored to exact requirements. The fixed-frequency oscillators may be ordered with a servo-feedback option for systems requiring extremely high amplitude stabilities and accuracies. This feature provides overall regulation of up to 0.01% against line and load changes.

800T VARIABLE-FREQUENCY MODELS

Freq. Range	Freq. Accy. @ 25°C	Model Number
20Hz to 20KHz in three bands	±1.0%	(1ϕ) 800T-20/20K-1-1 (2ϕ) 800T-20/20K-1-2 (3ϕ) 800T-20/20K-1-3 (3ϕ) 800T-20/20K-1-3D
45Hz to 75Hz in one band	±0.25%	(1ϕ) 800T-45/75-.25-1 (2ϕ) 800T-45/75-.25-2 (3ϕ) 800T-45/75-.25-3 (3ϕ) 800T-45/75-.25-3D
300Hz to 500Hz in one band	±0.25%	(1ϕ) 800T-300/500-.25-1 (2ϕ) 800T-300/500-.25-2 (3ϕ) 800T-300/500-.25-3 (3ϕ) 800T-300/500-.25-3D

810T FIXED-FREQUENCY GENERAL-PURPOSE MODELS

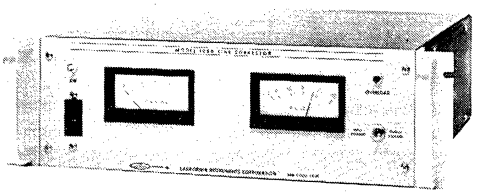
Any Single Freq. 45Hz to 10KHz	±0.1%	(1ϕ) 810T-Freq.-1.1 (2ϕ) 810T-Freq.-.1-2 (3ϕ) 810T-Freq.-.1-3 (3ϕ) 810T-Freq.-.1-3D
Any Single Freq. 45Hz to 10KHz	±0.1%	(1ϕ only) System-Servo oscillator with servo feedback set to maintain power source output at 115 VAC. Provides 0.01% line and load regulation from power source.
Any Single Freq. 45Hz to 10KHz	±0.1%	(1ϕ only) System-Servo oscillator with servo feedback adjustable to produce power source output of 105 to 135 VAC. Provides 0.01% line and load regulation from power source.

820T FIXED-FREQUENCY CRYSTAL-CONTROLLED MODELS

400Hz	±0.01%	(1ϕ) 820T-400-.01-1 (2ϕ) 820T-400-.01-2 (3ϕ) 820T-400-.0001-3
400Hz	±0.0001%	(1ϕ) 820T-400-.01-1 (2ϕ) 820T-400-.0001-2 (3ϕ) 820T-400-.0001-3
Any Single Freq. 45Hz to 10KHz	±0.01%	(1ϕ) 820T-Freq.-.01-1 (2ϕ) 820T-Freq.-.01-2 (3ϕ) 820T-Freq.-.01-3 (3ϕ) 820T-Freq.-.01-3D
Any Single Freq. 45Hz to 10KHz	±0.0001%	(1ϕ) 820T-Freq.-.0001-1 (2ϕ) 820T-Freq.-.0001-2 (3ϕ) 820T-Freq.-.0001-3 (3ϕ) 820T-Freq.-.0001-3D

SERIES 1000 DYNAMIC AC LINE CORRECTORS

For Precision AC Power Independent of Powerline Disturbances



- PEAK INSTANTANEOUS POWER TO FIVE TIMES RATING
- 3.5-TO-1 CREST FACTOR
- REDUCES 500 VOLT 10 μSEC TRANSIENTS BY 100-TO-1
- PURE SINE WAVE POWER
- HARMONIC DISTORTION REDUCTION OF 50:1
- SUPER REGULATION
  LINE — 0.025%
  LOAD — 0.025%
- PEAK AMPLITUDE STABILITY: ±0.01% CYCLE-TO-CYCLE
- IMPULSE SETTLING TIME LESS THAN 50 MICROSECONDS
- PEAK AMPLITUDE INSTABILITY LESS THAN 0.01%
- LOW OUTPUT TEMPERATURE COEFFICIENT — 0.005%/°C
- 100 DB COMMON MODE ISOLATION
- HIGH STABILITY — 0.05%/24 HOURS
- AUTOMATICALLY RECOVERS FROM OVERLOAD IN LESS THAN ONE CYCLE
- SIMULTANEOUS MONITORING OF VOLTAGE AND CURRENT OUTPUT
- SELF-CONTAINED AIR COOLING
- ALL-SILICON SOLID STATE

115 VOLT OUTPUT MODELS

Model	Input Voltage Range	Freq. Hz	Output Power (VA) Continuous	Output Power (VA) Max. Inst. Peak	Exact Output Volts
1040 1050 1060	95-115, 105-125, 115-135 (selectable by tap switch)	380-420 47-53 57-63	1000	5000	115V RMS ±0.15% Setable to 0.01% (±0.25% 400Hz Models)
1340 1350 1360		380-420 47-53 57-63	3000	15,000	
1361	180-264 in three ranges	57-63			

230 VOLT OUTPUT MODELS

1052 1062	180-220, 198-244, 216-264 (selectable by tap switch)	47-53 57-63	1000	5000	220,230 or 240V RMS ±0.15% Setable to 0.01% (Single Output voltage only; specify on order)
1352 1362		47-53 57-63	3000	15,000	

*At power factors of 1.0 to ±0.7.

MECHANICAL

	1000 VA Models	3000 VA Models
Dimensions:	19" x 5¼"H x 17½"D	19"W x 14"H x 20¼"D
Net Wt.:	55 lbs.	175 lbs.
Shipping Wt.:	70 lbs.	235 lbs.

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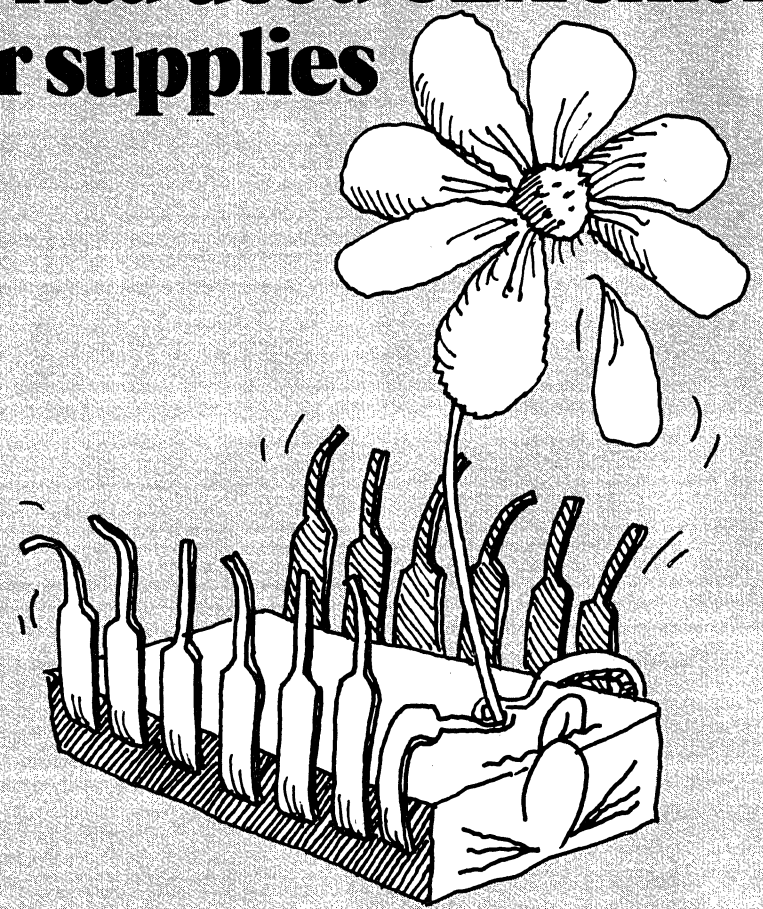
This IC would be alive today if you had used CEA shielded power supplies

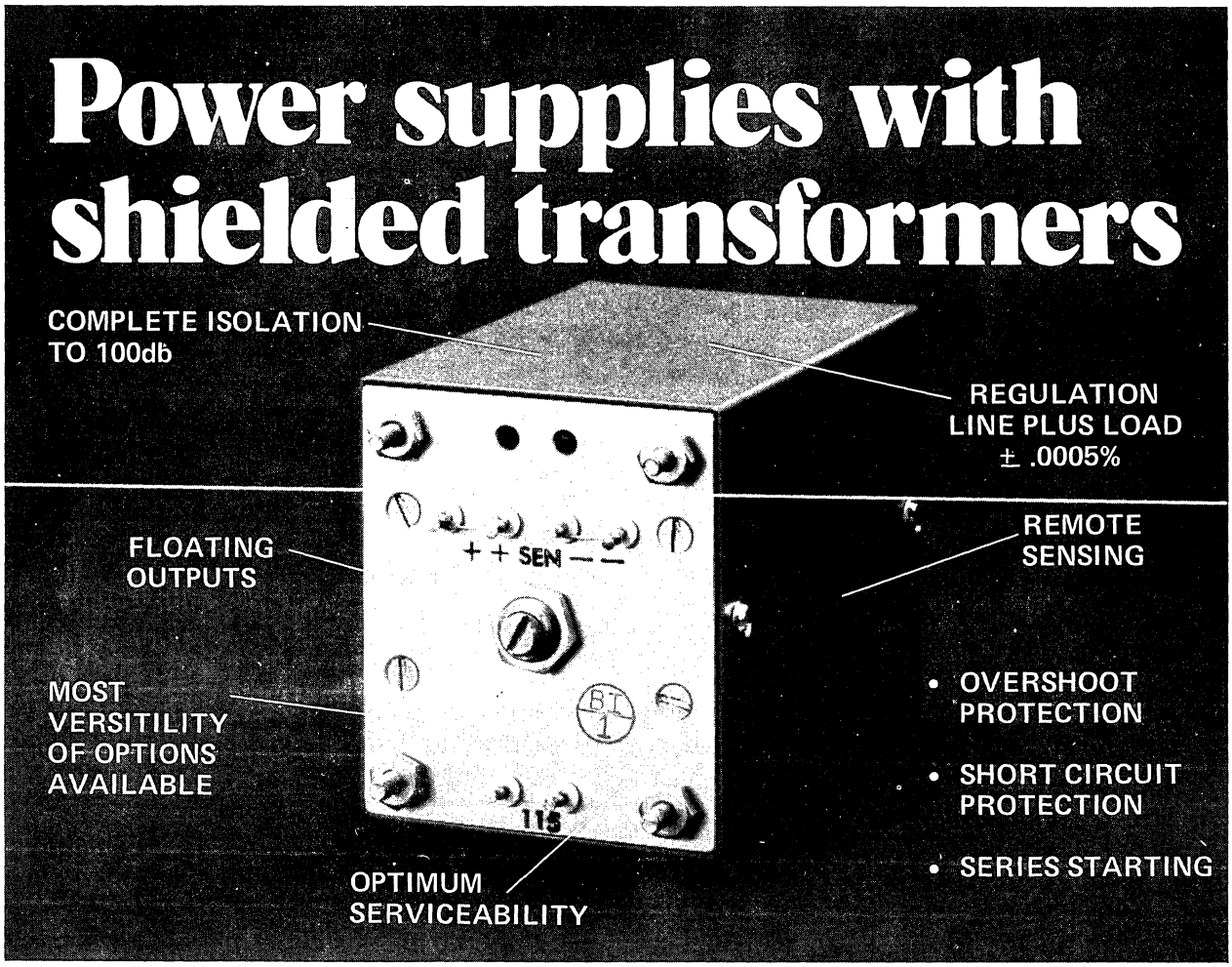


STATE	REPRESENTATIVE	TELEPHONE NO
Alabama	Mekco Associates, Inc.	(205) 881-3721
Arizona	Cleveland Enterprises	(602) 264-1969
Arkansas	Lear & Associates	(214) 231-7696
California (No.)	Long & Associates	(415) 369-3324
California (So.)	Technisales	(213) 792-5111
Colorado	Cleveland Enterprises	(303) 758-2409
Connecticut	Engineering Assoc. of N.E.,Inc.	(603) 623-7294
Delaware	S & S Associates, Inc.	(301) 654-1434
D.C.	S & S Associates, Inc.	(301) 654-1434
Florida	Mekco Associates, Inc.	(305) 841-2215
Georgia	Mekco Associates, Inc.	(919) 226-7177
Idaho	Cleveland Enterprises	(505) 298-7671
Illinois (So.)	Bard Associates, Inc.	(314) 849-0080
Indiana	Carter, McCormic & Peirce, Inc.	(513) 278-5873
Kansas	Bard Associates, Inc.	(913) 888-2673
Kentucky	Carter, McCormic & Peirce, Inc.	(513) 278-5873
Louisiana	Lear & Associates	(214) 231-7696
Maine	Engineering Assoc. of N.E.,Inc.	(603) 623-7294
Maryland	S & S Associates, Inc.	(301) 654-1434
Massachusetts	Engineering Assoc. of N.E., Inc.	(603) 623-7294
Michigan	Carter, McCormic & Peirce, Inc.	(313) 477-7700
Mississippi	Mekco Associates, Inc.	(205) 881-3721
Missouri	Bard Associates, Inc.	(314) 849-0080
Nebraska	Bard Associates, Inc.	(913) 888-2673
Nevada	Cleveland Enterprises	(602) 264-1969
New Hampshire	Engineering Assoc. of N.E., Inc.	(603) 623-7294
New Jersey (So.)	S & S Associates, Inc.	(215) 265-3450
New Mexico	Cleveland Enterprises	(505) 298-7671
New York (Upper)	Engineering Assoc. of N.E., Inc.	(603) 623-7294
No. Carolina	Mekco Associates, Inc.	(919) 226-7177
Ohio	Carter, McCormic & Peirce, Inc.	(216) 333-5650
Ohio	Dayton, Ohio Area	(513) 278-5873
Oklahoma	Lear & Associates	(214) 231-7696
Oregon	Dewar Associates, Inc.	(206) 763-2233
Penn. (Eastern)	S & S Associates, Inc.	(215) 265-3450
Penn. (Western)	Carter, McCormic & Peirce, Inc.	(412) 824-3760
Rhode Island	Engineering Assoc. of N.E.,Inc.	(603) 623-7294
So. Carolina	Mekco Associates, Inc.	(919) 226-7177
Tennessee	Mekco Associates, Inc.	(919) 226-7177
Texas (No.)	Lear & Associates	(214) 231-7696
Texas (So.)	Lear & Associates	(713) 649-7727
Utah	Cleveland Enterprises	(505) 298-7671
Vermont	Engineering Assoc. of N.E.,Inc.	(603) 623-7294
Virginia	Mekco Associates, Inc.	(919) 226-7177
Virginia (No.)	S & S Associates	(301) 654-1434
Washington	Dewar Associates, Inc.	(206) 763-2233
W. Virginia	Carter, McCormic & Peirce	(412) 824-3760
Wyoming	Cleveland Enterprises	(505) 298-7671
Canada	Microtech Associates	(514) 631-6859
Foreign	Trans-World Trade	(213) 472-0444

CEA, *a division of Berkleonics, Inc.*

1221 S. SHAMROCK AVENUE, MONROVIA, CALIFORNIA 91016 TELEPHONE: (213) 359-9261

Power supplies with shielded transformers



	Input	Output Range			Best Efficiency	Best Response Time	Specification Classes: Line + Load Reg. (%)	Specification Classes: Ripple (p-p.) %	Specification Classes: Temp. Coeffi. (%/°C)	Model Series
		Volts	Amps	Watts						
SINGLE OUTPUT HIGHEST REGULATION	A.C. Or D.C.	3.5 To 500	.05 To 25	To 800	50%	10μsec	.05	.04	.01	CEA6
							.01	.004	.005	
							.0025	.002	.001	
							.0005	.0011	.0005	
DUAL OUTPUT HIGHEST REGULATION	A.C. Or D.C.	3.5 To 500	.05 To 10	To 300	50%	10μsec	.05	.04	.01	CEAD6
							.01	.004	.005	
							.0025	.002	.001	
							.0005	.0011	.0005	
SINGLE OUTPUT HIGHEST EFFICIENCY	A.C. Or D.C.	3.0 To 500	.05 To 60	To 640	80%	100μsec	1.0	2.0	.10	CEA3
							0.1	0.2	.01	
D.C.CONVERTERS	D.C. Only	3.0 To 500	.05 To 40	To 640	90%	100μsec	Line: None Load: 10%	3.0	.10	CEA2
							Line: 1% Load: 10%	3.0	.10	
							Line: 1% Load: 1%	1.0	.05	
SHIELDED LINE ISOLATORS	A.C. Only	110 Or 220	.85 To 17.3	100 To 2000	96%	60Hz	4.0	None	None	CEA10 thru CEA35

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1221 S. SHAMROCK AVENUE, MONROVIA, CALIFORNIA 91016 TELEPHONE: (213) 359-9261

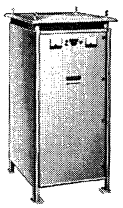
CHRISTIE SINCE 1929 ®

GENERAL PURPOSE HIGH CURRENT D-C POWER SUPPLIES

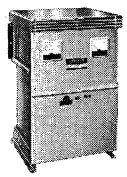
Send for "AC" Bulletin

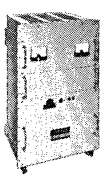
MAGAMP "K & KK" SERIES, 3-PHASE

- 0.25% Static Reg.
- 1% rms Ripple
- 50 msec Response Time
- 6 v Dynamic Reg. NL ⇕ FL



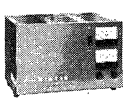
VOLTS	AMPS	MODEL
5½-8	0-50	MH8-50K2S
	-100	-100K2S
	-200	-200K2S
	-300	-300K2S
11-16	0-50	MH16-50K2S
	-100	-100K2S
	-200	-200K2S
	-300	-300K2S
22-32	0-50	MH32-50K2S
	-100	-100K24S
	-200	-200K24S
	-300	-300K24S
15-36	0-50	MH36-50KK2S
	-100	-100KK2S
	-200	-200KK2S
	-400	IC36-400KK4S
26-36	0-400	IC36-400K4S
	-500	-500K4S
	-600	-600K4S
	-800	2C36-800K4S
	-1000	-1000K4S
	-1200	-1200K4S
26-32	0-1500	2C32-1500K4S
44-64	0-100	MH64-100K2S
	-200	IC64-200K4S
	-300	-300K4S
110-135	0-40	MH135-40K2S
	-60	-60K2S
	-100	IC135-100K4S
	-200	-200K4S
	-300	2C135-300K4S
220-280	0-100	2C280-100K4S





SCR "SCO" SERIES, 1-PHASE

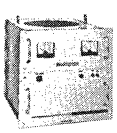
- 0.25% Static Reg.
- 1% rms Ripple
- 25 msec Response Time
- 5 v Dynamic Reg. NL ⇕ FL



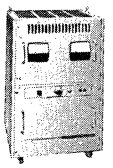
2-15	0-100	SCO15-100-12S
2-37	-50	SCO36-50-12S
2-48	-40	SCO48-40-12S

SCR "E" SERIES, 3-PHASE

- 0.1% Voltage Reg.
- 30 mv rms Ripple
- 1% Current Reg.
- 3 v Dynamic Reg. NL ⇕ FL



2-40	0-150	IRO40-150E24S
	-300	2RO40-300E24S
	-600	ICO40-600E24S
2-135	0-150	2CO135-150E4S
	-300	2CO135-300E4S



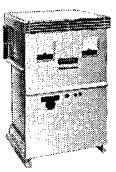
TRANSISTOR "KKGG" SERIES, 3-PHASE

- 0.01% Static Reg.
- 1 mv rms Ripple
- 50 microsec Response Time
- 0.5 v Dynamic Reg. NL ⇕ FL

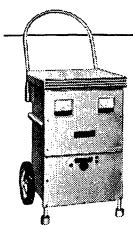
VOLTS	AMPS	MODEL
15-36	0-50	MH36-50KKGG24L
	-100	-100KKGG24L
	-200	-200KKGG24L
26-36	0-400	2C36-400KGG24S
	-600	-600KGG24S

SEMI-REGULATED SERIES, 3-PHASE

- "R & T" Load Regulated Only
- 1% rms Ripple
- "A" Unregulated



VOLTS	AMPS	MODEL
0-30	0-100	MH28-100AN2S
	-200	-200AN2S
	-600	IC28-600AN2S
0-56	0-50	MH56-50AN2S
28/14	0-100/200	MH28-100DT2S
28	0-100	MH28-100A2S
	-100	-100R2S
	-200	-200A2S
	-200	-200R2S
	-300	-300R2S
	-400	-400R2S
	-600	-600R2S
	-1000	A28-1000T4S
120	0-20	MH120-20A2S
	-40	-40A2S
	-60	-60A2S
	-80	-80A2S
	-125	-125A2S
	-200	H120-200A4S
	-400	IC120-400A4S
120/240	0-200	IC240-200A4S

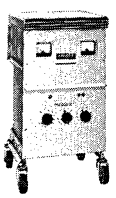


AIRCRAFT STARTING "RA" SERIES

Send for "RA" Bulletin

- 2% Static Reg.
- 1% rms Ripple
- 600% Intermittent Current Rating
- Mobile

12/24	0-50	QRA24-50
28	0-100	MH28-100RA2M
	-200	-200RA2M
	-300	-300RA2M
	-400	-400RA2M
	-600	-600RA2M
	-1000	-1000TJA2M



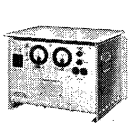
UNREGULATED LOW VOLTAGE SERIES, 3-PHASE

- Unregulated
- 6% rms Ripple

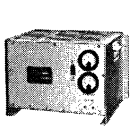
2-14/1-7	0-100/200	MH6-200PD2S
	-150/300	-300PD2S
	-200/400	-400PD2S
	-300/600	-600PD2S
	-500/1000	H6-1000PD2S
	-600/1200	-1200PD2S
4-28/2-14	0-100/200	MH12-200PD2S

All specifications are typical only

Typical Special Army, Navy, Air Force, A.E.C. and NASA Units

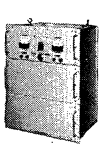


30 AMP AUTOMATIC BATTERY CHARGER

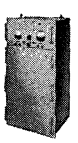


50 AMP RADIO POWER

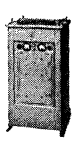
75 AMP MISSILE TESTING SUPPLY



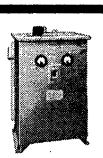
250 AMP MISSILE GROUND POWER



500 AMP MISSILE GROUND POWER



HELICOPTER STARTING POWER SUPPLY



175 AMP FORKLIFT TRUCK CHARGER

CHRISTIE SINCE 1929 ®

CHRISTIE ELECTRIC CORP.

D.C. POWER SUPPLIES
BATTERY CHARGERS & TESTERS
ELECTRO-OPTICAL SYSTEMS

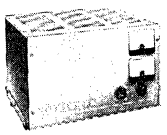
3404A W. 67TH ST., LOS ANGELES, CALIF. 90060 • PHONE: (213) 750-1151 • TWX 910-321-3867

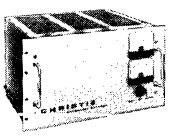
AUTOMATIC BATTERY CHARGERS

LEAD-ACID • SILVER-ZINC

Send for "BC" Bulletin

- Emergency Standby Float Service
- 0.25% Voltage Regulation
- General Purpose Chargers and Battery Eliminators





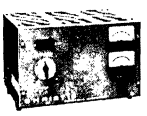
NOM. D-C VOLTS	RATED D-C AMPS	BASIC MODEL NO.	1-PH OR 3-PH
6/12	12	BCA14-12-01-S	1-Ph
	25	BCA14-25-01-S	1-Ph
	50	BCA14-50-12-S	1-Ph
6/12/24	12	BCA30-12-01-S	1-Ph
	25	BCA30-25-01-S	1-Ph
	50	BCA30-50-12-S	1-Ph
	150	2FCB30-150-02-S	3-Ph
36/40	20	BCA40-20-01-S	1-Ph
	40	BCA40-40-12-S	1-Ph
	150	2FCB36-150-02-S	3-Ph
	150	1FCB40-150-02-S	3-Ph
48	6	BCA50-6-01-S	1-Ph
	12	BCA50-12-01-S	1-Ph
	25	BCA50-25-12-S	1-Ph
	50	FCA50-50-02-S	1-Ph
	60	1FCB50-60-02-S	3-Ph
	130	2FCB50-130-02-S	3-Ph
120	6	BCA126-6-01-S	1-Ph
	12	BCA126-12-12-S	1-Ph
	25	FCA126-25-02-S	1-Ph
	30	1FCB126-30-02-S	3-Ph
	50	1FCA126-50-02-S	1-Ph
	60	1FCB126-60-02-S	3-Ph
	100	2FCB126-100-02-S	3-Ph

NICKEL-CADMIUM

1 HOUR

REFLEX CHARGER

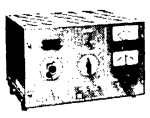
AN ENTIRELY NEW & UNIQUE PRINCIPLE



Model BCA30-50-12BU-S

- Charges to over 100% nominal capacity in only ½ to 1 hour
- Less Battery Memory, Cell Imbalance, Heating, Gassing & Loss of Electrolyte
- Higher Charging Efficiency
- Longer Battery Cycle Life
- One Universal All-Purpose Unit for different number of cells and 11 to 150 ampere hours

CAPACITY TESTER with "RPM" Charger



Model BCA30-50-12BBU-S

- Regulated Constant Current Discharge
- Ampere-hour Readout
- Go/No-Go can be preset at any battery capacity
- "RPM" Charger as above
- Automatic Programmed Charge-Discharge-Charge Cycle — 2½ to 4 hours total duration

• STATIC INVERTERS • STATIC FREQUENCY CHANGERS • UNINTERRUPTIBLE POWER SYSTEMS (UPS)

0.5 TO 7KVA, 1-PH
1.5 TO 20KVA, 3-PH
50 TO 10,000 Hz

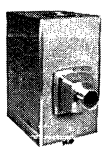
CHRISTIE SINCE 1929

XENOLITE®

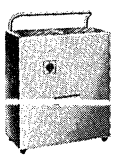
- LAMPHOUSES
- OPTICS
- POWER SUPPLIES
- IGNITERS
- LAMPS
- PROJECTORS

Send for XENOLITE Bulletins

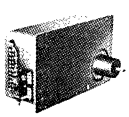
XENON AND MERCURY ARC LAMP SYSTEMS



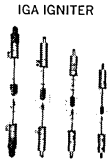
BF LAMPHOUSE



XM POWER SUPPLY



IGA IGNITER

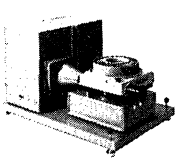


XENON LAMPS

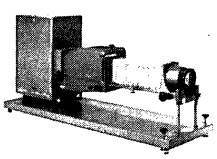
LAMP				IGNITER	LAMPHOUSE incl. Igniter			POWER SUPPLY		
NOM. WATTS	TYPE*	STD.	OZONE-FREE	MANUAL/ AUTOMATIC IGNITION	UF (ADJ. FOCUS)	BF (BRIGHT FIELD)	BSG (EXTRA BRIGHT)	CLASS I (REGULATED)	CLASS II	CLASS III (MOST ECONOMICAL)
150	X	CXL-155	—	‡	UF5	BF5	—	LX151-1	BXM450-1	—
200	H	CSH-200D	—	IGM-2°°°	UF2J-B2	—	—	—	—	Inside Lamphouse
300	X	CXL-305	—	IGM-2***	UF5	BF5	—	SCX1200-12	BXM450-1	—
450	X	CXL-451	CXL-451-O	IGA-5	UF5	BF5	—	SCX1200-12°°	BXM450-1	XM450-1
500	H	CSH-500D	—	IGA-5	UF5J	BF5J	—	SCX1200-12J	BXM500B-1	—
900	X	CXL-900	CXL-900-O	IGA-5	UF10	BF10	—	SCX1200-12°°	—	XM900-1**
1000	XH	—	—	IGA-5	UF10	BF10	—	SCX1200-12	—	—
1000	H	CSH-1000D	—	IGA-5	UF10J	BF10J	—	SCX1200-12	—	—
1600	X	CXL-1600	CXL-1600-O	IGA-8	UF16	BF16	BSG30	1FX1600-02S	—	XM1600-2S**
2000	X	CXL-2000K	—	IGA-8	UF16	BF16	BSG30	1FX1600-02S	—	XM1600-2S**
2500	XH	—	—	IGA-12	UF30J	BF30J	BSG30J	1FX2500B-02S	—	—
2500-3000	X	CXL-3000K	—	IGA-12	UF30	BF30	BSG30	1FX2500-02S	—	1FXM2500-02S
4200	X	CXL-4200K	—	IGA-20	—	—	BSG50	2FX6500-02S	—	3FXM4200-02S
5000	XH	—	—	IGA-20	—	—	BSG50	2FX6500B-02S	—	—
6500	X	—	—	IGA-20	—	—	BSG65	2FX6500-02S	—	3FXM6500-02S
12000	X	—	—	IGA-35	—	—	—	CX12000-24S	—	—
25000	X	—	—	IGA-60	—	—	—	CX25000-4S	—	—

*X = Xenon *XH = Xenon-Mercury *H = Mercury **other models also available °°°Manual ignition only.
‡Included with power supply

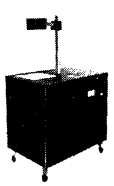
XENON ILLUMINATED PROJECTORS UP TO 6 TIMES BRIGHTER FOR FRONT OR REAR PROJECTION



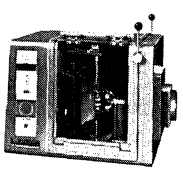
XENOLITE with 35mm & 2"x2" SLIDE PROJECTOR



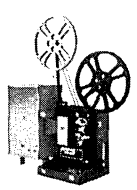
XENOLITE with 3¼"x4" SLIDE PROJECTOR



XENOLITE OVERHEAD PROJECTOR



XENOLITE for 35 & 70mm MOVIE PROJECTORS



XENOLITE with 16mm MOVIE PROJECTOR

CHRISTIE SINCE 1929

CHRISTIE ELECTRIC CORP.

D.C. POWER SUPPLIES
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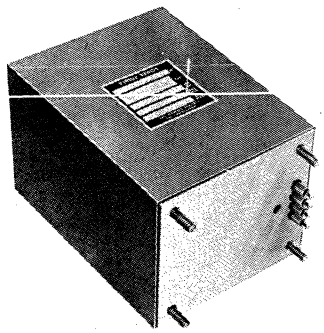
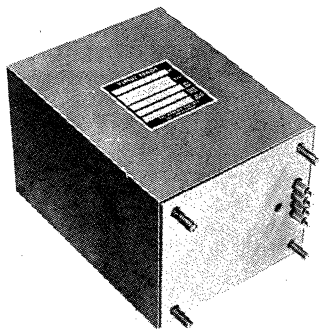
CIRCUIT POWER INC. POWER SUPPLIES



C-90 SERIES

OUR STANDARD SERIES featuring the greatest variety precisely regulated modules.

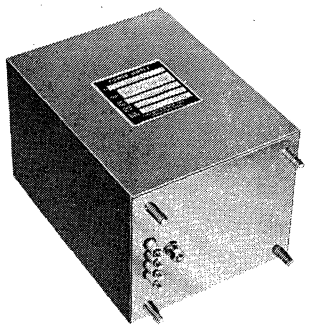
Base Operating Temperature . . . −20°C to +90°C
Input . . . 103-127 VAC, 47-420 Hz
Output Voltage . . . 3.0 to 600 VDC
Output Current . . . to 25 Amps
Output Power . . . to 800 Watts
Regulation . . . ±0.02%; ±0.05%; ±0.5%



LC-75 SERIES

LOWER PRICE SERIES

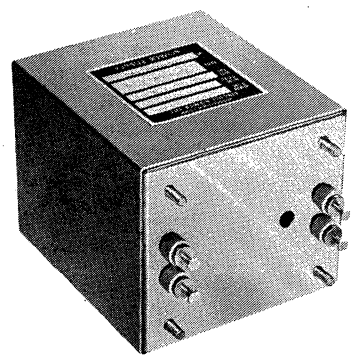
Base Operating Temperature . . . −20°C to 75°C
Input . . . 103-127 VAC, 47-420 Hz
Output Voltage . . . 3.0 to 150 VDC
Output Current . . . to 25 Amps
Output Power . . . to 750 Watts
Regulation . . . ±0.05%; ±0.5%



AN-100 SERIES

DESIGNED AND QUALIFIED FOR EXTREME MILITARY ENVIRONMENTS

Base Operating Temperature . . . −55°C to +100°C
Input . . . 103-127 VAC, 47-420 Hz
Output Voltage . . . 3.0 to 600 VDC
Output Current . . . to 25 Amps
Output Power . . . to 800 Watts
Regulation . . . ±0.02%; ±0.05%; ±0.5%



SR-90 SERIES

OUR MINIATURE SERIES featuring not only more power per volume but a 50% output voltage adjust range.

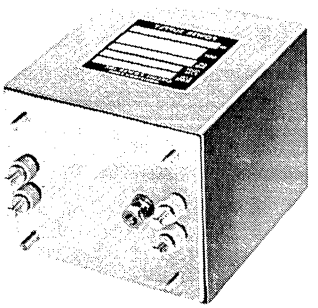
Base Operating Temperature . . . 20°C to +90°C
Input . . . 105-125 VAC, 50-400 Hz
Output Voltage . . . 2.8 to 120 VDC
Output Current . . . to 30 Amps
Output Power . . . to 375 Watts
Regulation . . . Line . . . ±(0.05% +5 mv)
Load . . . ±(0.1% +15 mv)

CIRCUIT POWER INC. 227 MAIN ST., PORTLAND, CONN. 06480
AREA CODE (203) 342-2520

CIRCUIT POWER INC. POWER SUPPLIES

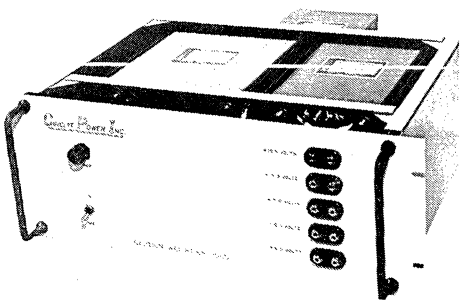
DC-100 SERIES

Base Operating Temperature . . . −55°C to +100°C
Input . . . 21 to 30 VDC
Output Voltage . . . 2.8 to 120 VDC
Output Current . . . to 25 Amps
Output Power . . . to 240 Watts
Regulation . . . ±(0.1% +15 mv)



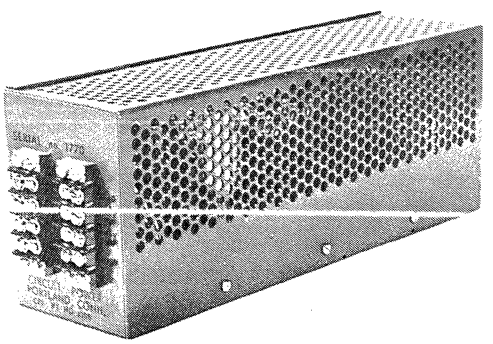
RACK MOUNTS

C-90 Modules in 19 inch Rack Mount



SPECIAL CASES

High-efficiency multi-output in Special Case, with operating ambient temperature of 0°C to 70°C



CIRCUIT POWER OFFERS THE FOLLOWING OPTIONAL FEATURES:

- 208 or 230 Volt Input
- Fixed Output Voltage
- Remote Sensing
- External Output Voltage Adjust
- Overvoltage Protection
- Temperature Coefficient to 0.002% per °C
- and many others!

MULTIPLE OUTPUTS — SPECIAL SIZES AND SHAPES

CIRCUIT POWER INC.
227 MAIN ST., PORTLAND, CONN. 06480
AREA CODE (203) 342-2520

HIGH VOLTAGE EQUIPMENT

HIGHLY REGULATED ADJUSTABLE HIGH VOLTAGE MODULES SERIES "HRM"

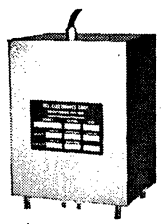
SPECIFICATIONS

Input: 115V ±10% 60 cps
Output: Regulation for 10% line change .03% max. Regulation for NL to FL .03% max
Ripple: .03% RMS max
Temp. Range: −54°C to +65°C operating
Temp. Coefficient: 0.02%/°C

- No voltage overshoot
- Adjustable output
- Short circuit proof (no fuses)
- Meet environmental and transient requirements of MIL-E-16400

Model No. Pos. Output	Model No. Neg. Output	Output Voltage	Max. Current	Dimensions Inches	Net Wt. (Lbs.)
.6HRM5P1	.6HRM5N1	300-600V	5MA	4⅜ x 3⅜ x 4¾	7
1.2HRM5P1	1.2HRM5N1	600-1.2KV	5MA	4⅜ x 3¾ x 4¾	7½
1.7HRM5P1	1.7HRM5N1	900-1.7KV	5MA	4⅜ x 3¾ x 4¾	9
2.5HRM4P1	2.5HRM4N1	1.3-2.5KV	4MA	4⅜ x 3¾ x 4¾	9
3.5HRM3P1	3.5HRM3N1	1.7-3.5KV	3MA	4 1/16 x 4 x 4 15/16	10
5HRM2P1	5HRM2N1	2.5-5.0KV	2MA	4 1/16 x 4 x 4 15/16	10
7HRM1.5P1	7HRM1.5N1	3.5-7.0KV	1.5MA	5½ x 4½ x 6	15
10HRM1P1	10HRM1N1	5.0-10KV	1MA	5½ x 4½ x 6	15
15HRM1.5P1	15HRM1.5N1	7.5-15KV	1.5MA	7¼ x 4 5/16 x 7½	20
20HRM1P1	20HRM1N1	10-20KV	1MA	7¼ x 4 5/16 x 8	20
25HRM2P1	25HRM2N1	12-25KV	2MA	9¼ x 5½ x 9 5/8	35
30HRM.75P1	30HRM.75N1	15-30KV	0.75MA	8¼ x 5 5/16 x 7⅞	37
40HRM.5P1	40HRM.5N1	20-40KV	0.5MA	6¼ x 8¼ x 8	42
50HRM.5P1	50HRM.5N1	25-50KV	0.5MA	10 x 8 x 10	60

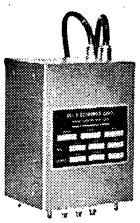
REGULATED MODULES TRANSISTORIZED SERIES "TRHV"



The TRHV series of regulated power supplies are all solid state units. Reference and regulating circuitry is accomplished at low voltage. The units are completely self-contained and require only 115 Volt AC 60/400 cycle excitation to be operative. These supplies are rugged and feature good line, load and thermal stability. The operating temperature range is −20°C to +55°C. Regulation better than 0.25% for 10% line change & NL to FL. Ripple 0.5% RMS at max current.

Model No. Positive Output	Model No. Negative Output	Voltage Output	Max. Current	Dimensions (Inches)	Net Weight (Lbs.)
1RP5-1	1RN5-1	1 KV	5 MA	4¼x3¾x5½	8½
2.5RP4-1	2.5RN4-1	2.5 KV	4 MA	4¼x3¾x5½	8½
5RP2-1	5RN2-1	5 KV	2 MA	4¼x3¾x5½	8½
7.5RP1.5-1	7.5RN1.5-1	7.5 KV	1.5 MA	4¾x4x6	10
10RP1-1	10RN1-1	10 KV	1 MA	4¾x4x6	10½
10RP2-1	10RN2-1	10 KV	2 MA	6¾x4¼x7½	18½
15RP1.5-1	15RN1.5-1	15 KV	1.5 MA	6¾x4¼x7½	18
20RP1-1	20RN1-1	20 KV	1 MA	7¼x4¼x7½	19

UNREGULATED MODULES COMPACT HIGH VOLTAGE SERIES "S"



These power supplies are designed for operation from either a 0-115 volt or 0-125 volt line at 60/400 cycles. Three input terminals are provided to permit proper line connection. The output is available from shielded polyethylene cables and may be varied over the full range by varying the input AC line. The two output cables are insulated for the full output voltage, so that either the positive or negative terminal may be grounded.* All units have selenium rectifiers and are hermetically sealed in an epoxy, vacuum filled, metal case.

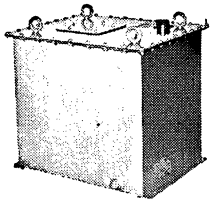
Units for 50 cycle operation at various line voltages are available on request.

*Model 40-2-4 is designed with one output cable for single polarity operation. When ordering, please specify polarity.

Model No.	Max. Output Voltage	Max. Rated Current	**Ripple at Full Load %RMS/MA at 60 CPS	Dimensions (Inches)	Net Weight (Lbs.)
2.5-2-6	0-2.5 KV	2 MA	0.25	3 x 2⅝ x 4¼	3¼
5-2-4	0-5.0 KV	2 MA	0.25	3 x 3½ x 3⅞	4¼
10-1-12	0-10 KV	1.25 MA	0.30	3 x 3½ x 4⅞	5½
15-1-8	0-15 KV	1.25 MA	0.25	4¼ x 5 x 5¾	11½
20-1-4	0-20 KV	1.25 MA	0.25	4¼ x 5⅛ x 6¾	14
25-1-3	0-25 KV	1.25 MA	0.30	4¾ x 6 x 7¼	20¼
30-1-5	0-30 KV	1.25 MA	0.20	5 x 6½ x 8	24½
40-1-1	0-40 KV	1 MA	0.25	6¼ x 8¼ x 7	26
40-2-4*	0-40 KV	2 MA	0.30	6¼ x 8¼ x 7	30
50-1-5	0-50 KV	1 MA	0.25	9⅞ x 7¾ x 9⅜	52
60-1.5-1	0-60 KV	1.5 MA	0.35	12¼x9¼x11¼	87
1-5-2	1 KV	5 MA	.20	3 x 2¾ x 4¼	3½
2.5-5-3	2.5 KV	5 MA	.20	3½ x 3 x 5	5
5-5-4	5 KV	5 MA	.25	4 x 3⅜ x 5¼	7½
7.5-5-1	7.5 KV	5 MA	.20	4⅜ x 3¾ x 5½	8½
10-5-1	10 KV	5 MA	.25	4⅜ x 3¾ x 5½	10
15-5-1	15 KV	5 MA	.30	5¾ x 5 x 6¾	19½
20-5-3	20 KV	5 MA	.25	6½ x 6½ x 6½	21
25-5-1	25 KV	5 MA	.25	6¾ x 6¼ x 7¼	27¼
30-5-8	30 KV	5 MA	.30	7¼ x 6½ x 7¾	38
1-10-1	1 KV	10 MA	.10	3½ x 3 x 5	5
2.5-10-1	2.5 KV	10 MA	.10	4 x 3⅜ x 5¼	6½
5-10-2	5 KV	10 MA	.12	4⅜ x 3¾ x 5½	9
7.5-10-1	7.5 KV	10 MA	.10	4¾ x 4 x 7¼	13½
10-10-3	10 KV	10 MA	.10	5 x 4⅜ x 6¾	14½
15-10-2	15 KV	10 MA	.15	6½ x 6½ x 6½	22½
20-10-3	20 KV	10 MA	.15	6¾ x 6¼ x 7¼	27½
25-10-2	25 KV	10 MA	.10	7½ x 6½ x 8½	38
30-10-3	30 KV	10 MA	.15	8 x 7¾ x 8¾	50

*Single polarity unit, state positive or negative output.
**Ripple at 400 cycles is 15% of ripple at 60 cycles, shown above.

SERIES "O" OIL INSULATED TANK UNITS



DEL SERIES "O", oil insulated, High Voltage Power Supplies offers one of the most comprehensive lines of basic high voltage units available to industry and laboratories. These D.C. supplies are designed to provide long, reliable service in such applications as dielectric testing, capacitor chargers, electrostatic precipitators, electron microscopes, image intensifiers, plasma research and accelerators. Series "O" supplies feature reversible polarity on most units, shielded polyethylene output cables, high quality insulating oil in dust free tank, quiet, long life operation with low corona.

STANDARD MODELS

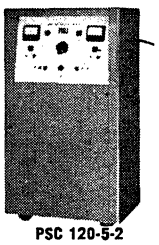
Model No.	Output Voltage (kv)	Output Current (ma)	Model No.	Output Voltage (kv)	Output Current (ma)	Model No.	Output Voltage (kv)	Output Current (ma)
PSO20-200-3	20	200	PSO50-50-8	50	50	PSO100-300-1	100	300
PSO20-300-2	20	300	PSO50-75-1	50	75	PSO100-500-1	100	500
PSO25-50-2	25	50	PSO50-100-4	50	100	PSO120-5-3	120	5
PSO25-200-11	25	200	PSO50-200-5	50	200	PSO120-10-1	120	10
PSO25-400-1	25	400	PSO50-220-2	50	220	PSO120-30-1	120	30
PSO25-500-6	25	500	PSO50-300-1	50	300	PSO130-2-3	130	2
PSO30-3-2	30	3	PSO50-500-3	50	500	PSO150-5-5	150	5
PSO30-5-4	30	5	PSO60-1-1A†	60	1	PSO150-10-1	150	10
PSO30-5-16	30	5	PSO60-5-2	60	5	PSO150-20-1	150	20
PSO30-20-9	30	20	PSO60-10-1	60	10	PSO150-50-3	150	50
PSO30-30-5	30	30	PSO60-100-2	60	100	PSO150-100-1	150	100
PSO30-75-1	30	75	PSO70-5-1	70	5	PSO150-150-1	150	150
PSO30-150-4	30	150	PSO70-5-3	70	5	PSO150-200-1	150	200
PSO30-200-2	30	200	PSO75-30-1	75	30	PSO150-300-1	150	300
PSO30-500-1	30	500	PSO75-60-1	75	60	PSO160-2-1	160	2
PSO40-5-6	40	5	PSO80-5-1	80	5	PSO200-10-1	200	10
PSO40-10-4	40	10	PSO80-5-4	80	5	PSO200-150-1	200	150
PSO40-20-1	40	20	PSO80-10-1B	80	10	PSO200-250-1	200	250
PSO40-220-1	40	220	PSO80-60-1	80	60	PSO250-1-2	250	1
PSO50-1-2†	50	1	PSO100-2-1	100	2	PSO250-3-2	250	3
PSO50-5-6	50	5	PSO100-30-6	100	30	PSO250-10-2	250	10
PSO50-5-9	50	5	PSO100-50-1	100	50	PSO300-10-1	300	10
PSO50-10-2	50	10	PSO100-100-1	100	100	PSO300-50-2	300	50
PSO50-20-2	50	20	PSO100-150-1	100	150			
PSO50-30-4	50	30	PSO100-200-3	100	200			

† Polarity — All units feature reversible polarity except Models PSO 40-2-3, PSO 50-1-2, and PSO 60-1-1A which supply positive outputs only.

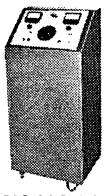
NOTE: Larger units are shipped without oil to reduce transportation costs. See notations on price list.

COMPLETE LINE OF CONTROL PANELS AND REGULATED CONTROLS AVAILABLE FOR ALL SERIES "O" POWER SUPPLIES.

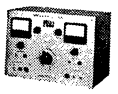
INSTRUMENTED POWER SUPPLIES



PSC 120-5-2



PSC 25-200-2



PSC 30-5-1

DEL Series "PSC" Instrumented, High Voltage Power Supplies provides a broad selection of units designed for reliable and dependable use in research and industry.

All units: Input 115V, 60 cps unless noted otherwise.
All units up to 20KV are air insulated and utilize epoxy components.
All other units have high voltage section immersed in high grade insulating oil to insure freedom from electrical noise.

STANDARD MODELS

Model No.	Output Voltage Range (kv)	Max. Output Current (ma)	Model No.	Output Voltage Range (kv)	Max. Output Current (ma)	Model No.	Output Voltage Range (kv)	Max. Output Current (ma)
PSC.5-1000-1	0-0.5	1000	PSC20-25-1	0-20	25	PSC80-10-1B	0-80	10
PSC1-150-1	0-1 5	150	PSC20-150-1	0-20	150	PSC100-30-2	0-100	30
PSC1-5000-1	0-1	5000	PSC20-300-1	0-20	300	PSC100-50-1	0-100	50
PSC2-100-1	0-2	100	PSC25-200-2	0-25	200	PSC100-100-1	0-100	100
PSC2.5-750-1	0-2.5	750	PSC25-400-1	0-25	400	PSC120-5-2A	0-120	5
PSC2.5-1000-1	0-2.5	1000	PSC30-5-1	0-30	5	PSC120-10-1	0-120	10
PSC2.5-2000-1	0-2.5	2000		0-35	1	PSC120-30-1	0-120	30
PSC5-50-1	0-5	50	PSC30-5-7	0-30	5	PSC150-5-1	0-150	5
PSC5-500-1	0-5	500	PSC30-75-1	0-30	75	PSC150-10-1	0-150	10
PSC5-1000-3	0-5	1000	PSC30-150-1	0-30	150	PSC150-20-1	0-150	20
PSC10-10-8	0-10	10	PSC30-200-1	0-30	200	PSC150-50-1	0-150	50
PSC10-250-1	0-10	250	PSC50-30-3	0-50	30	PSC200-10-1	0-200	10
PSC10-500-10	0-10	500	PSC50-50-1	0-50	50	PSC250-1-1A	0-250	1
PSC10-750-1	0-10	750	PSC50-75-3	0-50	75	PSC250-3-1	0-250	3
PSC15-10-1	0-15	10	PSC50-100-2	0-50	100	PSC250-10-1	0-250	10
PSC15-200-1	0-15	200	PSC50-200-3	0-50	200	PSC300-10-1	0-300	10
PSC15-300-1	0-15	300	PSC75-30-1	0-75	30	PSC300-50-1	0-300	50
PSC20-10-1	0-20	10	PSC75-60-1	0-75	60			

NOTE: Some units are shipped without oil to reduce transportation charges. See notations on price lists.

Standard Power Supplies and Transformers are available from stock. Others can be built to your specific requirements with output up to 350 KV and 250 KVA. HPS Series — High Powered, Heavy Duty Power Supplies are available upon request.

SEND FOR NEW COMPLETE CATALOG COVERING ALL HIGH VOLTAGE EQUIPMENT.

HIGH VOLTAGE EQUIPMENT

RACK MOUNT POWER SUPPLIES
"RHPT" SERIES HIGH POT TESTER

The Del RHPT series of rack mounted Hi Pot Testers are general-purpose power supplies which are fully instrumented, completely enclosed, and fully protected. These units are designed for standard 19-inch racks and have light gray panels. They are recommended for all cmmercial, industrial, and laboratory uses where reliable dc high-voltage sources are required.

Model No.	Output Voltage Range (kv)	Max. Current (ma)	Model No.	Output Voltage Range (kv)	Max. Current (ma)
1RHPT-5-1	0-1	5	10RHPT-1.25-1	0-10	1.25
1RHPT-10-1	0-1	10	10RHPT-5-1	0-10	5
1RHPT-25-1	0-1	25	10RHPT-10-1	0-10	10
1RHPT-50-1	0-1	50	10RHPT-25-1	0-10	25
1RHPT-100-1	0-1	100	10RHPT-50-1	0-10	50
1RHPT-500-1	0-1	500	10RHPT-100-1	0-10	100
1RHPT-1000-1	0-1	1000	10RHPT-150-1	0-10	150
1RHPT-1500-1	0-1	1500	15RHPT-1.25-1	0-15	1.25
2.5RHPT-2-1	0-2.5	2	15RHPT-5-1	0-15	5
2.5RHPT-5-1	0-2.5	5	15RHPT-10-1	0-15	10
2.5RHPT-10-1	0-2.5	10	15RHPT-25-1	0-15	25
2.5RHPT-25-1	0-2.5	25	15RHPT-50-1	0-15	50
2.5RHPT-50-1	0-2.5	50	15RHPT-75-1	0-15	75
2.5RHPT-100-1	0-2.5	100	20RHPT-1.25-1	0-20	1.25
2.5RHPT-200-1	0-2.5	200	20RHPT-5-1	0-20	5
2.5RHPT-400-1	0-2.5	400	20RHPT-10-1	0-20	10
2.5RHPT-600-1	0-2.5	600	20RHPT-25-1	0-20	25
5RHPT-2-1	0-5	2	20RHPT-50-1	0-20	50
5RHPT-5-1	0-5	5	20RHPT-75-1	0-20	75
5RHPT-10-1	0-5	10	25RHPT-1.25-1	0-25	1.25
5RHPT-25-1	0-5	25	25RHPT-5-1	0-25	5
5RHPT-50-1	0-5	50	25RHPT-10-1	0-25	10
5RHPT-100-1	0-5	100	25RHPT-25-1	0-25	25
5RHPT-200-1	0-5	200	30RHPT-1.25-1	0-30	1.25
5RHPT-300-1	0-5	300	30RHPT-5-1	0-30	5
7.5RHPT-5-1	0-7.5	5	30RHPT-10-1	0-30	10
7.5RHPT-10-1	0-7.5	10	30RHPT-25-1	0-30	25
7.5RHPT-25-1	0-7.5	25	40RHPT-2-1†	0-40	2
7.5RHPT-50-1	0-7.5	50	50RHPT-1-1	0-50	1
7.5RHPT-100-1	0-7.5	100	60RHPT-1-1	0-60	1

"HIGH POT" TESTERS
"TC" SERIES POWER SUPPLIES

DEL TC Series multi-purpose D.C. Power Supplies are compact, fully instrumented and fully protected units providing ratings up to 80,000 volts D.C. continuously variable.

Seleninum Rectifiers used throughout to provide long life and instantaneous operation. No filament warm up time required.

All high voltage components immersed in special high grade insulating oil. This assures LONG trouble-free LIFE.

STANDARD MODELS

Model No.	Full Load Voltage Range (kv)	Current Range (ma)	Ripple* (% rms/ma at 60 Hz)	Dimensions** Complete Unit (in., w x d x h)	Dimensions** Tank Only (in., w x d x h)
30TC-5-1	0-30	0-5	0.4	14½ x 13½ x 25¾	14 x 13 x 16½
40TC-5-1	0-40	0-5	0.5		
50TC-5-1	0-50	0-5	0.4		
60TC-5-1	0-60	0-5	0.4		
30TC-20-1	0-30	0-20	0.4	17 x 17 x 32	16½ x 16½ x 21½
40TC-20-1	0-40	0-20	0.4		
50TC-10-1	0-50	0-10	0.4		
60TC-10-1	0-60	0-10	0.4		
70TC-5-1	0-70	0-5	0.4		
80TC-5-1	0-80	0-5	0.4		

*%/ma is specified at maximum voltage and current. Percentage shown is also accurate for lower currents down to less than 15% of the maximum ma rating.

**Dimensions are nominal. Outline drawings available on request.

ALSO AVAILABLE FOR OTHER INPUT AND OUTPUT VOLTAGES

LHRM SERIES

The Del LHRM Series of High Voltage Power Supplies offer the HRM module power supply with its high regulation, low ripple, short circuit protection and other desirable features in a lab. type rack mountable supply.

Full voltage control by ten-turn potentiometer, ammeter and voltmeter, line switch, etc., make this unit essential in lab. development and testing of high voltage equipment such as high resolution CRT displays, and other applications requiring a precision high voltage power supply. It offers the great advantage in that the characteristics are identical to the HRM modules which can be then utilized in the final equipment.

FEATURES

- Short Circuit Proof
- Full Adjustable Output
- Excellent Thermal Stability
- No Voltage Overshoot on Turn On or Turn Off
- Single Shielded Output Cable
- Fast Response
- No Warm-up Required
- All Silicon Transistors
- No r.f.i., Chopper or Hhigh Frequency Oscillator
- Automatic Resetting Thermal Cutout

Enhances selection of final power supply module.
Ten Turn Potentiometer with 0.15% Linearity.

SPECIFICATIONS — ALL MODELS

INPUT: 115V ±10% 60 to 400 Hz. single phase for units up to 10 KV.
115V ±10% 60 or 400 Hz. for units 15 KV and above.

OUTPUT: See table

REGULATION:

LINE: Less than 0.03% from 50% to 100% of max. rated output voltage increasing to 0.5% at 10% of max. rated output voltage for a ±10% line votlage change.

LOAD: Same as line regulation above from no load to full load.

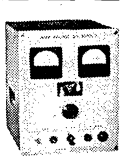
RIPPLE: Less than 0.03% rms of max. rated output voltage.

LINEARITY: Better than 0.15" with a ten turn potentiometer. Models marked (*) 0.7%.

MODEL NUMBER Pos. Output	MODEL NUMBER Neg. Output	Output Voltage KV	Output Current MA	19" Rack Panel Mount (W.x D.x H.)	(Lbs.) Approx. Wgt.
1.2LHRM5P1	1.2LHRM5N1	0-1.2	5		10
1.7LHRM5P1	1.7LHRM5N1	0-1.7	5		10
2.5LHRM4P1	2.5LHRM4N1	0-2.5	4		10
3.5LHRM3P1	3.5LHRM3N1	0-3.5	3	21¾x15¼x10½	11
5LHRM2P1	5LHRM2N1	0-5	2		11
7LHRM1.5P1	7LHRM1.5N1	0-7	1.5		18
10LHRM1P1	10LHRM1N1	0-10	1		18
12LHRM5P1*	12LHRM5N1*	0-12	5		23
15LHRM1.5P1	15LHRM1.5N1	0-15	1.5		23
15LHRM5P1*	15LHRM5N1*	0-15	5		23
20LHRM1P1	20LHRM1N1	0-20	1		23
20LHRM5P1*	20LHRM5N1*	0-20	5	21¾x15¼x12¼	23
25LHRM5P1*	25LHRM5N1*	0-25	5		23
25LHRM10P1*	25LHRM10N1*	0-25	10		23
30LHRM.75P1	30LHRM.75N1	0-30	.75		42
30LHRM5P1	30LHRM5N1*	0-30	5		47
40LHRM.5P1	40LHRM.5N1	0-30	.5	21¾x15¼x14	47
50LHRM.5P1	50LHRM.5P1	0-50	.5		66

NOTE: All Models Available with Digital Voltmeter Readout Grounding Switches Ripple Reducers Upon Special Request.

"HI-POT" TESTERS



Del D.C. "HI-POT" supplies are fully instrumented and fully protected units providing output voltages up to 160,000 volts D.C. Supplies are well designed to provide conservative ratings.

Thirteen models offer a wide selection to meet all applications. Portable units as well as floor type with rack mountable control panels* are available

Input 115 VAC - 60 cycle.

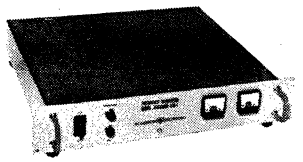
Model No.	Voltage Range Full Load	Current Range MA	Ripple at Full Load % RMS/MA	Size	Polarity
2.5 HPT-2-1	0-2,500	2	0.30	9½" x 11" x 12"	Reversible
5 HPT-2-1	0-5,000	2	0.20	9½" x 11" x 12"	Reversible
10 HPT-1-1	0-10,000	1.25	0.45	9½" x 11" x 12"	Reversible
15 HPT-1-1	0-15,000	1.25	0.30	9½" x 11" x 12"	Reversible
20 HPT-1-1	0-20,000	1.25	0.30	9½" x 11" x 12"	Reversible
20 HPT-5-1	0-20,000	5	0.50	9½" x 11" x 12"	Reversible
30 HPT-3-1	0-30,000	3	0.50	9½" x 11" x 12"	Reversible
40 HPT-1-1	0-40,000	1	0.30	9½" x 11" x 12"	Reversible
40 HPT-2-1	0-40,000	2	0.30	20" x 12" x 14"	Positive
50 HPT-1-1	0-50,000	1	0.50	20" x 12" x 14"	Positive
60 HPT-1-1	0-60,000	1	0.50	20" x 12" x 14"	Positive
100 HPT-2-1	0-100,000	2	0.50	20¾" x 17½" x 25½" Tank Only	Reversible
*130 HPT-2-1	0-130,000	2	0.50	29¼" x 19" x 27" Tank Only	Reversible
*160 HPT-2-1	0-160,000	2	0.50	29¼" x 19" x 33½" Tank Only	Reversible

Rack Mountable Hi-Pot Testers also available from stock.

DEL ELECTRONICS CORP. MOUNT VERNON, N.Y.
250 E. Sandford Blvd. 914 - 699-2000 TWX: 710-562-0130

AUXILIARY EQUIPMENT

TRANSISTORIZED FREQUENCY CONVERTERS



ATA SERIES

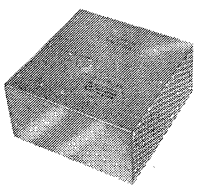
The ATA Series of frequency converters is a source of stable 400 cycle power which operates directly from a standard 50 to 60 cycle line. These units feature excellent frequency characteristics, waveform purity, voltage regulation and low dynamic impedance.

SPECIFICATIONS

INPUT VOLTAGE	105-125 VAC, 50-70 cps
OUTPUT VOLTAGE	Adj. 105-125 VAC
OUTPUT FREQ.	400 cps, adjustable, 398 to 402 cps.
DISTORTION	0.8%, Max.
POWER FACTOR	±0.7 to Unity
VOLTAGE REG.	
LOAD	Within 0.5% for no load to full load.
LINE	±0.5% for 105-125 V
METERS	Output voltage and current.
CONSTRUCTION	Designed for rack mounting.

MODEL	OUTPUT V.A.	SIZE W x D x H (in.)	TYPE
ATA 400RS-100	100	19 x 16 x 3½	Regulated
ATA 400RS-500	500	19 x 16 x 8¾	Regulated
ATA 400RS-1000	1000	19 x 16 x 14	Regulated

TRANSISTORIED DC/AC INVERTERS



DTA 60 SERIES

The DTA 60 Series of DC to 60 cycle AC and the DTA 400 Series of DC to 400 cycle AC inverters include regulated units, for those applications requiring precise output voltage, and unregulated units where the output voltage is not critical. All units operate from a 22 to 30 volt DC source, are capable of frequency synchronization to an external source, and are protected against overvoltage, reverse polarity, overload and over-temperature.

SPECIFICATIONS

INPUT VOLTAGE: 22-30 VDC

OUTPUT VOLTAGE: 115 VAC for regulated units; 115 VAC Nom. with ±10% taps for unregulated units.

POWER FACTOR: ±0.7 to unity.

DISTORTION: 2½% for DTA 60 Series 0.8% for DTA 400 Series.

VOLTAGE REG. LOAD: Approx. 6% for 50% load change, unregualted units. 0.5% no load to full load for regulated units.

LINE: Output proportional to input for unregulated units. 0.5% for 22 to 30 VDC for regulated units.

FREQUENCY REG. 60 SERIES: 0.5% for 22 to 30 VDC 0.5% for no load to full load. 400 SERIES: 0.2% for 22 to 30 VDC. 0.2% for no load to full load.

ISOLATION: Between input, output, gnd.

HOUSING: Modular, with heat radiating finish.

MOUNTING: Tapped inserts in base.

TERMINATIONS: Input, output, ground and synchronization signal, all available under removable access plate.

UNREGULATED MODEL	OUTPUT V.A.	SIZE W x D x H (in.)	WEIGHT LBS.	TYPE
DTA 60RS_100	100	10 x 10 x 5	25	Regulated
DTA 60RS-500	500	12 x 14 x 12	95	Regulated
DTA 60RS-1000	1000	17 x 18 x 14	180	Regulated
DTA 60RS-2500	2500	17 x 17 x 19	280	Regulated
DTA 60S-100	100	10 x 10 x 5	30	Unregulated
DTA 60S-500	500	12 x 14 x 12	85	Unregulated
DTA 60S-1000	1000	14 x 14 x 14	165	Unregulated
DTA 60S-2500	2500	17 x 17 x 19	275	Unregulated
REGULATED MODEL	**OUTPUT V.A.**	**SIZE W x D x H (in.)**	**WEIGHT LBS.**	**TYPE**
DTA 400RS-100	100	10 x 10 x 5	21	Regulated
DTA 400RS-500	500	12 x 14 x 12	65	Regulated
DTA 400RS-1000	1000	17 x 18 x 4	145	Regulated
DTA 400S-100	100	10 x 10 x 5	25	Unregulated
DTA 400S-500	500	12 x 14 x 12	75	Unregulated
DTA 400S-1000	1000	14 x 14 x 14	165	Unregulated

METER MULTIPLIERS

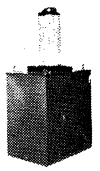
Del Electronics' line of multipliers is designed and built to provide high voltage DC measurements with safety and minimum ccrona at reasonable cost. Each unit consists of resistors immersed in high grade insulating oil and hermetically sealed grounded case. All units are designed for use with 100 ua full scale meter. Can be furnished with panel type 4½" rectangular 100 ua meter (2% accuracy), with KV scale to match.

Type	Maximum Kilivolts	Case Dimension (Max.) W	D	H	Insulator Height
M-5	5	2 5/16"	2 1/16"	2½"	1"
M-10	10	2 5/16"	2 1/16"	2½"	1¾"
M-15	15	2 5/16"	2 1/16"	3⅛"	1¾"
M-20	20	2¾"	2½"	4"	2½"
M-30	30	4¼"	3¾"	5½"	3"
M-50	50	4¾"	4"	8"	8⅛"
M-100	100	9½"	9½"	9½"	14"
M-150	150	11"	11"	12"	20"
M-250	250	16½"	16½"	22"	28¾"

ALSO AVAILABLE FOR OTHER INPUT AND OUTPUT VOLTAGES

TRANSFORMERS

ISOLATION TRANSFORMERS

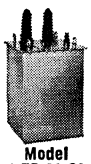


Model 2-TR-250-21

DEL ELECTRONICS' line of High Voltage Isolation Transformers are designed and manufactured for use in industry and in research and development laboratories.

These DEL High Quality Transformers have the following features:

- Complete vacuum varnish impregnation
- Immersed in high grade insulating oil
- Electrostatic shield between primary and secondary
- Good regulation



Model 3-TR-60-22

STANDARD 60 HZ TYPE ISOLATION TRANSFORMERS

Model No.	Max Kva	Kvdc Insulation	Tank Size (in., w x d x h)	Insulator Height (in.) ††
1-TR-30-XX†	1	30	10 x 12 x 11	6
1.5-TR-30-XX†	1.5	30	10 x 12 x 11	6
1-TR-50-XX†	1	50	13 x 13⅞ x 16⅜	8½
3-TR-50-XX†	3	50		
1-TR-60-XX†	1	60	9¾ x 12⅜ x 13⅜	11
2-TR-60-XX†	2	60	9¾ x 12⅜ x 13⅜	11
3-TR-60-XX†	3	60	16½ x 16½ x 21⅜	11
5-TR-60-XX†	5	60		
3-TR-75-XX†	3	75	16½ x 16½ x 22	11
1-TR-100-XX†	1	100	20¾ x 17½ x 17 13/16	14
3-TR-100-XX†	3	100		
3-TR-150-XX†	3	150	29¼ x 19 x 27	19½
5-TR-150-XX†	5	150		
2-TR-250-XX†	2	250	25 x 33 x 37 5/16	28¾
3-TR-250-XX†	3	250	29¾ x 29¾ x 36⅜	28¾
5-TR-250-XX†	5	250	25 x 33 x 37¼	28¾
4-TR-300-XX†	4	300	39½ x 47½ x 50½	35

* Dimensions are nominal. Outline drawings available on request.

† NOTE — Add the following suffix in place of XX.

FOR	SUFFIX	FOR	SUFFIX
120/120	11	240/120	21
120/240	12	240/240	22

†† If shielded polyethylene output cables are desired in place of porcelain insulator, designate by a C prefix; e.g., 1-CTR-30-XX.

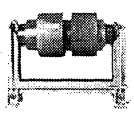
HIGH VOLTAGE ISOLATION TRANSFORMERS

OPEN TYPE CONSTRUCTION — EPOXY COATED

Primaries: 115 V, 230 V — 60 cps • Secondaries: 115 V

Type	KVA	Insulation KVDC Working	Size
AD 1640	.200	10	6⅛ x 4 x 5⅛
AD 1641	.500	10	7⅝ x 5⅞ x 7¾
AD 1642	.750	10	9½ x 6 5/16 x 8¼
AD 1643	1.000	10	8½ x 8 x 9¾
AD 1644	.200	20	8½ x 4 x 5⅝
AD 1645	.500	20	10¼ x 5⅝ x 7½
AD 1646	.750	20	9¾ x 6¾ x 8
AD 1647	1.000	20	11¼ x 6⅝ x 8¾
AD 3060	.250	30	8½ x 7¼ x 6½
AD 3061	.500	30	9¾ x 7 x 8¾
AD 3062	.750	30	10½ x 7½ x 9½
AD 3063	1.000	30	11 x 9 x 9½
AD 3064	.250	40	10 x 7 x 6½
AD 3065	.500	40	11¼ x 7¼ x 8¾
AD 3066	.750	40	12½ x 7½ x 9½
AD 3067	1.000	40	12¾ x 9 x 9½
AD 3068	.250	50	13¼ x 7¼ x 6½
AD 3069	.500	50	13¼ x 7¼ x 8¾
AD 3070	.750	50	14½ x 7½ x 9½
AD 3071	1.000	50	14¾ x 9 x 9½

TRANSFORMER REACTORS



SPECIAL PURPOSE TRANSFORMERS

We design and manufacture to customers' specifications a wide variety of High Voltage. Low Capacity Filament Transformers, and Hermetically Sealed units

OVER 3500 PROVEN AND TESTED TRANSFORMER DESIGNS AVAILABLE

SEND FOR DEL ELECTRONICS NEW CATALOG ON

CAPACITORS

SILVERCAP® • HERMETIC SEALED • PRECISION CERAMIC & BAKELITE CASED • ENERGY STORAGE • DELMICA • DELPLATE

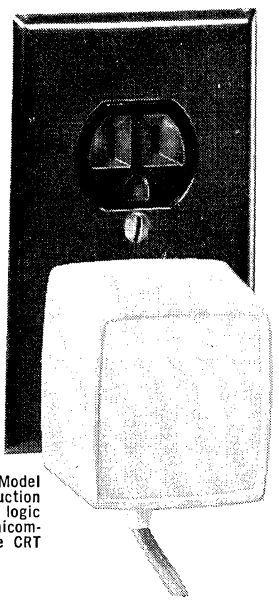
MULTISYN® — INDUCTOSYN®

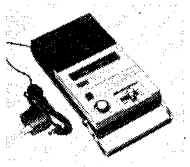
PRECISION ANGLE SENSING, CONTROL, AND DIGITIZING COMPONENTS. ACCURACIES TO 0.5 SECOND OF ARC.

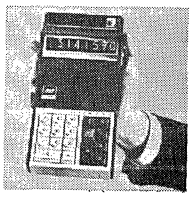
DEL ELECTRONICS CORP. — 250 E. Sandford Blvd. — **MOUNT VERNON, N.Y.** — 914 - 699-2000 **TWX: 710-562-0130**

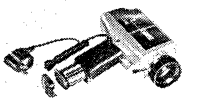
WALL PLUG-IN LOW VOLTAGE

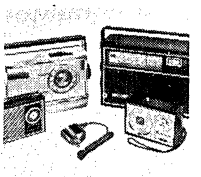
CONVERTERS/INVERTERS/CHARGERS

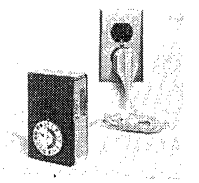


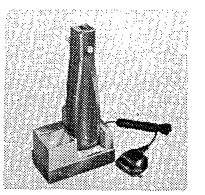








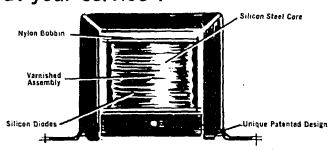




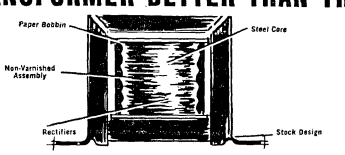
To insure high quality and top performance in our plug-in power supplies and chargers, we make our own low voltage

TRANSFORMERS

using superior materials in a smaller sized unit. The years of successfully satisfying the unique needs of the industry with specialty transformers is "at your service".



WHY IS THIS LOW COST DYNAMIC TRANSFORMER BETTER THAN THIS



STOCK TRANSFORMER COSTING MORE.

In addition to those advantages already pointed out, DYNAMIC TRANSFORMERS can be made to your SPECIFICATIONS in days and in most cases with NO COST for prototypes.

TRANSFORMERS FOR ALL REASONS

- ☐ Patented, U/L listed
- ☐ Internal or External
- ☐ Wall-mounted
- ☐ Fast-charging
- ☐ Power conversion
- ☐ Conversion/charging
- ☐ Printed circuit
- ☐ Sub-miniature
- ☐ Ferro-resonant
- ☐ Multi-input
- ☐ Multi-output

Designed to be listed under the U/L • CSA SPECIFICATIONS

Illustrated at right is the Model 3-1743 presently in production for use with a keyboard logic circuit. Suitable for minicomputers, calculators, remote CRT terminals, etc.

Dynamic Instrument Corp. has designed, developed and patented a complete range of low-voltage, filtered, transistor-regulated power supplies and chargers designed to supply the necessary power to a vast variety of Electronic equipment.

Utilizing a wall plug-in type unit eliminates or greatly reduces the problems involved with UL listing your product. They also remove the major heat source, reduce size and weight, and also greatly increase your design flexibility. The latest design applications of the Dynamic wall plug-in supplies are in conjunction with such sophisticated equipment as mini-computers, calculators, keyboard logic circuits, and remote CRT Terminals.

Just call or write: Dept. WPX-1.

Dynamic's product range and capabilities also cover:

POWER CONVERSION
AC-AC for products requiring low-level AC voltage. AC-DC for small electric motor driven products that do not use batteries.

SECONDARY BATTERY CHARGING
Dynamic Chargers for charging Nickel-Cadmium; Lead-Acid and Manganese-Alkaline Batteries.

AC-DC CONVERSION/CHARGING
Dynamic Converter-Chargers providing rechargeability or instant use of battery operated products.

FAST CHARGING SYSTEMS
Dynamic design and production capability relative to Fast Charging Systems.

TRANSFORMERS
Internal, External and Wall-Mounted Dynamic Transformers.

SPECIALTY TRANSFORMERS
Dynamic Plug-In, Printed Circuit Transformers; Sub-Miniature Transformers; Ferro-resonant Transformers; Multi-Input Voltage and Multi-Output Voltage Transformers.

THE TRANSFORMATION OF POWER
A unique brochure explaining the many advantages and application possibilities of Dynamic's patented U/L listed transformers, converters, chargers and power supplies, technical data sheets and bulletins, are available on specific products. A request on your letterhead or phone our Sales Engineering Department WPX-1.

DYNAMIC INSTRUMENT CORP.

TWX 510-224-6842 CABLE ADDRESS "DYNINST" PLAINVIEW, N. Y.

115 E. Bethpage Rd.,
Plainview, N. Y. 11803
516 - 694-6000

Deltron inc.

OS, PS SERIES

SPECIFICATIONS		
Line/Load Regulation	0.02% + 5 mv	
Ripple & Noise	500 μv rms	
Temperature Coefficient	0.02% + 2 mv	
Stability	0.05% + 5 mv	
Recovery Time	10 μs	
Overload & Short Circuit	PS — Current limiting with automatic recovery. OS — Use external fuse.	
Temperature Deratings 0-50°C Full Output	60°C	71°C
	15%	30%
Storage Temperature	−55°C to 85°C	

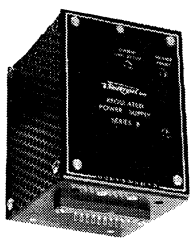
CA, CD SERIES

SPECIFICATIONS		
Line/Load Regulation	CV	0.01% + 1 mv
	CC	0.05% + 500 I_M μa
Ripple & Noise	CV	250 μv rms
	CC	250 I_M μa rms
Temperature Coefficient	CV	0.01% + 1 mv
	CC	0.05% + 500 I_M μa
Stability	CV	0.05% + 5 mv
	CC	0.1% + 2 I_M ma
Recovery Time	CV	50 μs
Operating Temperature		0°C to 71°C

B SERIES

Very low cost, wide range modules. Either plug-in or wire-in installation. Hardware included for mounting 2 units together.
Automatic series and parallel operation.
Remote sensing and programming.

MODEL	OUTPUT Volts	OUTPUT Amps	PRICE
B10-0.6	0-10	0-6	$59
B10-1.2	0-10	1.2	$69
B20-0.35	0-20	0.35	$59
B20-0.7	0-20	0.7	$69
B40-0.2	0-40	0.2	$59
B40-0.4	0-40	0.4	$69

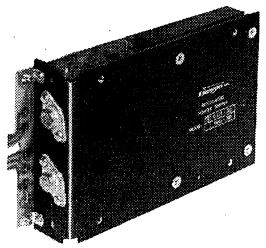


Built-in over voltage crowbar — Add Suffix C.....$15

REGULATED POWER SUPPLIES

CUSTOM ENGINEERING: In addition to standard catalog power supplies, Deltron offers complete engineering of CUSTOM POWER SUPPLIES designed to meet your specific requirements. Multiple outputs — wide range — special packaging. Deltron guarantees performance to your specifications.

ACCESSORIES AND OPTIONS: Deltron offers a complete line of accessories, such as crowbars, meter panels, rack adapters, including options of wide slots, 230 VAC operation and other features.

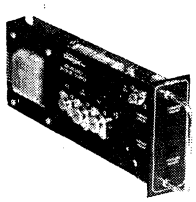


Mating Connector Available — Model J2 ..... $3

Very low cost compact card modules with dual tracking or independent outputs. Series and parallel operation.

MODEL	RANGE	PRICE
OS6-0.2D	5-6 Volts 0.2 Amps	$49
PS6-0.2D		$69
OS6-0.6D	5-6 Volts 0.6 Amps	$69
PS6-0.6D		$89
OS15-0.1D	8-15 Volts 0.1 Amps	$49
PS15-0.1D		$69
OS15-0.3D	8-15 Volts 0.3 Amps	$69
PS15-0.3D		$89

Wide range compact card modules with remote sensing and programming. Automatic series or parallel operation. Automatic crossover and current limiting models.



AUTOMATIC CROSSOVER Models	Price	DC OUTPUT RANGE Volts	Amps	CURRENT LIMITING Models	Price
CD10-1	$112	0-10	0-1	CA10-1	$ 99
CD10-2	$132	0-10	0-2	CA10-2	$115
CD20-0.5	$112	0-20	0-0.5	CA20-0.5	$ 99
CD20-1	$132	0-20	0-1	CA20-1	$115
CD40-0.3	$112	0-40	0-0.3	CA40-0.3	$ 99
CD40-0.6	$132	0-40	0-0.6	CA40-0.6	$115
CD60-0.2	$112	0-60	0-0.2	CA60-0.2	$ 99
CD60-0.4	$132	0-60	0-0.4	CA60-0.4	$115
CD80-0.15	$112	0-80	0-0.15	CA80-0.15	$ 99
CD80-0.3	$132	0-80	0-0.3	CA80-0.3	$115
CD100-0.12	$112	0-100	0-0.12	CA100-0.12	$ 99
CD100-0.24	$132	0-100	0-0.24	CA100-0.24	$115

SPECIFICATIONS		
Line/Load Regulation	0.02% + 5 mv	
Ripple & Noise	500 μv rms	
Temperature Coefficient	0.01% + 2 mv	
Stability	0.05% + 5 mv	
Recovery Time	10 μs	
Temperature Deratings 0-50°C Full Output	60°C	71°C
	15%	30%
Storage Temperature	−55°C to 85°C	
Overload & Short Circuit	Adjustable current limiting with automatic recovery.	

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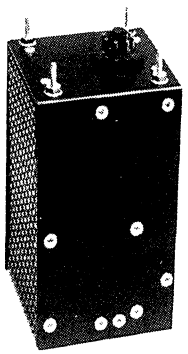
Deltron inc.

D SERIES

Feature dual independent outputs, compact construction, plug-in or wire-in installation, remote sensing and programming, automatic series and parallel operation.

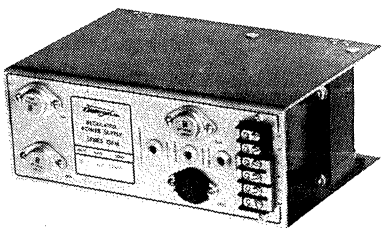
SPECIFICATIONS		
Line/Load Regulation	0.02% + 5 mv	
Ripple & Noise	1 mv rms	
Temperature Coefficient	0.01% + 2 mv	
Stability	0.05% + 5 mv	
Recovery Time	10 μs	
Temperature Deratings 0-50°C Full Output	60°C	71°C
	15%	30%
Storage Temperature	−55°C to 85°C	
Overload & Short Circuit	Cutback current limiting.	



MODEL	OUTPUT A Volts	OUTPUT A Amps	OUTPUT B Volts	OUTPUT B Amps	PRICE
D5/5-0.4	4.5-6.5	0.4	4.5-6.5	0.4	$118
D5/5-1.5	4.5-6.5	1.5	4.5-6.5	1.5	$159
D5/10-0.4	4.5-6.5	0.4	9-11	0.4	$118
D5/10-1.5	4.5-6.5	1.5	9-11	1.5	$159
D5/15-0.4	4.5-6.5	0.4	14-16	0.4	$118
D5/15-1.5	4.5-6.5	1.5	14-16	1.5	$159
D10/10-0.4	9-11	0.4	9-11	0.4	$118
D10/10-1.5	9-11	1.5	9-11	1.5	$159
D10/15-0.4	9-11	0.4	14-16	0.4	$118
D10/15-1.5	9-11	1.5	14-16	1.5	$159
D15/15-0.4	14-16	0.4	14-16	0.4	$118
D15/15-1.5	14-16	1.5	14-16	1.5	$159

OEM SERIES

Minimum order — 10 units of individual models.



Very low cost, high power density. Remote sensing and programming. High reliability, fast response time for pulsed loads. Voltage Adjustable ±5% about Nominal.

SPECIFICATIONS			
Line/Load Regulation	0.05% + 5 mv		
Ripple & Noise	1 mv rms		
Temperature Coefficient	0.01% + 2 mv		
Stability	0.05% + 5 mv		
Recovery Time	10 μs		
Temperature Deratings 0-40° Full Output	50°C	60°C	71°C
	10%	20%	30%
Storage Temperature	−55°C to 85°C		
Overload & Short Circuit	Adjustable cutback current limiting with automatic recovery.		

Overvoltage Crowbar —
Add Suffix C $20
Model P31, 1-2 Unit Rack Panel ..... $ 6

To construct model number, start with OEM followed by the Nom. Volts, then a dash followed by the Amperes; e.g., OEM15-3.8

Nom. Volts	Amperes	
3	4.5	9.0
5	3.9	7.8
9	2.9	5.8
12	2.3	4.6
15	1.9	3.8
18	1.7	3.4
21	1.5	3.0
24	1.3	2.6
28	1.1	2.2
32	1.0	2.0
36	0.90	1.8
40	0.85	1.7
48	0.70	1.4
Price	**$75**	**$85**

LA SERIES

Highly regulated modular supplies. Minimum height modules interchangeable mechanically with similar models of other manufacturers. Adjustable cutback current limiting with automatic recovery. Thermal cutout with automatic recovery. Aluminum channel and gusset construction for high strength to weight ratio. Remote sensing and programming. Voltage Adjustable ±5% about Nominal.

To construct model number, start with LA followed by the Nom. Volts, then a dash followed by the Amperes; e.g., LA15-11.

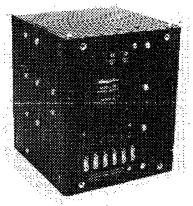
Nom. Volts	Amperes							
3	3.9	5.6	7.5	11.0	13.8	19.5	27.7	39.0
5	3.6	5.2	6.8	10.1	12.7	17.9	25.4	35.8
9	3.2	4.6	6.0	8.9	11.2	15.8	22.4	31.6
12	2.8	4.0	5.3	7.8	9.8	13.8	19.6	27.7
15	2.2	3.2	4.2	6.2	7.8	11.0	15.6	22.0
18	2.0	2.9	3.9	5.7	7.2	10.1	14.3	20.2
21	1.9	2.8	3.7	5.4	6.8	9.6	13.6	19.2
24	1.8	2.6	3.4	5.0	6.3	8.9	12.6	17.7
28	1.7	2.5	3.3	4.9	6.2	8.7	12.3	17.4
Price	**$109**	**$129**	**$139**	**$159**	**$179**	**$219**	**$249**	**$299**

Tracking Overvoltage Crowbar Option — Add Suffix C $25

SPECIFICATIONS			
Line/Load Regulation	0.005% + 1 mv		
Ripple & Noise	1 mv rms		
Temperature Coefficient	0.01% + 1 mv		
Stability	0.01% + 2 mv		
Recovery Time	40 μs		
Temperature Deratings 0-40°C Full Output	50°C	60°C	71°C
	10%	20%	30%
Storage Temperature	−55°C to 85°C		

Deltron inc. — N SERIES

These rugged modules combine outstanding design and quality components. Features include integrated circuit regulator system, cutback current limiting, remote sensing and programming, series and parallel operation. No thermal transients.



To construct model number, start with N, followed by the Nom. Volts, then a dash followed by the Amperes; e.g., N5-10.5.

Adjustment range is ± 5% about the nominal.

Nom. Volts	Amperes							
3	0.80	1.5	3.8	5.3	11	20	24	36
5	0.76	1.45	3.7	5.2	10.5	19	23	35
6	0.74	1.4	3.5	5.2	9	18	22	34
9	0.53	1.2	3.0	4.4	8	15	20	32
12	0.53	1.0	2.8	4.0	7.3	15	17	28
15	0.42	0.75	2.7	3.5	6.3	13	17	28
18	0.39	0.69	2.6	3.2	5.8	12	16	25
21	0.35	0.60	2.2	2.9	4.7	11	14	22
24	0.34	0.53	2.0	2.7	4.6	9.2	13	20
28	0.34	0.53	1.9	2.5	4.6	9.2	12	19
32	0.22	0.51	1.2	2.2	3.9	8.7	11	18
36	0.21	0.44	1.1	2.0	3.6	7.3	10	17
40	0.21	0.37	1.1	1.8	3.3	6.2	9	15
48	0.21	0.35	1.0	1.7	3.0	6.1	8.5	12
Price	**$79**	**$89**	**$109**	**$129**	**$159**	**$219**	**$249**	**$299**

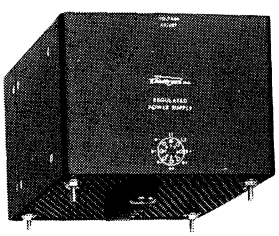
Overvoltage crowbar used on all N models — Model CB1 ..... $30

SPECIFICATIONS				
Line/Load Regulation	0.005% + 500 μv			
Ripple & Noise	500 μv rms			
Temperature Coefficient	0.02% + 500 μv			
Stability	0.01% + 1 mv			
Recovery Time	40 μs			
Temperature Deratings 0-40°C Full Output	Nom. Volts	50°C	60°C	71°C
	3-6	10%	30%	50%
	9-12	10%	25%	40%
	over 12	10%	20%	30%
Storage Temperature	−25°C to 85°C			
Overload & Short Circuit	Adjustable cutback current limiting.			

Complete rack assemblies, meter and control panels available.

C SERIES

Designed to meet MIL Specs. Integrated circuit regulation system, cutback current limiting, remote sensing and programming, automatic series and parallel operation. Thermal cutout with automatic reset. No thermal transients.



SPECIFICATIONS				
Line/Load Regulation	0.003% + 500 μv			
Ripple & Noise	500 μv rms			
Temperature Coefficient	0.01% + 500 μv			
Stability	0.01% + 1 mv			
Recovery Time	40 μs			
Temperature Deratings 0-40°C Full Output	Nom. Volts	50°C	60°C	71°C
	3-6	10%	30%	50%
	9-12	10%	25%	40%
	over 12	10%	20%	30%
Storage Temperature	−25°C to 85°C			
Overload & Short Circuit	Adjustable cutback current limiting.			

To construct model number, start with C followed by the Nom. Volts, then a dash followed by the Amperes; e.g., C 5-23.

Adjustment range is ± 5% about the nominal.

	Nom. Volts	Amperes									
LOW VOLTAGE	3	0.8	1.5	3.8	5.3	11	14	20	24	32	36
	5	0.76	1.45	3.7	5.2	10.5	13.5	19	23	31	35
	6	0.74	1.4	3.5	5.2	9	13	18	22	30	34
	9	0.53	1.2	3	4.4	8	12	15	20	27	32
	12	0.53	1	2.8	4	7.3	10.5	15	17	22	28
	15	0.42	0.75	2.7	3.5	6.3	10	13	17	21	28
	18	0.39	0.69	2.6	3.2	5.8	9	12	16	19	25
	21	0.35	0.6	2.2	2.9	4.7	8.5	11	14	17	22
	24	0.34	0.53	2	2.7	4.6	8	9.2	13	16	20
	28	0.34	0.53	1.9	2.5	4.6	7.5	9.2	12	15	19
	32	0.22	0.51	1.2	2.2	3.9	6	8.7	11	13	18
	Price	**$75**	**$85**	**$115**	**$135**	**$175**	**$195**	**$255**	**$295**	**$390**	**$420**
MEDIUM VOLTAGE	36	0.21	0.44	1.1	2	3.6	5.7	7.3	10	12	17
	40	0.21	0.37	1.1	1.8	3.3	5.5	6.2	9	12	15
	48	0.21	0.35	1	1.7	3	5	6.1	8.5	10	12
	54	0.21	0.34	0.85	1.6	2.8	4.1	6.1	7.4	8.7	11
	60	0.2	0.30	0.75	1.4	2.6	3.7	5	6.5	7.8	9.5
	68	0.19	0.28	0.7	1.3	2.4	3.5	4.7	5.9	7.2	9
	76	0.17	0.25	0.65	1.2	1.7	3.3	4.4	5.5	6.6	8.5
	84	0.17	0.24	0.6	1.1	1.6	3.1	4.2	5.1	6	8
	92	0.088	0.23	0.5	1	1.5	3	4	4.4	5.6	7
	Price	**$85**	**$95**	**$125**	**$145**	**$185**	**$235**	**$285**	**$375**	**$405**	**$455**
HIGH VOLTAGE	100	0.088	0.16	0.37	0.58	1	1.8	2.1	2.8	3.3	4.3
	120	0.088	0.16	0.3	0.54	0.98	1.7	2	2.6	3.1	4
	135	0.084	0.15	0.28	0.52	0.88	1.6	1.9	2.4	2.9	3.5
	150	0.08	0.14	0.25	0.48	0.81	1.4	1.8	2.1	2.7	3.1
	165	0.078	0.11	0.23	0.42	0.59	1.3	1.6	2	2.4	2.9
	180	0.072	0.11	0.2	0.36	0.58	1.2	1.5	1.8	2.2	2.5
	195	0.062	0.1	0.17	0.33	0.52	1.1	1.3	1.7	2.1	2.3
	210	0.052	0.09	0.14	0.28	0.5	0.8	1.1	1.6	1.9	2.2
	230	0.042	0.07	0.12	0.24	0.46	0.73	1	1.5	1.8	2.2
	250	0.026	0.06	0.1	0.21	0.42	0.63	0.84	1.4	1.7	2.1
	Price	**$105**	**$115**	**$135**	**$160**	**$195**	**$245**	**$295**	**$395**	**$420**	**$470**

Overvoltage Crowbar Models CB50-200 ..... $30
Complete rack assemblies available.

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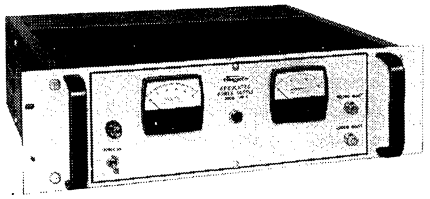
Deltron inc. L SERIES



Features include integrated circuit regulator system, remote sensing and programming, automatic series and parallel operation. Compact units can be stacked with no derating. Thermal cutout with automatic recovery. No thermal transients.

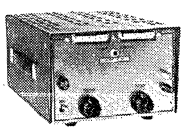
SPECIFICATIONS		
Line/Load Regulation	0.005% + 500 μv	
Ripple & Noise	500 μv rms	
Temperature Coefficient	0.01% + 1 mv	
Stability	0.01% + 1 mv	
Recovery Time	40 μs	
Temperature Deratings 0-50°C Full Output	60°C	71°C
	15%	30%
Storage Temperature	−25°C to 85°C	
Overload & Short Circuit	Adjustable cutback current limiting.	

EACH VOLTAGE WITHIN THE GROUPING IS AVAILABLE IN ALL CURRENT RANGES DIRECTLY TO THE RIGHT

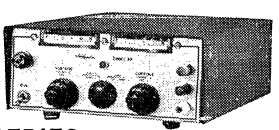
Nom. Volts	Range	Amps	Price	Amps	Price	Nom. Volts	Range	Amps	Price	Amps	Price
1.0	0.5-1.5	4	$190	40	$500	26	24-28	1.7	$192	17	$511
1.5	1.0-2.0					28	26-30				
2.0	1.5-2.5	8	$240	48	$550	30	28-32	3.5	$243	21	$563
2.5	2.0-3.0					32	30-34				
3.0	2.5-3.5					34	32-36				
3.5	3.0-4.0	16	$320	56	$595	36	34-38	7	$325	24	$610
4.0	3.5-4.5					38	36-40				
4.5	4.0-5.0					40	38-42				
5.0	4.5-5.5	24	$390	64	$635	42	40-44	10	$397	28	$652
5.5	5.0-6.0					44	42-46				
6.0	5.5-6.5					46	44-48				
6.5	6.0-7.0	32	$450	72	$675	48	46-50	14	$459	31	$694
7.0	6.5-7.5	35	$190	35	$500	52	48-56	1	$197	10	$535
7.5	7.0-8.0					56	52-60				
8.0	7.5-8.5	7	$240	42	$550	60	56-64	2	$250	12	$592
8.5	8.0-9.0					64	60-68				
9.0	8.5-9.5					68	64-72				
9.5	9.0-10	14	$320	49	$595	72	68-76	4	$336	14	$643
10.0	9.5-10.5					76	72-80				
10.5	10-11					80	76-84				
11.0	10.5-11.5	21	$390	56	$635	84	80-88	6	$412	16	$689
11.5	11-12					88	84-92				
12.0	11.5-12.5	28	$450	63	$675	92	88-96	8	$479	18	$734
12.5	12-13					96	92-100				
13	12-14	2.5	$192	25	$511	104	96-112	0.5	$217	5	$645
14	13-15					112	104-120				
15	14-16	5	$243	30	$563	120	112-128	1	$280	6	$722
16	15-17					128	120-136				
17	16-18					136	128-144				
18	17-19	10	$325	35	$610	144	136-152	2	$386	7	$793
19	18-20					152	144-160				
20	19-21					160	152-168				
21	20-22	15	$397	40	$652	168	160-176	3	$482	8	$859
22	21-23					176	168-184				
23	22-24	20	$459	45	$694	184	176-192	4	$569	9	$924
24	23-25					192	184-200				

Overvoltage Crowbar Models CB10-200 ..... $30
Over-Under Voltage Relay Models VK50-200 ..... $30

SP SERIES



These precision lab supplies all contain integrated circuit regulator systems, automatic crossover from constant voltage to constant current, 2% accurate meters, remote sensing and programming. SP Series have fast response SCR pre-regulators.



RP SERIES

FULL RACK MODELS

MODEL	DC OUTPUT RANGE Volts	DC OUTPUT RANGE Amps	PRICE
SP10-15	0-10	0-15	$380
SP10-20	0-10	0-20	$435
SP10-25	0-10	0-25	$485
SP10-30	0-10	0-30	$530
SP10-40	0-10	0-40	$610
SP10-50	0-10	0-50	$680
SP20-15	0-20	0-15	$445
SP20-20	0-20	0-20	$510
SP20-25	0-20	0-25	$570
SP20-30	0-20	0-30	$625
SP20-50	0-20	0-50	$805
SP40-10	0-40	0-10	$480
SP40-15	0-40	0-15	$585
SP40-20	0-40	0-20	$675
SP40-25	0-40	0-25	$755
SP40-30	0-40	0-30	$825
SP60-10	0-60	0-10	$515
SP60-15	0-60	0-15	$675
SP60-20	0-60	0-20	$780
SP100-4	0-100	0-4	$535
SP100-8	0-100	0-8	$755
SP100-12	0-100	0-12	$925

HALF RACK MODELS

MODEL	DC OUTPUT RANGE Volts	DC OUTPUT RANGE Amps	PRICE
SP10-5	0-10	0-5	$220
SP10-10	0-10	0-10	$320
SP20-5	0-20	0-5	$295
SP20-10	0-20	0-10	$365
SP40-2.5	0-40	0-2.5	$285
SP40-5	0-40	0-5	$325
SP60-2.5	0-60	0-2.5	$325
SP60-5	0-60	0-5	$365
SP100-1	0-100	0-1	$270
SP100-2	0-100	0-2	$380
SP100-3	0-100	0-3	$465

SPECIFICATIONS		SP	RP
Line/Load Regulation	CV	0.005% + 500 μv	
	CC	0.005% + 500 I_M μa	
Ripple & Noise	CV	500 μv rms	200 μv rms
	CC	500 I_M μa rms	250 I_M μa rms
Temperature Coefficient	CV	0.01% + 500 μv	
	CC	0.05% + 500 I_M μa	
Stability	CV	0.05% + 2mv	
	CC	0.1% + 2 I_M ma	
Recovery Time	CV	50 μs	
Temperature Deratings 0-50°C Full Output		60°C	71°C
		15%	30%
Storage Temperature		−25°C to 85°C	

RP SERIES — DUAL/SINGLE RANGE MODELS

MODEL	DC OUTPUT RANGE Volts	DC OUTPUT RANGE Amps	PRICE
RP20-1.5	0-10 0-20	0-3 0-1.5	$175
RP30-1	0-16 0-32	0-2 0-1	$175
RP40-0.75	0-20 0-40	0-1.5 0-0.75	$175
RP50-0.6	0-25 0-50	0-1.2 0-0.6	$179
RP60-0.5	0-32 0-64	0-1 0-0.5	$179
RP100-0.3	0-50 0-100	0-0.6 0-0.3	$179
RP10-3	0-10	0-3	$159
RP15-2	0-16	0-2	$159
RP20-1.5S	0-20	0-1.5	$159
RP20-3	0-20	0-3	$195
RP25-1.2	0-25	0-1.2	$159
RP30-1S	0-32	0-1	$159
RP30-2	0-32	0-2	$195
RP40-0.75S	0-40	0-0.75	$159
RP40-1.5	0-40	0-1.5	$195
RP50-0.6S	0-50	0.0.6	$163
RP50-1.2	0-50	0-1.2	$199
RP50-1.5	0-50	0-1.5	$205
RP60-0.5S	0-64	0-0.5	$163
RP60-1	0-64	0-1	$199
RP100-0.3S	0-100	0-0.3	$163
RP100-0.6	0-100	0-0.6	$199

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New High Performance, Low Profile, Fixed Voltage All Silicon DC Power Supplies

These new low profile, convection cooled, all silicon, ±10% voltage adjustable DC Power Supplies have premium performance characteristics plus important extra features—at no extra cost!

The extra features combined with Dressen-Barnes' 23 years of power supply experience and an unconditional 5 year warranty assure you of the best power supply available at a highly competitive price.

All units feature integrated circuit regulators, military specification wire and finish, plug-in circuit boards, dual filter capacitors, automatic current limiting and an automatic thermostat for overheating protection. The units can be mounted on any one of three surfaces or rack mounted.

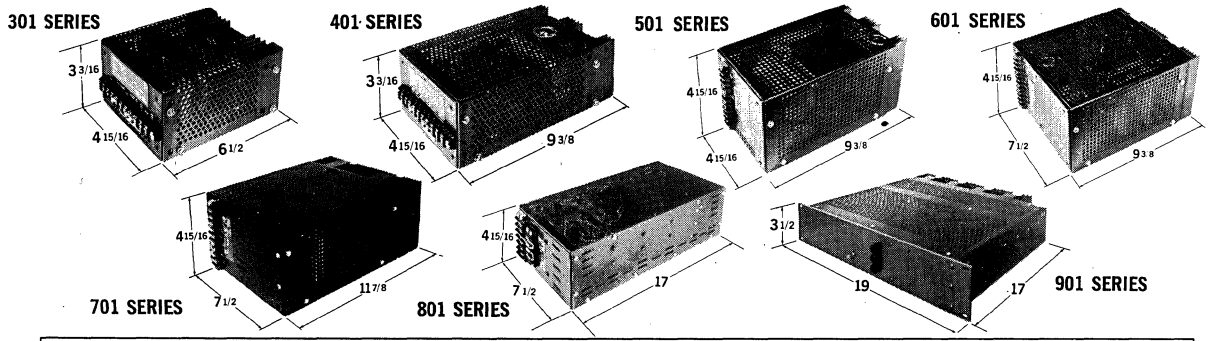
Remote sensing, remote voltage adjustment and remote programming are standard features. (Except 901 Series).

EXTRA FEATURES AT NO EXTRA COST

- .01% +1mv line regulation ■ .02% +1mv load regulation
- ½mv RMS ripple ■ Built-in ±10% voltage adjustment
- Paralleling capability (except 901 Series).

OPTIONS AVAILABLE AT EXTRA COST

- Overvoltage load protection ("L" option) ■ High humidity operation ("H" option) ■ Fungus proofing "F" option)



SPECIFICATIONS FOR SUPPLIES MODEL 301 THROUGH 901

Regulation: **Line:** .01% +1mv for line variation from 105 to 132VAC.
Load: .02% +1mv from zero to full rated load.
Ripple: ½ millivolt RMS with plus or minus output terminal grounded, at 60 Hz and 115VAC line input.
Temperature Range, Operating: —20°C to +71°C continuous duty.
Temperature Range, Storage: —55°C to +85°C.
Input Voltage: 105 to 132VAC, 45 to 440 Hz. 210 to 264VAC, 45 to 440 Hz at no extra cost ("V" option).
Transient Recovery: Less than 50 microseconds.
Temperature Coefficient: .01% per degree centigrade.
Overload Protection: Automatic current limiting at 110% to 130% of rated current. Automatic recovery on removal of overload.
Remote Sensing: Standard feature.
Remote Voltage Adjustment: Standard feature. (Except 901 series).
Remote Programming: 100 ohms per volt. (Except 901 series).
Thermal Protection: Built-in thermostat on heat sink. (Except 901 series).
Relative Humidity: 75%.
Input and Output Connections: Heavy duty terminal block on rear of chassis.
Finish: Black anodized aluminum, black semi-gloss enamel Fed. Std. 595, Color 27038.
Paralleling Capability: Built-in for paralleling without modification to power supplies. (Except 901 series).

OPTIONS

AC Input Option: Add suffix "V". All units are available with 210 to 264VAC, 45 to 440 Hz at no extra charge.
Overvoltage Load Protection Option: Add suffix "L". Protects easily damaged loads from overvoltage transients.
High Humidity Option: Add Suffix "H" for 95% relative humidity operation.
Fungus Proofing Operation: Add suffix "F". Treatment with MIL-V-173 varnish protects circuits from fungus.

Voltage and Current Table

OUTPUT** VOLTAGE →		3	5	6	10	12	15	18	20	24	28	32	36	48	100	120	150
SERIES	TEMP.	OUTPUT AMPERES															
301		3.8	3.7	3.2	2.7	2.5	2.2	2.0	1.8	1.4	1.3	1.2	1.1	0.9	0.37	0.3	0.25
401		5.3	5.1	4.8	4.2	4.0	3.5	3.2	3.1	2.5	2.3	2.1	2.0	1.6	0.55	0.49	0.39
501		11.0	10.5	9.0	7.5	7.3	6.0	5.5	5.0	4.0	3.5	3.2	3.0	2.5	1.0	0.9	0.7
601	40°C	13.1	12.6	12.4	10.8	10.0	9.0	7.9	7.4	6.7	6.0	5.7	5.4	4.1	1.7	1.5	1.1
701		22.0	20.0	19.0	16.0	15.0	14.0	13.0	12.0	11.0	10.0	9.0	8.0	6.0	2.0	1.7	1.4
801		33.0	31.0	30.0	24.0	21.0	19.0	16.5	15.2	14.0	13.0	11.7	10.4	7.7	3.3	3.0	2.2
901		48.0	48.0	47.0	38.0	33.0	25.0	25.0	23.0	20.0	19.0	16.0	13.0	10.0	4.3	3.7	3.1
301		3.3	3.2	2.9	2.5	2.3	2.0	1.8	1.6	1.3	1.2	1.1	1.0	0.85	0.34	0.28	0.23
401		4.6	4.3	4.1	3.6	3.5	3.2	3.0	2.9	2.4	2.1	2.0	1.8	1.4	0.51	0.45	0.36
501		9.4	9.0	8.4	7.0	6.8	5.6	5.1	4.6	3.7	3.4	3.1	2.9	2.4	0.96	0.86	0.67
601	50°C	11.3	10.8	10.6	9.7	9.2	8.4	7.4	6.9	6.3	5.6	5.3	5.0	3.9	1.5	1.3	1.0
701		20.0	18.0	17.3	14.5	13.6	12.7	11.8	10.9	10.0	9.0	8.2	7.3	5.4	1.7	1.5	1.3
801		29.0	24.6	24.6	20.4	19.0	18.0	14.8	13.7	12.5	11.5	10.6	9.8	7.1	3.0	2.7	2.0
901		42.0	41.0	40.0	33.0	28.0	22.0	22.0	20.0	17.0	16.0	13.5	11.0	9.0	3.6	3.1	2.6
301		2.6	2.5	2.4	2.2	2.1	1.8	1.7	1.5	1.2	1.1	1.0	0.9	0.8	0.3	0.25	0.2
401		3.7	3.4	3.3	3.0	2.9	2.8	2.7	2.6	2.2	2.0	1.8	1.7	1.3	0.47	0.42	0.33
501		8.2	8.0	7.7	6.3	5.9	5.1	4.7	4.2	3.4	3.1	2.9	2.7	2.2	0.9	0.8	0.62
601	60°C	9.2	9.2	8.9	8.5	8.3	7.9	6.9	6.5	5.8	5.2	4.9	4.7	3.6	1.3	1.1	0.9
701		16.5	16.5	15.6	13.0	12.3	11.5	10.6	9.8	9.0	8.0	7.3	6.5	4.9	1.6	1.4	1.2
801		25.0	20.8	20.8	16.8	16.1	15.5	12.4	11.8	10.8	9.8	9.2	8.6	6.5	2.5	2.2	1.75
901		34.0	33.0	32.0	27.0	22.0	18.0	18.0	17.0	14.0	13.0	11.5	10.0	7.5	3.0	2.6	2.1
301		1.6	1.5	1.4	1.4	1.3	1.3	1.3	1.2	1.1	1.0	0.96	0.85	0.75	0.28	0.23	0.19
401		2.5	2.4	2.4	2.0	1.9	1.9	1.9	1.8	1.5	1.4	1.35	1.3	1.0	0.42	0.38	0.3
501		5.5	5.5	5.5	5.0	4.7	4.3	4.1	3.6	3.0	2.8	2.6	2.4	1.9	0.8	0.7	0.55
601	71°C	6.2	6.1	6.0	5.7	5.7	5.3	5.0	4.9	4.8	4.7	4.5	4.3	3.1	1.1	1.0	0.8
701		10.0	10.0	10.0	9.5	9.5	8.6	8.6	8.5	7.6	7.1	6.4	5.7	4.3	1.5	1.2	1.0
801		20.5	17.3	17.3	13.8	13.2	12.7	10.1	9.7	9.0	8.2	7.6	7.1	5.4	2.1	1.9	1.5
901		25.0	25.0	24.0	21.0	17.0	14.0	14.0	13.0	11.0	10.0	8.8	7.5	6.0	2.3	1.9	1.6

NOTES TO TABLE

*The model number consists of the series indicated plus a dash number to indicate voltage. Examples: The model number 301-5 is a 5 VDC, 3.7 Amp at 40°C unit; the 301-28 is a 28 VDC, 1.3 Amp at 40°C unit. Note that current ratings vary with temperature.

**Output voltage is adjustable to ±5%. Higher currents available on special order. Built-in ±10% adjustment usable up to 85% of rated current.

PRICING

Prices for all power supplies listed in the table to the left are shown below. Prices for other voltages and currents are available from the factory.

			"L" option OVLP
301-3	thru 301-48	$117.00	$25.00
301-100	thru 301-150	137.00	25.00
401-3	thru 401-28	137.00	25.00
401-32	thru 401-150	157.00	25.00
501-3	thru 501-28	177.00	28.00
501-32	thru 501-150	197.00	28.00
601-3	thru 601-12	207.00	28.00
601-15	thru 601-28	217.00	28.00
601-32	thru 601-150	237.00	28.00
701-3	thru 701-36	267.00	37.00
701-48	thru 701-150	297.00	37.00
801-3	thru 801-48	318.00	75.00
801-100	thru 801-150	348.00	75.00
901-3	thru 901-28	448.00	75.00
901-32	thru 901-48	498.00	75.00
901-100	thru 901-150	528.00	75.00

OPTION PRICING

"H" option (95% relative humidity): $12.50 at time of initial order, $20.00 when added to power supply after completion.

"F" option (fungus proofing): 301-3 thru 501-150 $6.50, 601-3 thru 801-150 $8.50, 901-3 thru 901-150 $12.00.

Rack Adapters

Standard 19" or special racks to customer requirements can be supplied for mounting combinations of the above power supplies. Consult the factory with your requirements (outputs, meters, controls, etc.).

Prices and specifications subject to change without notice. Minor modifications can be made on all units to meet customer requirements. Quantity discounts on 10 units or more, depending on the model, available from the factory.

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DRESSEN-BARNES
ELECTRONICS CORPORATION
250 NORTH VINEDO AVENUE / PASADENA, CALIFORNIA / (213) 681-0643 / TWX: 910-588-3780

FIVE YEAR WARRANTY 5 DRESSEN-BARNES

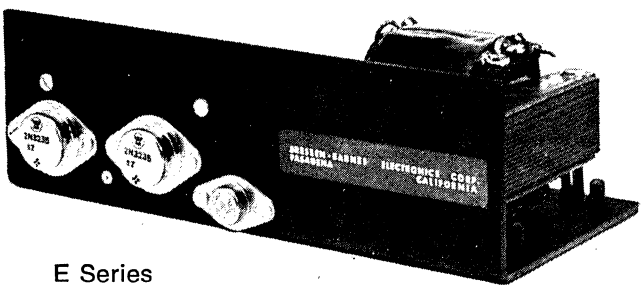
Economy Pack DC Power Supplies

A reliable, low profile package with popular voltages and features

NEW

$39.25
in 10-24 quantity

Our new E Series Power Supplies answers the need for a reliable, low cost unit. By designing a simple open-construction package we kept the cost down without sacrificing component quality or reliability. Check the specifications listed below and see the variety of popular features you get with the E Series. Even at this low price you still get the same reliability and service of more expensive power supplies.



E Series

Output Voltage*: 3, 5, 12, 15, 24 and 28 VDC, up to 35 watts.
Regulation: .1%.
Temperature Range: 0 to 71°C.
Temperature Coefficient: .02% per degree centigrade.
Input Voltage: 105-125 VAC, 60 Hz.
Overload Protection: Automatic current limiting.
Overvoltage Load Protection: Available.
Remote Sensing: Standard feature.
Mounting: Rack mountable.

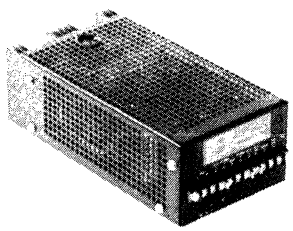
*Consult factory for other outputs. Variations including dual, multiple and higher power modules are available.

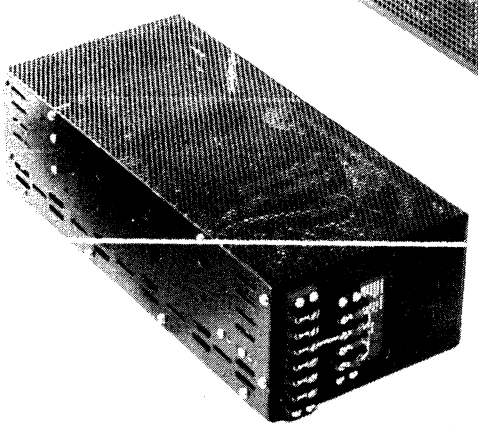
Request complete data.

High Power DC Power Supplies

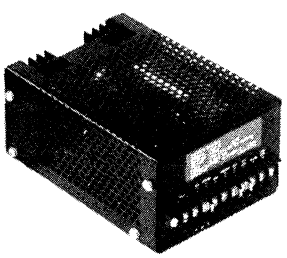
Up to 50% more power with no increase in package size.

NEW





P Series



The new P Series Power Supplies provide more power per dollar. They supply up to 50% more power than our 100 Series at the same price with no increase in package size. Take your choice of 3, 5, 12, 15, 24 or 28 VDC in packages that can be mounted in three positions or rack mounted. If you need more power in a small space the new P Series is the answer.

Output Voltage*: 3, 5, 12, 15, 24 and 28 VDC.
Regulation: Line: .01% + 1mv for line variation from 105 to 132VAC.
Load: .02% + 1mv from zero to full rated load.
Ripple: ½ millivolt RMS with plus or minus output terminal grounded, at 60 Hz and 115VAC line input.
Temperature Range, Operating: 0 to + 71°C.
Temperature Range, Storage: —55° to +85°C.
Input Voltage: 105-125VAC, 60 Hz.
Transient Recovery: Less than 50 microseconds.
Overload Protection: Automatic current limiting at 110% to 130% of rated current. Automatic recovery on removal of overload.
Remote Sensing: Standard feature.
Remote Voltage Adjustment: Standard feature.
Remote Programming: 100 ohms per volt.
Thermal Protection: Built-in thermostat on heat sink.
Relative Humidity: 75%.
Input and Output Connections: Heavy duty terminal block on rear of chassis.
Finish: Black anodized aluminum, black semi-gloss enamel Fed. Std. 595, Color 27038.
Paralleling Capability: Built-in for paralleling without modification to power supplies.

OPTIONS
Overvoltage Load Protection Option: Add suffix "L". Provides equipment protection from overvoltage transients.
High Humidity Option: Add Suffix "H" for 95% relative humidity operation.
Fungus Proofing Operation: Add suffix "F". Treatment with MIL-V-173 varnish protects circuits from fungus.

*Consult factory for other voltages.

Request complete data.

Prices and specifications subject to change without notice. Minor modifications can be made on all units to meet customer requirements. Quantity discounts on 10 units or more, depending on the model, available from the factory.

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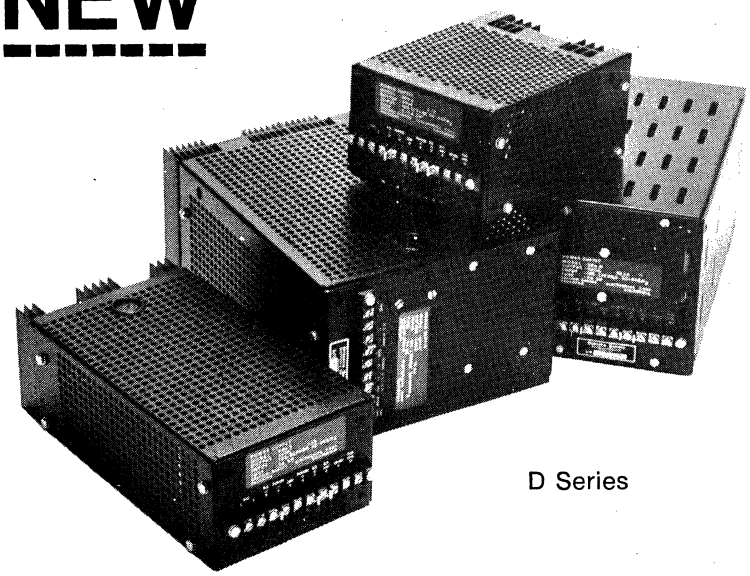
250 NORTH VINEDO AVENUE / PASADENA, CALIFORNIA / (213) 681-0643 / TWX: 910-588-3780

FIVE YEAR WARRANTY 5 DRESSEN-BARNES

Op Amp Power Supplies

NEW

Our new D Series (D for dual) is designed specifically for use with today's operational amplifiers. Whatever your current requirements, there's a Dressen-Barnes Op Amp Power Supply to satisfy them. Our new D Series covers both ±12 volts and ±15 volts up to 6.8 amps . . . and at competitive prices. These new low profile packages were designed for 5-inch rack mounting or they can be mounted on any of three mounting surfaces. Along with the competitive price you get the quality and reliability that Dressen-Barnes has been building into each DC Power Supply for over 20 years.



D Series

SPECIFICATIONS

MODEL NO.	OUTPUT VOLTAGE VDC	VOLTAGE ADJUSTMENT RANGE	MAXIMUM AMPS @ AMBIENT				MAXIMUM DIMENSIONS INCHES			WEIGHT LBS.	PRICE 1-9 EACH
			40°C	50°C	60°C	71°C	H	W	L		
D12-1.5 D15-1.3	±12 ±15	±5% ±5%	1.5 1.3	1.4 1.2	1.3 1.1	.8 .8	3.31	5.00	6.50	5.8	$136.00
D12-2.8 D15-2.4	±12 ±15	±5% ±5%	2.8 2.4	2.4 2.2	2.0 1.9	1.3 1.3	3.31	5.00	9.37	9	$156.00
D12-4.2 D15-3.7	±12 ±15	±5% ±5%	4.2 3.7	3.9 3.4	3.4 3.1	2.8 2.6	4.94	4.94	9.37	17	$193.00
D12-6.8 D15-6.2	±12 ±15	±5% ±5%	6.8 6.2	6.2 5.9	5.7 5.5	3.9 3.7	4.94	7.50	9.37	26	$232.00

Consult factory for other outputs.

Regulation: Line: .01% +1mv for line variation from 105 to 125VAC.

Load: .02% +1mv from zero to full rated load.

Ripple: ½ millivolt RMS with plus or minus output terminal grounded, at 60 Hz and 115VAC line input.

Temperature Range, Operating: −20°C to +71°C continuous duty.

Temperature Range, Storage: −55°C to +85°C.

Input Voltage: 105 to 125VAC, 50-440 Hz., 205 to 250VAC, 50-440 Hz at no extra cost ("V" option).

Transient Recovery: Less than 50 microseconds.

Temperature Coefficient: .01% per degree centigrade.

Overload Protection: Automatic current limiting at 110% to 130% of rated current. Automatic recovery on removal of overload.

Remote Sensing: Standard feature.

Thermal Protection: Built in thermostat on heat sink.

Relative Humidity: 75%.

Input and Output Connections: Heavy duty terminal block on rear of chassis.

Controls: DC output controls . . . Simple screwdriver voltage adjustment over entire voltage range.
Remote Sensing . . . Provision is made for remote sensing to eliminate effect of power output lead resistance on DC regulation.

Finish: Black anodized aluminum, black semi-gloss enamel Fed. Std. 595, Color 27038.

Mounting: Three surfaces, each with tapped mounting holes.

OPTIONS

AC Input Option: Add Suffix "V". All units are available with 205-250VAC, 50-440Hz at no extra charge.

Overvoltage Load Protection Option: Add suffix "L". Protects easily damaged loads from overvoltage transients.

High Humidity Option: Add Suffix "H" for 95% relative humidity. All models can be obtained with MIL-V-173 varnish for all fungi nutrient components.

Prices and specifications subject to change without notice. Minor modifications can be made on all units to meet customer requirements. Quantity discounts on 10 units or more, depending on the model, available from the factory.

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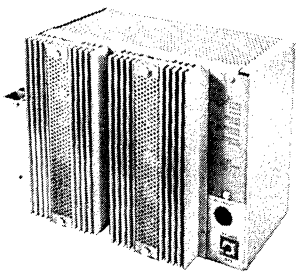
FIVE YEAR WARRANTY 5 DRESSEN-BARNES

Power Supplies Designed And Manufactured To Your Special Requirements

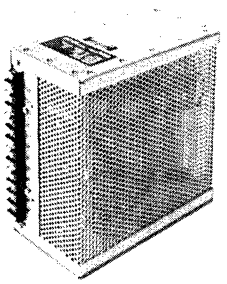
- **Single and Multiple output supplies on PC boards or in modules.**
- **Standard units modified to your requirements.**
- **Special packaging compatible to your equipment.**
- **Small order or production quantity capability.**
- **Fast service and competitive pricing.**

Dressen-Barnes 22 years of power supply know-how is available to you for designing and manufacturing special power supplies to meet your exact requirements. Over the years Dressen-Barnes has delivered over 4000 different models of custom power supplies. They range from simple modifications of standard units to highly sophisticated power supply consoles and systems. These years of experience and know-how can save you time and money in the design of your special requirement. When you need special power supply assistance — call an expert. Call Dressen-Barnes.

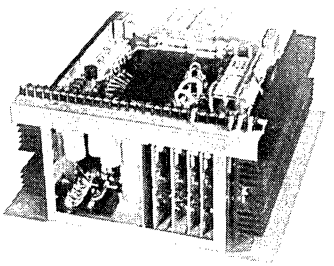
The power supplies described below are typical of those developed for leading companies.



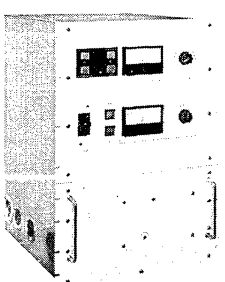
Desk top computer application.
4 separate DC and 1 AC output.
99-126 VAC and 198-253 VAC input.
UL approved.



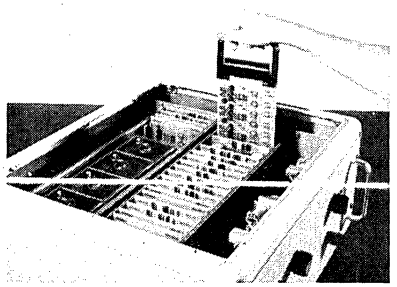
NASA ground support tracking equipment application.
Dual DC outputs.
Compact design.



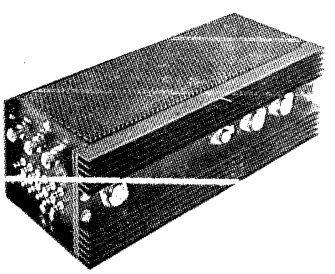
Computer application.
4 separate DC outputs.
Unique package designed to fit customer's equipment.
UL approved.



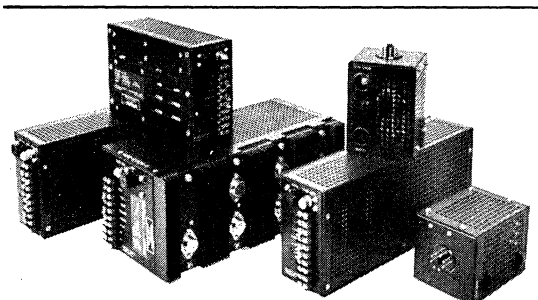
Computer microfilm Plotter-Printer application.
11 separate DC outputs on plug-in PC boards.
Fail safe design monitors all circuits and automatically shuts down unit on failure, visually indicating cause of failure.



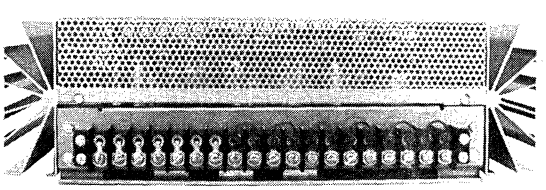
Digital transmission and reception application.
4 separate modular DC power supplies separate outputs to PCB circuitry.



Remote heart monitoring equipment application.
3 separate DC outputs with special overvoltage load protection.
Special input and output connections compatible to customer's equipment.



EDP microfilmer printout system application.
6 separate modular DC power supplies.
Lightweight aluminum construction.
UL approved.



Computer application.
4 separate DC and 1 AC output.
Unique packaging and heat sink design assures proper heat dissipation in a confined space.

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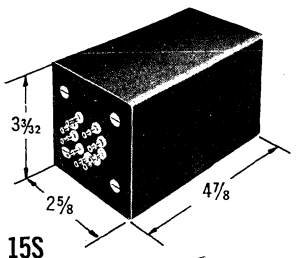
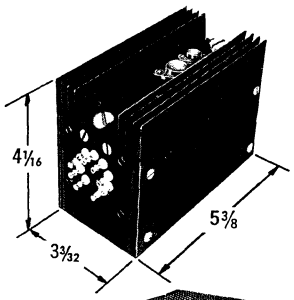
Regulated High-Density, Convection Cooled, Ultra-High Performance, All Silicon DC Power Modules — In Stock



15S



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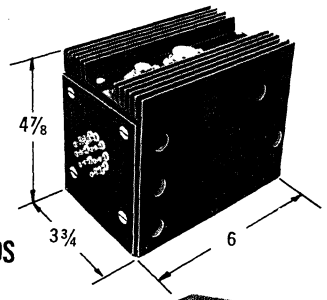
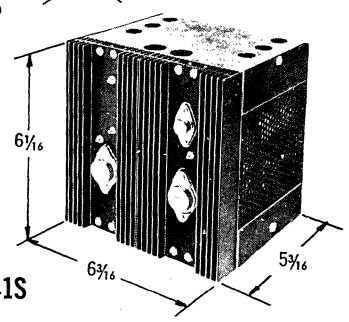
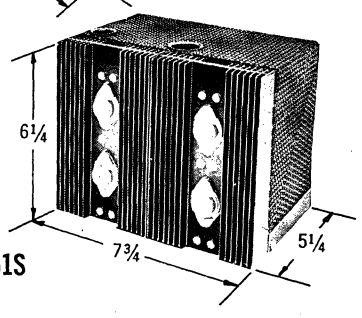


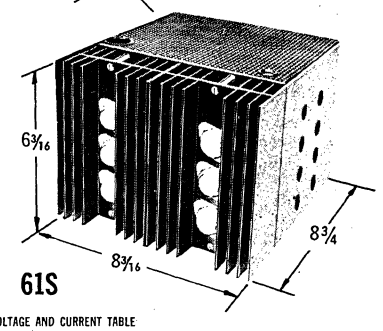
30S



41S



51S



61S

SPECIFICATIONS

Regulation: Line: 105-125 VAC: 0.01% or 5 MV (whichever is greater)
Load: NL to FL: 0.01% or 5 MV (whichever is greater)

Ripple: 1 MV RMS max. (2 MV RMS max. above 100V)

Ambient Temperature Range: 0 to 71°C

Storage Temperature Range: —55°C to 85°C

Input: 105-125V; 50-400 CPS, single phase, 0.2 amperes

Transient Recovery Time: Less than 100 microseconds

Temperature Coefficient (Typical):
0.03%/°C for Voltages below 45V
0.01%/°C for Voltages 45V and above

Stability (Typical):
0.5%/8 hrs. for Voltages below 45V
0.1%/8 hrs. for Voltages 45V and above

Output Impedance: Less than 1 ohm @ 500 KC

Overload Protection: Resistor-fuse protection above 40 volts output. Automatic current limiting up to 40 volts set between 110 and 130% of full load.

Remote Sensing: Standard feature.

Remote Voltage Adjust: Standard feature.

Remote Fuse: Standard feature.

OPTIONS AVAILABLE AT EXTRA COST

9-pin plug (M1 option) ■ Barrier strip (M92 option) ■ Overvoltage load protection (M93 option) ■ 95% relative humidity operation (M95 option) ■ Fungus Proofing ("F" option).

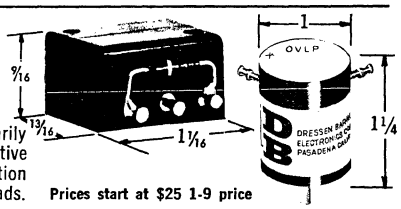
VOLTAGE AND CURRENT TABLE

OUTPUT ALL SERIES **	CURRENT RATING (50°C)† (65°C & 71°C)‡											
	15S	PRICE	20S	PRICE	30S	PRICE	41S	PRICE	51S	PRICE	61S	PRICE
VOLTS	MILLIAMPERES						AMPERES					
3	750	69.50	1400	85.00	3.10	117.50	6.0	137.50	12.9	"	24.0	"
5	750	69.50	1400	85.00	3.10	117.50	6.0	137.50	11.0	197.50	21.0	265.00
6	735	69.50	1400	85.00	2.95	117.50	5.8	137.50	10.5	197.50	21.0	265.00
10	580	69.50	1100	85.00	2.34	117.50	4.8	137.50	8.6	197.50	16.0	265.00
12	535	69.50	1000	85.00	2.16	117.50	4.5	137.50	7.8	197.50	14.5	265.00
15	430	69.50	800	85.00	1.75	117.50	4.0	137.50	7.1	197.50	14.5	265.00
18	375	69.50	700	85.00	1.50	117.50	3.6	137.50	6.6	197.50	13.5	265.00
20	375	69.50	700	85.00	1.50	117.50	3.4	137.50	6.1	197.50	12.5	265.00
24	325	69.50	600	85.00	1.30	117.50	3.1	137.50	5.4	197.50	10.5	265.00
28	285	69.50	550	85.00	1.13	117.50	2.8	137.50	4.9	197.50	9.5	265.00
32	250	"	500	"	1.00	"	2.6	"	4.6	"	9.0	"
36	225	"	400	"	0.94	"	2.2	"	3.8	"	7.5	"
48	170	"	300	"	0.68	"	1.7	"	2.9	"	5.7	"
100	55	"	150	"	0.345	"	0.8	"	1.5	"	3.0	"
120	—	"	110	"	0.29	"	0.7	"	1.0	"	2.0	"
150	—	—	60	"	0.215	"	0.6	"	0.85	"	1.8	"
200	—	—	35	"	0.165	"	0.4	"	0.7	"	1.0	"
M1 option 9-pin plug	15.00		15.00		15.00		Not Available					
M92 option Barrier Strip	15.00		15.00		15.00		15.00		15.00		15.00	
M93 option OVLP	25.00		25.00		25.00		28.00		28.00		37.00	
M95 option 95% RH	All units $12.50 at time of initial order, $20.00 when added to power supply after completion.											
"F" option Fungus	6.50		6.50		6.50		8.50		8.50		8.50	

*Price and delivery information for these models and other models, from 1-200V, available from the factory.
**The model number consists of the series indicated, plus a dash number to indicate voltage. Examples: The model number 15-3S is a 3 VDC, 750 MA unit; the 30-28S is a 28 VDC, 1.13 AMP unit.
†Any supply can be adjusted 10% in voltage by a screw adjustment on the supply. Slight current derating will result. Contact factory for exact values.
‡Lineal Feet per Minute over the surfaces of the power supply. Temperature is of the air, measured 2 inches up stream.
Many modifications can be made to fit individual customer requirements. For example: different input voltages, parallel operation and wider output voltage swings. Consult the factory for your specific modification requirements.

Overvoltage Load Protector (OVLP) for overvoltage detection

TYPICAL UNITS



For use with DB Electronics power supplies and other equipment requiring overvoltage protection. Primarily designed for protecting IC circuitry from line transients but can also be used to protect any load sensitive to momentary or continuous overvoltage conditions. Features high speed overvoltage detectors in conjunction with "Crowbar" SCR. Units available in fixed and variable trip voltages. SCR's are sized for current loads.

Prices start at $25 1-9 price

Prices and specifications subject to change without notice. Minor modifications can be made on all units to meet customer requirements. Quantity discounts on 10 units or more, depending on the model, available from the factory.

FIRST IN DC POWER

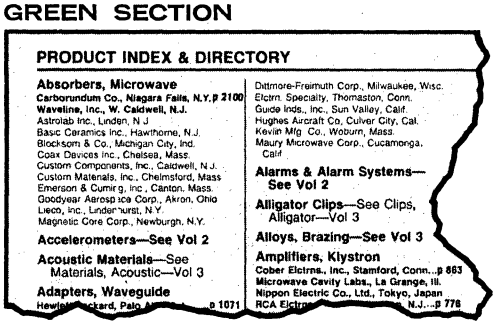
DRESSEN-BARNES ELECTRONICS CORPORATION
250 NORTH VINEDO AVENUE / PASADENA, CALIFORNIA / (213) 681-0643 / TWX: 910-588-3780

5 YEAR WARRANTY DRESSEN-BARNES

How to use eem

to find manufacturers of a specific product

GREEN SECTION



PRODUCT INDEX & DIRECTORY

Absorbers, Microwave
Carborundum Co., Niagara Falls, N.Y.p 2100
Waveline, Inc., W. Caldwell, N.J.
Astrolab Inc., Linden, N.J.
Basic Ceramics Inc., Hawthorne, N.J.
Blocksom & Co., Michigan City, Ind.
Coax Devices Inc., Chelsea, Mass.
Custom Components, Inc., Caldwell, N.J.
Custom Materials, Inc., Chelmsford, Mass.
Emerson & Cuming, Inc., Canton, Mass.
Goodyear Aerospace Corp., Akron, Ohio
Lieco, Inc., Lindenhurst, N.Y.
Magnetic Core Corp., Newburgh, N.Y.

Accelerometers—See Vol 2

Acoustic Materials—See Materials, Acoustic—Vol 3

Adapters, Waveguide
Hewlett-Packard, Palo A... p 1071
Dittmore-Freimuth Corp., Milwaukee, Wisc.
Electro Specialty, Thomaston, Conn.
Gude Inds., Inc., Sun Valley, Calif.
Hughes Aircraft Co, Culver City, Cal.
Kevlin Mfg. Co., Woburn, Mass.
Maury Microwave Corp., Cucamonga, Calif

Alarms & Alarm Systems—See Vol 2

Alligator Clips—See Clips, Alligator—Vol 3

Alloys, Brazing—See Vol 3

Amplifiers, Klystron
Cober Elctrns., Inc., Stamford, Conn...p 863
Microwave Cavity Labs., La Grange, Ill.
Nippon Electric Co., Ltd., Tokyo, Japan
RCA Elctrn... N.J....p 776

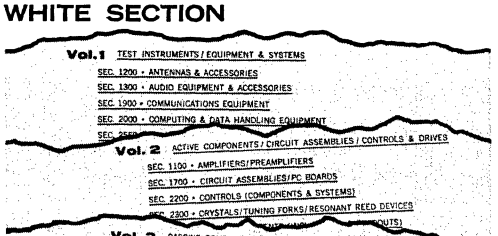
Each of the three volumes of **eem** contains a Product Index and Directory, the Green Section. This Index is a complete alphabetical listing of products. If the product you are looking for appears in the particular volume you are consulting, the green pages will provide a complete list of manufacturers who make that product. If the product is included in another volume of **eem**, the Index will provide a cross reference, directing you to the correct volume.

Boldface listings under product headings indicate that the listed manufacturer has products cataloged in **eem. Boldface** listings with page numbers indicate that this manufacturer's catalog pages include detailed data on the product indicated in the product heading.

Similar products are grouped together. For example, the many kinds of meters are listed in this manner: "Meters, Ampere," "Meters, Capacitance," "Meters, Flux" etc. To help you locate the prime product heading, there are hundreds of cross references, e.g. "Voltmeters — See Meters, Volt."

to find manufacturers' catalog information

WHITE SECTION



Vol. 1 TEST INSTRUMENTS / EQUIPMENT & SYSTEMS
SEC. 1200 • ANTENNAS & ACCESSORIES
SEC. 1300 • AUDIO EQUIPMENT & ACCESSORIES
SEC. 1900 • COMMUNICATIONS EQUIPMENT
SEC. 2000 • COMPUTING & DATA HANDLING EQUIPMENT
SEC. 2500 • ...
Vol. 2 ACTIVE COMPONENTS / CIRCUIT ASSEMBLIES / CONTROLS & DRIVES
SEC. 1100 • AMPLIFIERS/PREAMPLIFIERS
SEC. 1700 • CIRCUIT ASSEMBLIES/PC BOARDS
SEC. 2200 • CONTROLS (COMPONENTS & SYSTEMS)
SEC. 2300 • CRYSTALS/TUNING FORKS/RESONANT REED DEVICES
SEC. 2400 • ... (OUTS)
Vol. 3 PASSIVE COMPONENTS / MATERIALS / HARDWARE
SEC. 1400 • CABINETS/CONTAINERS/RACKS, ETC.
SEC. 1500 • CAPACITORS
SEC. 1600 • CHEMICALS
SEC. 1800 • COILS/ASSEMBLIES/FORMS

Catalog pages in **eem** are divided into three volumes based on very broad product groupings. These are:

Volume 1 — Test Instruments / Equipment and Systems

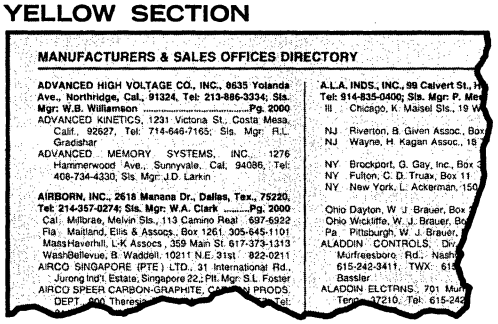
Volume 2 — Active Components / Circuit Assemblies / Controls and Drives

Volume 3 — Passive Components / Materials / Hardware

These volumes are further divided into 55 **eem** Product Sections which are assigned individually to the most appropriate volume. Within each of the 55 product sections manufacturers are arranged alphabetically, wherever possible. A complete index of all manufacturers' catalog pages is included in every volume. To locate the catalog pages of a specific manufacturer, refer to this index at the beginning of the white section in any of the three volumes. This index will provide the page numbers you require. In Volume 1, the index begins on page 302, in Volume 2 on page 1274 and in Volume 3, page 2310.

to find manufacturers' addresses, phones and sales offices

YELLOW SECTION



MANUFACTURERS & SALES OFFICES DIRECTORY

ADVANCED HIGH VOLTAGE CO., INC., 9635 Yolanda Ave., Northridge, Cal., 91324, Tel: 213-886-3334; Sls. Mgr: W.B. Williamson .....Pg. 2000
ADVANCED KINETICS, 1231 Victoria St., Costa Mesa, Calif., 92627, Tel: 714-646-7165; Sls. Mgr: R.L. Gradishar
ADVANCED MEMORY SYSTEMS, INC., 1276 Hammerwood Ave., Sunnyvale, Cal, 94086, Tel: 408-734-4330, Sls. Mgr: J.D. Larkin

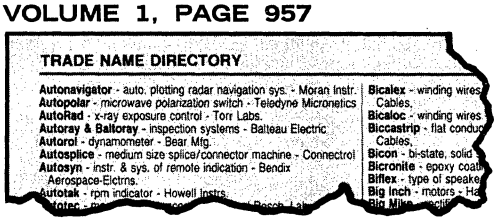
AIRBORN, INC., 2618 Manana Dr., Dallas, Tex., 75220, Tel: 214-357-0274; Sls. Mgr: W.A. Clark .....Pg. 2000
Cal., Millbrae, Melvin Sls., 113 Camino Real 697-6922
Fla., Maitland, Ellis & Assocs., Box 1261, 305-645-1101
Mass Haverhill, L-K Assocs., 359 Main St. 617-373-1313
Wash Bellevue, B. Waddell, 10211 N.E. 31st 822-0211
AIRCO SINGAPORE (PTE) LTD., 31 International Rd., Jurong Ind'l. Estate, Singapore 22.; Plt. Mgr: S.L. Foster
AIRCO SPEER CARBON-GRAPHITE, C... PRODS. DEPT., 900 Theres... Tel:

A.L.A. INDS., INC., 99 Calvert St., H... Tel: 914-835-0400; Sls. Mgr: P. Me...
Ill. Chicago, K. Maisel Sls., 19 W...
NJ Riverton, B. Given Assoc., Box...
NJ Wayne, H. Kagan Assoc., 18...
NY Brockport, G. Gay, Inc., Box...
NY Fulton, C. D. Truax, Box 11
NY New York, L. Ackerman, 150...
Ohio Dayton, W. J. Brauer, Box...
Ohio Wickliffe, W. J. Brauer, Bo...
Pa. Pittsburgh, W. J. Brauer,
ALADDIN CONTROLS, Div. ... Murfreesboro Rd., Nash... 615-242-3411, TWX: 615... Bassler
ALADDIN ELCTRNS., 701 Mur... Tenn., 37210, Tel: 615-242...

More than 6,000 manufacturers of electronic components, materials, instruments, assemblies, systems and key services are listed in the Yellow Section. An identical Yellow Section appears in each of the three volumes of **eem**, listing addresses, phone numbers and sales managers' names. TWX numbers are also included where available. **Boldface** listings indicate that detailed information on the manufacturers' products is cataloged in the White Section of **eem. Boldface** listings also indicate that local sales offices or representatives are listed for that manufacturer.

to find trade name sources

VOLUME 1, PAGE 957



TRADE NAME DIRECTORY

Autonavigator - auto. plotting radar navigation sys. - Moran Instr.
Autopolar - microwave polarization switch - Teledyne Micronetics
AutoRad - x-ray exposure control - Torr Labs.
Autoray & Baltoray - inspection systems - Balteau Electric
Autorol - dynamometer - Bear Mfg.
Autosplice - medium size splice/connector machine - Connectrol
Autosyn - instr. & sys. of remote indication - Bendix Aerospace-Elctrns.
Autotak - rpm indicator - Howell Instrs.
...tec... - ... - Reese Lab...

Bicalex - winding wires... Cables.
Bicaloc - winding wires...
Biccastrip - flat conduc... Cables.
Bicon - bi-state, solid...
Bicronite - epoxy coat...
Biflex - type of speake...
Big Inch - motors - Ha...
Big Mike - ...ellite

If you know only the trade name, brand name or trade mark of a product, you can locate it in **eem** by using the **Trade Name Directory.** This appears only in Volume 1, beginning on page 957 of the White Section. These pages can be identified by a vertical black band along the outside edge.

if you require additional assistance

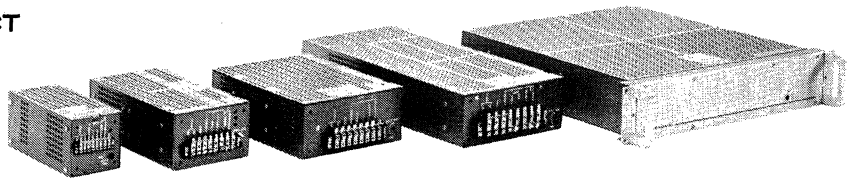
contact the Editorial Department, United Technical Publications, Inc., 645 Stewart Ave., Garden City, N.Y. 11530, or phone (516) 248-9700.

WR SERIES

WIDE RANGE SUPPLIES (RESISTANCE PROGRAMMABLE)

A MIX'N MATCH PRODUCT

POPULAR MODELS CAN BE SHIPPED WITHIN 72 HOURS



SPECIFICATIONS

Input: 105-125 VAC, 47-420 Hz

Output (Floating): See table of Models
Output Voltage Adjustment: From 0 to 7, 15, 30 or 50 VDC per table of models. Resolution of Adjustment: 0.6%

Regulation: Combined: ±0.05% of max output voltage, for ±10 VAC input change and 0 to full load change

Ripple and Noise: 0.002% of max output voltage or 1 Mv max, whichever is greater.

Temperature: Operating: −20°C to +71°C (see current ratings at three temperatures)
Storage: −62°C to +85°C
Coefficient: ±0.01%/°C from −20°C to +71°C

Electronic Short Circuit Protection: Foldback type. Standard, all Units. Max Current approximately 125% of full load current. At short circuit, current is approximately 35% of maximum full load current at 50°C. See operating limits curves.

Overtemperature Protection: Standard, all Units

Remote Programming (Resistance): Standard, all Units (200 ohms per volt)

Remote Sensing: Standard, all Units

OPTIONS AVAILABLE - SUMMARY

MODEL NUMBER Suffix required	OPTION	PRICE ADDER
AA	Regulation — ±.025%	$10.00
D	Overvoltage crowbar; built-in, set to approximately 130% of maximum output voltage	+15%
M	Meters (E Case only); Voltage and current — 1 pair	$50.00
N	230 VAC input	N/C
W	Wide range input (95 VAC - 132 VAC) Derate output by 25%	+10%

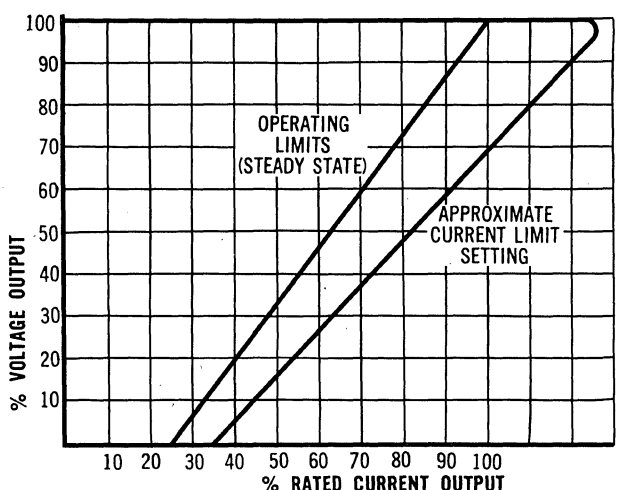
CASE SIZES:

A	3 3/16" x 3 3/16" x 7 1/4"
B	3 3/16" x 4 15/16" x 9 3/8"
C	3 3/16" x 7 1/8" x 9 5/8"
D	3 3/16" x 8" x 16 1/2"
E	3 15/32" x 16 5/8" x 17"

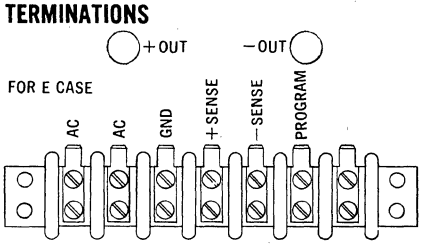
CHART DATA

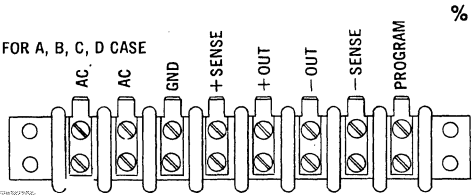
OUTPUT VOLTAGE RANGE	MAXIMUM OUTPUT CURRENT AT FULL OUTPUT VOLTAGE (See Operating Limits Curve) 50°C	60°C	71°C	CASE SIZE	MODEL NUMBER	PRICE
0-7	2.0	1.65	1.35	A	WR7-2.0	$124.00
0-7	4.0	3.4	2.7	B	WR7-4.0	152.00
0-7	8.0	7.0	6.0	C	WR7-8.0	195.00
0-7	16.0	14.0	12.0	D	WR7-16.0	265.00
0-7	32.0	28.0	24.0	E	WR7-32.0	435.00
0-15	1.1	0.96	0.83	A	WR15-1.1	124.00
0-15	2.2	1.9	1.6	B	WR15-2.2	154.00
0-15	5.0	4.3	3.7	C	WR15-5.0	195.00
0-15	10.0	8.6	7.4	D	WR15-10.0	265.00
0-15	20.0	17.2	14.8	E	WR15-20.0	435.00
0-30	0.6	0.54	0.44	A	WR30-0.6	135.00
0-30	1.2	1.1	0.9	B	WR30-1.2	162.00
0-30	3.0	2.6	2.2	C	WR30-3.0	195.00
0-30	6.0	5.2	4.4	D	WR30-6.0	265.00
0-30	12.0	10.4	8.8	E	WR30-12.0	470.00
0-50	0.35	0.32	0.26	A	WR50-0.35	135.00
0-50	0.7	0.64	0.53	B	WR50-0.7	162.00
0-50	2.0	1.7	1.5	C	WR50-2.0	195.00
0-50	4.0	3.4	3.0	D	WR50-4.0	265.00
0-50	8.0	6.8	6.0	E	WR50-8.0	470.00

OPERATING LIMITS



TERMINATIONS





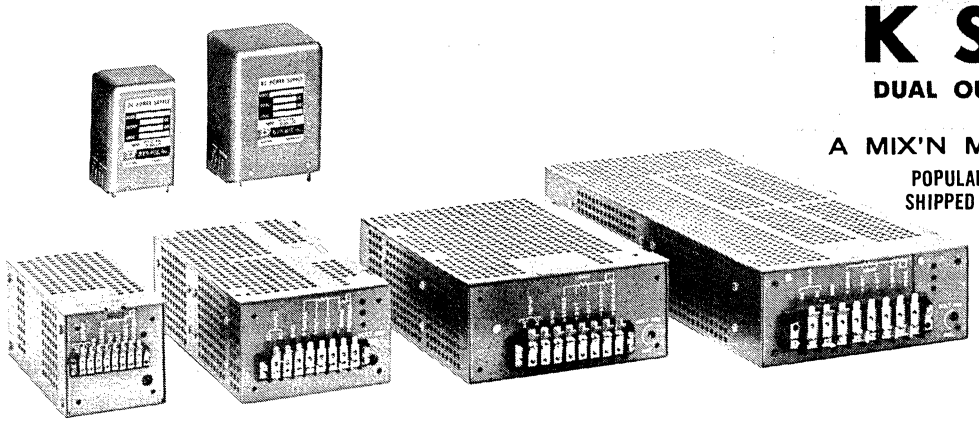
DYNAGE inc.
1331 BLUE HILLS AVENUE, BLOOMFIELD, CONN. 06002
TEL: (203) 243-0315 TWX: 710-425-6063

K SERIES

DUAL OUTPUT SUPPLIES

A MIX'N MATCH PRODUCT

POPULAR MODELS CAN BE SHIPPED WITHIN 72 HOURS



SPECIFICATIONS

Input: 105-125 VAC, 47-420 Hz

Output (Floating): See table of Models. Master voltage is positive output; slave is negative.

Output Voltage Adjustment: ±1.0 volts on positive. Slave follows and is set within ±1% of master.

Resolution of Adjustment: ±70 mv

Regulation: Combined: ±0.1% for combined ±10 VAC change and 0 to full load variation.

Ripple and Noise: 2 MV RMS, max.

Temperature: Operating: −20°C to +71°C (see current ratings at three temperatures)

Storage: −62°C to +85°C

Coefficient: ±0.03%/°C from −20°C to +71°C

Tracking: Negative output will track with positive output to within ±0.02%/°C.

Electronic Short Circuit Protection: Foldback type. Standard, all Units. Independent, each side. Max. current approximately 125% of full load current. At short circuit, current is approximately 25% of rated full load current at 50°C.

Overtemperature Protection: Standard, all Units

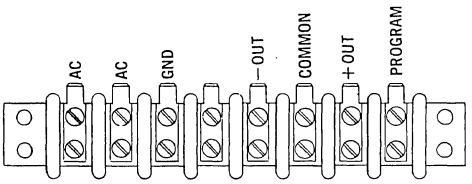
Remote Programming (Resistance): Standard; A, B, C, D cases only (100 ohms per volt).

OPTIONS AVAILABLE - SUMMARY

MODEL NUMBER Suffix required	OPTION	PRICE ADDER
A	Regulation ±0.05%	$10.00
D	For cases A, B, C, D only -Overvoltage crowbar; built-in, set to approximately 130% at nominal output voltage	15%
F (Specify level)	Fixed output (to ±1%)	N/C
FF (Specify level)	Fixed output (to ±0.25%)	$ 5.00
K	Improved tracking, to within ±0.005%/°C	$20.00
N	230 VAC input (A, B, C, D Cases only)	N/C
P	Remote programming standard on Cases A, B, C, D and no suffix required. G & J Cases	$ 5.00
R	Improved resolution (with "A" suffix only) 12 MV over range of ±250 MV	$10.00
S	Remote sensing	$ 5.00
V	Fungus proofing (G & J Cases only)	$10.00
W	Wide range input (95 VAC - 132 VAC) Derate output by 25%	10%

TERMINATIONS

FOR G AND J CASES, SEE GENERAL CATALOG.
FOR A, B, C, D CASES:



NOTE: WHEN REQUIRED, 3 ADDITIONAL TERMINALS (SOLDER TYPE) ARE PROVIDED FOR REMOTE SENSE.

CHART DATA

OUTPUT VOLTAGE ±1.0 VDC MASTER / SLAVE	OUTPUT CURRENT EACH SIDE 50°C	60°C	71°C	CASE SIZE	MODEL NUMBER	PRICE
12/12	.150	(Current rating to 71°C if base does not exceed 80°C)		G	K-12/12-.150/.150	$85.00
12/12	.500			J	K-12/12-.50/.50	95.00
12/12	.95	.8	.65	A	K-12/12-.95/.95	140.00
12/12	1.8	1.5	1.3	B	K-12/12-1.8/1.8	170.00
12/12	3.8	3.3	2.8	C	K-12/12-3.8/3.8	225.00
12/12	6.4	5.8	5.1	D	K-12/12-6.4/6.4	295.00
15/15	.150	(Current rating to 71°C if base does not exceed 80°C)		G	K-15/15-.150/.150	85.00
15/15	.500			J	K-15/15-.50/.50	95.00
15/15	.8	.7	.6	A	K-15/15-.80/.80	140.00
15/15	1.6	1.4	1.2	B	K-15/15-1.6/1.6	170.00
15/15	3.4	3.0	2.5	C	K-15/15-3.4/3.4	225.00
15/15	6.0	5.4	4.8	D	K-15/15-6.0/6.0	295.00

CASE SIZES:

A	3 3/16" x 3 3/16" x 7 1/4"
B	3 3/16" x 4 15/16" x 9 3/8"
C	3 3/16" x 7 1/8" x 9 5/8"
D	3 3/16" x 8" x 16 1/2"
E	3 15/32" x 16 5/8" x 17"
G	2 5/8" x 3 1/16" x 4 5/16"
J	3 3/8" x 3 5/16" x 5 5/16"

SPECIAL COMBINATIONS OF VOLTAGE AND CURRENT ARE AVAILABLE ON SPECIAL ORDER.

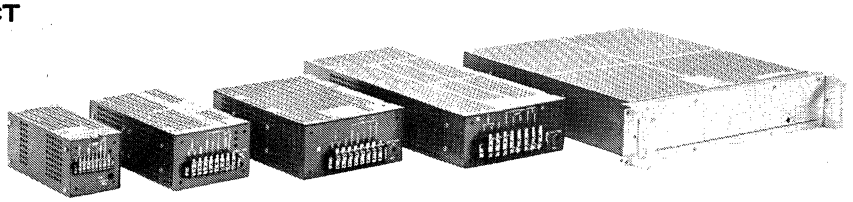
DYNAGE inc.
1331 BLUE HILLS AVENUE, BLOOMFIELD, CONN. 06002
TEL: (203) 243-0315 TWX: 710-425-6063

L SERIES

FOR LOGIC APPLICATIONS
BUILT-IN O/V, STANDARD

A MIX'N MATCH PRODUCT

POPULAR MODELS CAN BE SHIPPED WITHIN 72 HOURS



SPECIFICATIONS

Input: 105-125 VAC, 47-420 Hz

Output (Floating): See table of Models

Output Voltage Adjustment: ±5% from nominal. See range in table of models

Resolution of Adjustment: 0.5%

Regulation: Line only: ±0.2% for ±10 VAC at constant load

Load only: ±0.3% for 0 to full load at 115 VAC
±0.2% for 25% load change at 115 VAC

Combined: ±0.5% for combined ±10 VAC change and 0 to full load variation

Ripple and Noise: 0.1% RMS max. — 1.0% P-P max.

Temperature: Operating: −20°C to +71°C (see current ratings at three temperatures)

Storage: −62°C to +85°C

Coefficient: ±0.05%/°C from −20°C to +71°C

Electronic Short Circuit Protection: Foldback type. Standard, all Units. Max Current approximately 125% of full load current. At short circuit current is approximately 25% of rated full load current at 50°C.

Overvoltage Protection: Adjustable, set for approximately 130% of output voltage at no load when shipped. Range: 110-150%

Overtemperature Protection: Standard, all Units

Remote Programming (Resistance): Standard, all Units (100 ohms per volt)

Remote Sensing: Standard, all Units

Parallel Operation: Current Sharing within ±10%

OPTIONS AVAILABLE - SUMMARY

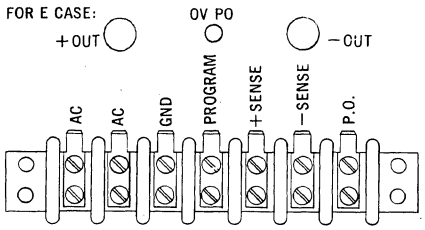
MODEL NUMBER Suffix required	OPTION	PRICE ADDER
F (Specify level)	Fixed output (to ±1%)	N/C
FF (Specify level)	Fixed output (to ±0.25%)	$ 5.00
M	Meters (E Case only); Voltage and current — 1 pair	$50.00
N	230 VAC input	N/C

CASE SIZES:

A	3 3/16" x 3 3/16" x 7 1/4"
B	3 3/16" x 4 15/16" x 9 3/8"
C	3 3/16" x 7 1/8" x 9 5/8"
D	3 3/16" x 8" x 16 1/2"
E	3 15/32" x 16 5/8" x 17"

TERMINATIONS

FOR E CASE:



FOR A, B, C, D CASES:

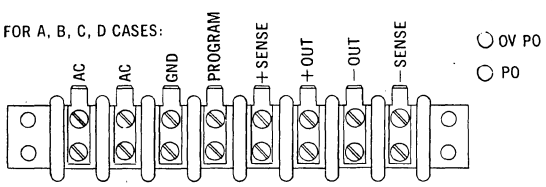


CHART DATA

OUTPUT VOLTAGE RANGE	OUTPUT CURRENT (AMPS) 50°C	60°C	71°C	CASE SIZE	MODEL NUMBER	PRICE
5.0-5.5	4.5	4.1	3.5	A	L-5.25-4.5	$139.00
5.0-5.5	12.0	11.0	9.7	B	L-5.25-12	169.00
5.0-5.5	18.0	16.4	14.5	C	L-5.25-18	219.00
5.0-5.5	31.0	28.0	25.0	D	L-5.25-31	298.00
5.0-5.5	75.0	68.0	61.0	E	L-5.25-75	525.00
12.0-13.2	2.6	2.4	2.1	A	L-12.6-2.6	139.00
12.0-13.2	6.5	5.9	5.3	B	L-12.6-6.5	169.00
12.0-13.2	10.0	9.1	8.1	C	L-12.6-10	219.00
12.0-13.2	18.0	16.4	14.5	D	L-12.6-18	298.00
12.0-13.2	40.0	36	33	E	L-12.6-40	525.00
15.0-16.5	2.1	1.9	1.7	A	L-15.7-2.1	139.00
15.0-16.5	5.6	5.1	4.6	B	L-15.7-5.6	169.00
15.0-16.5	8.4	7.6	6.8	C	L-15.7-8.4	219.00
15.0-16.5	15.0	13.6	12.2	D	L-15.7-15	298.00
15.0-16.5	36	33	29	E	L-15.7-36	525.00
24.0-26.4	1.4	1.25	1.1	A	L-25.2-1.4	139.00
24.0-26.4	3.6	3.3	2.9	B	L-25.2-3.6	169.00
24.0-26.4	5.8	5.3	4.7	C	L-25.2-5.8	219.00
24.0-26.4	10	9.1	8.1	D	L-25.2-10	298.00
24.0-26.4	24	21.8	19.5	E	L-25.2-24	525.00

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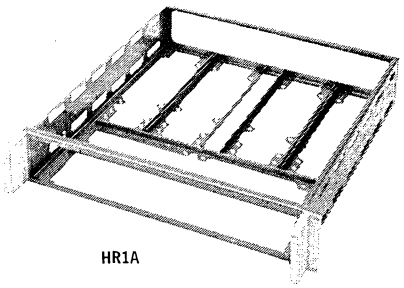
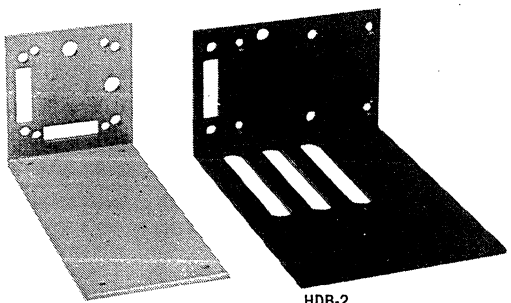
MIX'N MATCH

ACCESSORIES

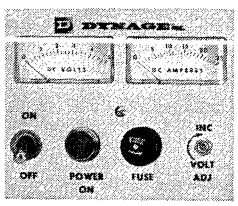
SEE WR, L, K, H AND D SERIES



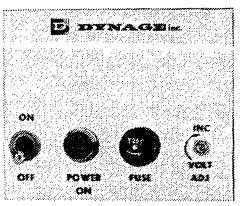
HR1A



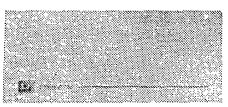
HDB-1 HDB-2



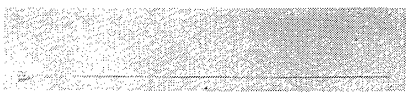
HMP-1



HCP-1



HBP-1 HBP-2



HBP-3

Rack Adapters—Refer to page 13* for combinations at supply sizes which may be accommodated. Proper rack adapter number is indicated for each arrangement.

Note that "D" Series and "K" Series (Cases F, G and H only) must use brackets shown below:

HR1A	$60.00
HR1A-1	$70.00
HR1B	$60.00
HR1B-1	$60.00
HR1C	$60.00

Panels—Refer to page 13.* All HR1A combinations allow meter and control panel configurations, up to 4 quarter panels.
Other configurations accept either 2 quarter panels plus blanks, or none, as shown. For these situations, consult factory for assistance in planning your system.

HMP-1	as shown, with ammeter, voltmeter, switch, pilot light, fuse, adjustment potentiometer, shunt, and connector block	$50.00
HCP-1	as shown, with switch, pilot light, fuse and adjustment potentiometer	$25.00
HBP-1	¼ rack blank panel	$ 5.00
HBP-2	½ rack blank panel	$10.00
HBP-3	Full rack blank panel	$10.00

Mounting Brackets — These brackets are used for D & K Series supplies to enable use in the standard rack adapter and to provide the necessary heat sinking for the cases.

HDB-1 for case sizes F and G. Use in place of "A" case sizes in figures on page 13.*

HDB-2 for case sizes H. Use in place of "B" case sizes in figures on page 13.*

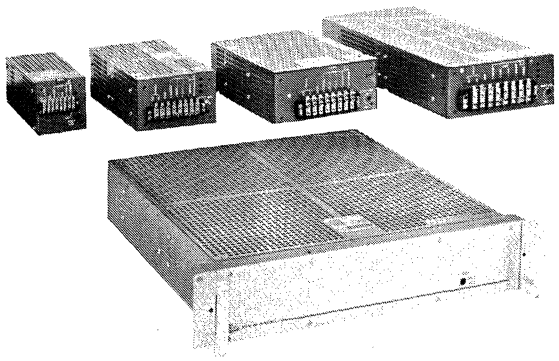
*In standard Dynage catalog.

NOTE: ASSEMBLIES OF ABOVE COMPONENTS WITH POWER SUPPLIES OF THE DYNAGE "MIX 'N MATCH" TYPES, COMPLETELY WIRED, ARE ALSO AVAILABLE. ASK YOUR DYNAGE REPRESENTATIVE FOR A QUOTE, OR CONTACT US DIRECTLY.

DYNAGE inc.
1331 BLUE HILLS AVENUE, BLOOMFIELD, CONN. 06002
TEL: (203) 243-0315 TWX: 710-425-6063

H SERIES

HIGH PERFORMANCE SUPPLIES



A MIX'N MATCH PRODUCT

POPULAR MODELS CAN BE SHIPPED WITHIN 72 HOURS

SPECIFICATIONS

Input: 105 - 125 VAC, 47 - 420 Hz

Output (Floating): See table of models

Output Voltage Adjustment: ±5% at rated load
±10% at 90% load

Resolution of Adjustment: 0.4% or 30 mv, whichever is greater

Regulation: Combined ±0.05% or 1.5 mv, whichever is greater, for a ±10 VAC change and 0 to full load variation.

Ripple and Noise: 0.002% or 1 mv, rms, whichever is greater.

Temperature: Operating: −20° to +71°C (See current ratings at three temperatures)

Storage: −62°C to +85°C

Coefficient: ±0.01%/°C or 1.2 mv/°C, whichever is greater, from −20°C to +71°C.

Electronic Short Circuit Protection: Foldback type. Standard, all Units. Max. current approximately 125% of full load current. At short circuit, current is approximately 25% of rated full load current at 50°C.

Overtemperature Protection: Standard, all Units.

Remote Programming (Resistance): Standard, all Units (200 ohms per volt).

Remote Sensing: Standard, all units

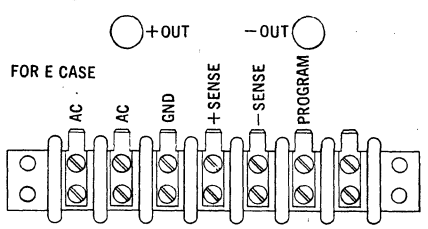
OPTIONS AVAILABLE — SUMMARY

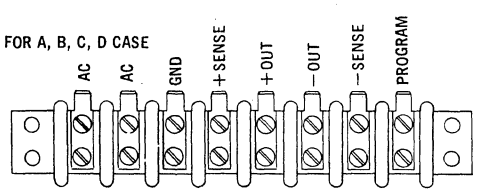
MODEL NUMBER Suffix required	OPTION	PRICE ADDER
A	Regulation — Standard on all models See charts	
AA	Improved regulation — ±0.025% or ±0.75 mv; whichever is greater	$10.00
B	Series connection diodes — For units with the same rating to be used in series (4 units maximum)	+3%
D	Overvoltage protection crowbar Built-in; set to approximately 130% at nominal output voltage	+15%
F (Specify level)	Fixed output (to ±1%)	N/C
FF (Specify level)	Fixed output (to ±0.25%)	$ 5.00
M	Meters (E Case only) voltage and current 1 pair	$50.00
N	230 VAC input	N/C
R	Improved adjustment resolution — See Chart, Page 3*	$10.00
W	Wide range input (95 VAC - 132 VAC) Derate output by 25%	+10%

*In standard Dynage catalog.

Output Voltage Range	Output Current (Amps) at 50°C	at 60°C	at 71°C	Size	Model	Price
0.5-1.2	3.3	2.7	2.2	A	H-0.9-3.3A	$124.00
0.5-1.2	6.4	5.3	4.3	B	H-0.9-6.4A	147.00
0.5-1.2	11.3	9.9	8.5	C	H-0.9-11.3A	195.00
0.5-1.2	23.0	20.1	17.2	D	H-0.9-23.0A	265.00
0.5-1.2	46.0	40.2	34.4	E	H-0.9-46.0A	435.00
1.2-1.8	3.3	2.7	2.2	A	H-1.5-3.3A	124.00
1.2-1.8	6.4	5.3	4.3	B	H-1.5-6.4A	147.00
1.2-1.8	11.3	9.9	8.5	C	H-1.5-11.3A	195.00
1.2-1.8	23.0	20.1	17.2	D	H-1.5-23.0A	265.00
1.2-1.8	46.0	40.2	34.4	E	H-1.5-46.0A	435.00
1.8-2.3	3.3	2.7	2.2	A	H-2.1-3.3A	124.00
1.8-2.3	6.4	5.3	4.3	B	H-2.1-6.4A	147.00
1.8-2.3	11.3	9.9	8.5	C	H-2.1-11.3A	195.00
1.8-2.3	23.0	20.1	17.2	D	H-2.1-23.0A	265.00
1.8-2.3	46.0	40.2	34.4	E	H-2.1-46.0A	435.00
2.3-2.7	3.3	2.7	2.2	A	H-2.5-3.3A	124.00
2.3-2.7	6.4	5.3	4.3	B	H-2.5-6.4A	147.00
2.3-2.7	11.3	9.9	8.5	C	H-2.5-11.3A	195.00
2.3-2.7	23.0	20.1	17.2	D	H-2.5-23.0A	265.00
2.3-2.7	46.0	40.2	34.4	E	H-2.5-46.0A	435.00
2.7-3.1	3.3	2.7	2.2	A	H-2.9-3.3A	124.00
2.7-3.1	6.4	5.3	4.3	B	H-2.9-6.4A	147.00
2.7-3.1	11.3	9.9	8.5	C	H-2.9-11.3A	195.00
2.7-3.1	23.0	20.1	17.2	D	H-2.9-23.0A	265.00
2.7-3.1	46.0	40.2	34.4	E	H-2.9-46.0A	435.00
3.1-3.5	3.3	2.7	2.2	A	H-3.3-3.3A	124.00
3.1-3.5	6.4	5.3	4.3	B	H-3.3-6.4A	147.00
3.1-3.5	11.3	9.9	8.5	C	H-3.3-11.3A	195.00
3.1-3.5	23.0	20.1	17.2	D	H-3.3-23.0A	265.00
3.1-3.5	46.0	40.2	34.4	E	H-3.3-46.0A	435.00
3.5-3.9	3.3	2.7	2.2	A	H-3.7-3.3A	124.00
3.5-3.9	6.4	5.3	4.3	B	H-3.7-6.4A	147.00
3.5-3.9	11.3	9.9	8.5	C	H-3.7-11.3A	195.00
3.5-3.9	23.0	20.1	17.2	D	H-3.7-23.0A	265.00
3.5-3.9	46.0	40.2	34.4	E	H-3.7-46.0A	435.00
3.9-4.3	3.3	2.7	2.2	A	H-4.1-3.3A	124.00
3.9-4.3	6.4	5.3	4.3	B	H-4.1-6.4A	147.00
3.9-4.3	10.8	9.4	8.1	C	H-4.1-10.8A	195.00
3.9-4.3	21.1	18.5	15.8	D	H-4.1-21.1A	265.00
3.9-4.3	42.2	37.0	31.6	E	H-4.1-42.2A	435.00
4.3-4.7	3.2	2.7	2.2	A	H-4.5-3.2A	124.00
4.3-4.7	6.4	5.3	4.3	B	H-4.5-6.4A	147.00
4.3-4.7	10.8	9.4	8.1	C	H-4.5-10.8A	195.00
4.3-4.7	21.1	18.5	15.8	D	H-4.5-21.1A	265.00
4.3-4.7	42.2	37.0	31.6	E	H-4.5-42.2A	435.00
4.7-5.3	3.2	2.7	2.2	A	H-5.0-3.2A	124.00
4.7-5.3	6.4	5.3	4.3	B	H-5.0-6.4A	147.00
4.7-5.3	10.8	9.4	8.1	C	H-5.0-10.8A	195.00
4.7-5.3	21.1	18.5	15.8	D	H-5.0-21.1A	265.00
4.7-5.3	42.2	37.0	31.6	E	H-5.0-42.2A	435.00

TERMINATIONS





CASE SIZES:

A	3 3/16" x 3 3/16" x 7 1/4"
B	3 3/16" x 4 15/16" x 9 3/8"
C	3 3/16" x 7 1/8" x 9 5/8"
D	3 3/16" x 8" x 16 1/2"
E	3 15/32" x 16 5/8" x 17"

DYNAGE inc.
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TEL: (203) 243-0315 TWX: 710-425-6063

H SERIES

HIGH PERFORMANCE SUPPLIES

A MIX'N MATCH PRODUCT

POPULAR MODELS CAN BE SHIPPED WITHIN 72 HOURS

Output Voltage Range	Output Current (Amps) at 50°C	at 60°C	at 71°C	Size	Model	Price
5.3-5.8	3.1	2.6	2.1	A	H-5.5-3.1A	124.00
5.3-5.8	6.1	5.1	4.1	B	H-5.5-6.1A	147.00
5.3-5.8	9.9	8.6	7.4	C	H-5.5-9.9A	195.00
5.3-5.8	20.0	17.5	15.0	D	H-5.5-20.0A	265.00
5.3-5.8	40.0	35.0	30.0	E	H-5.5-40.0A	435.00
5.8-6.4	2.9	2.4	2.0	A	H-6.1-2.9A	124.00
5.8-6.4	5.8	4.8	3.9	B	H-6.1-5.8A	147.00
5.8-6.4	9.8	8.5	7.3	C	H-6.1-9.8A	195.00
5.8-6.4	19.5	17.1	14.6	D	H-6.1-19.5A	265.00
5.8-6.4	39.0	34.2	29.2	E	H-6.1-39.0A	435.00
6.4-7.0	2.8	2.3	1.9	A	H-6.7-2.8A	124.00
6.4-7.0	5.5	4.6	3.7	B	H-6.7-5.5A	152.00
6.4-7.0	9.6	8.4	7.2	C	H-6.7-9.6A	195.00
6.4-7.0	19.0	16.6	14.2	D	H-6.7-19.0A	265.00
6.4-7.0	38.0	33.2	28.4	E	H-6.7-38.0A	435.00
7.0-7.7	2.7	2.3	1.8	A	H-7.3-2.7A	124.00
7.0-7.7	5.4	4.5	3.6	B	H-7.3-5.4A	152.00
7.0-7.7	9.3	8.1	7.0	C	H-7.3-9.3A	195.00
7.0-7.7	18.0	15.7	13.5	D	H-7.3-18.0A	265.00
7.0-7.7	36.0	31.4	27.0	E	H-7.3-36.0A	435.00
7.7-8.5	2.5	2.1	1.7	A	H-8.1-2.5A	124.00
7.7-8.5	4.9	4.1	3.3	B	H-8.1-4.9A	152.00
7.7-8.5	9.0	7.9	6.7	C	H-8.1-9.0A	195.00
7.7-8.5	17.4	15.2	13.0	D	H-8.1-17.4A	265.00
7.7-8.5	34.8	30.4	26.0	E	H-8.1-34.8A	435.00
8.5-9.4	2.4	2.0	1.6	E	H-8.9-2.4A	124.00
8.5-9.4	4.7	4.0	3.2	B	H-8.9-4.7A	152.00
8.5-9.4	8.5	7.4	6.3	C	H-8.9-8.5A	195.00
8.5-9.4	16.4	14.3	12.3	D	H-8.9-16.4A	265.00
8.5-9.4	32.8	28.6	24.6	E	H-8.9-32.8A	435.00
9.4-10.3	2.2	1.9	1.5	A	H-9.8-2.2A	124.00
9.4-10.3	4.4	3.7	3.0	B	H-9.8-4.4A	152.00
9.4-10.3	8.0	7.0	6.0	C	H-9.8-8.0A	195.00
9.4-10.3	15.6	13.6	11.7	D	H-9.8-15.6A	265.00
9.4-10.3	31.2	27.2	23.4	E	H-9.8-31.2A	435.00
10.3-11.4	2.1	1.8	1.4	A	H-10.8-2.1A	124.00
10.3-11.4	4.1	3.5	2.8	B	H-10.8-4.1A	152.00
10.3-11.4	7.7	6.7	5.7	C	H-10.8-7.7A	195.00
10.3-11.4	14.8	12.9	11.1	D	H-10.8-14.8A	265.00
10.3-11.4	29.6	25.8	22.2	E	H-10.8-29.6A	435.00
11.4-12.6	1.9	1.6	1.3	A	H-12.0-1.9A	124.00
11.4-12.6	3.8	3.2	2.6	B	H-12.0-3.8A	152.00
11.4-12.6	7.4	6.5	5.4	C	H-12.0-7.4A	195.00
11.4-12.6	14.3	12.5	10.7	D	H-12.0-14.3A	265.00
11.4-12.6	28.6	25.0	21.4	E	H-12.0-28.6A	435.00
12.6-13.9	1.8	1.6	1.3	A	H-13.2-1.8A	124.00
12.6-13.9	3.5	3.1	2.5	B	H-13.2-3.5A	154.00
12.6-13.9	7.0	6.1	5.2	C	H-13.2-7.0A	195.00
12.6-13.9	13.7	12.0	10.3	D	H-13.2-13.7A	265.00
12.6-13.9	27.4	24.0	20.6	E	H-13.2-27.4A	435.00
13.9-15.3	1.6	1.4	1.2	A	H-14.6-1.6A	124.00
13.9-15.3	3.2	2.8	2.3	B	H-14.6-3.2A	154.00
13.9-15.3	6.7	5.8	5.0	C	H-14.6-6.7A	195.00
13.9-15.3	13.3	11.6	10.0	D	H-14.6-13.3A	265.00
13.9-15.3	26.6	23.2	20.0	E	H-14.6-26.6A	435.00
15.3-16.9	1.5	1.3	1.1	A	H-16.1-1.5A	124.00
15.3-16.9	3.0	2.6	2.1	B	H-16.1-3.0A	154.00
15.3-16.9	6.3	5.5	4.7	C	H-16.1-6.3A	195.00
15.3-16.9	12.4	10.8	9.3	D	H-16.1-12.4A	265.00
15.3-16.9	24.8	21.6	18.6	E	H-16.1-24.8A	435.00
16.9-18.7	1.4	1.3	1.0	A	H-17.8-1.4A	124.00
16.9-18.7	2.7	2.5	2.0	B	H-17.8-2.7A	154.00
16.9-18.7	6.0	5.2	4.5	C	H-17.8-6.0A	195.00
16.9-18.7	11.8	10.3	8.8	D	H-17.8-11.8A	265.00
16.9-18.7	23.6	20.6	17.6	E	H-17.8-23.6A	435.00
18.7-20.6	1.3	1.2	0.95	A	H-19.6-1.3A	124.00
18.7-20.6	2.5	2.3	1.9	B	H-19.6-2.5A	154.00
18.7-20.6	5.5	4.8	4.1	C	H-19.6-5.5A	195.00
18.7-20.6	11.0	9.6	8.2	D	H-19.6-11.0A	265.00
18.7-20.6	22.0	19.2	16.4	E	H-19.6-22.0A	435.00
20.6-22.7	1.2	1.1	0.85	A	H-21.6-1.2A	124.00
20.6-22.7	2.3	2.1	1.7	B	H-21.6-2.3A	154.00
20.6-22.7	5.2	4.5	3.9	C	H-21.6-5.2A	195.00
20.6-22.7	10.5	9.2	7.9	D	H-21.6-10.5A	265.00
20.6-22.7	21.0	18.4	15.8	E	H-21.6-21.0A	435.00

Output Voltage Range	Output Current (Amps) at 50°C	at 60°C	at 71°C	Size	Model	Price
22.7-25.0	1.1	1.0	0.80	A	H-23.8-1.1A	124.00
22.7-25.0	2.2	2.0	1.6	B	H-23.8-2.2A	154.00
22.7-25.0	4.8	4.2	3.6	C	H-23.8-4.8A	195.00
22.7-25.0	9.5	8.3	7.1	D	H-23.8-9.5A	265.00
22.7-25.0	19.0	16.6	14.2	E	H-23.8-19.0A	435.00
25.0-27.6	1.0	0.90	0.75	A	H-26.2-1.0A	135.00
25.0-27.6	2.0	1.8	1.5	B	H-26.2-2.0A	162.00
25.0-27.6	4.6	4.0	3.4	C	H-26.2-4.6A	195.00
25.0-27.6	9.0	7.9	6.7	D	H-26.2-9.0A	265.00
25.0-27.6	18.0	15.8	13.4	E	H-26.2-18.0A	470.00
27.6-30.4	0.95	0.85	0.70	A	H-29.0-0.95A	135.00
27.6-30.4	1.9	1.7	1.4	B	H-29.0-1.9A	162.00
27.6-30.4	4.3	3.7	3.2	C	H-29.0-4.3A	195.00
27.6-30.4	8.5	7.4	6.4	D	H-29.0-8.5A	265.00
27.6-30.4	17.0	14.8	12.8	E	H-29.0-17.0A	470.00
30.4-33.6	0.85	0.80	0.65	A	H-32.0-0.85A	135.00
30.4-33.6	1.7	1.6	1.3	B	H-32.0-1.7A	162.00
30.4-33.6	4.0	3.5	3.0	C	H-32.0-4.0A	195.00
30.4-33.6	7.7	6.7	5.8	D	H-32.0-7.7A	265.00
30.4-33.6	15.4	13.4	11.6	E	H-32.0-15.4A	470.00
33.6-37.0	0.80	0.75	0.60	A	H-35.2-0.80A	135.00
33.6-37.0	1.6	1.5	1.2	B	H-35.2-1.6A	162.00
33.6-37.0	3.8	3.3	2.8	C	H-35.2-3.8A	195.00
33.6-37.0	7.3	6.4	5.5	D	H-35.2-7.3A	265.00
33.6-37.0	14.6	12.8	11.0	E	H-35.2-14.6A	470.00
37.0-40.8	0.70	0.65	0.55	A	H-38.8-0.70A	135.00
37.0-40.8	1.4	1.3	1.1	B	H-38.8-1.4A	162.00
37.0-40.8	3.6	3.1	2.7	C	H-38.8-3.6A	195.00
37.0-40.8	7.0	6.1	5.2	D	H-38.8-7.0A	265.00
37.0-40.8	14.0	12.2	10.4	E	H-38.8-14.0A	470.00
40.8-45.0	0.65	0.60	0.50	A	H-42.8-0.65A	135.00
40.8-45.0	1.3	1.2	1.0	B	H-42.8-1.3A	162.00
40.8-45.0	3.4	3.0	2.5	C	H-24.8-3.4A	195.00
40.8-45.0	6.6	5.7	4.9	D	H-42.8-6.6A	265.00
40.8-45.0	13.2	11.4	9.8	E	H-42.8-13.2A	470.00
45.0-50.0	0.60	0.55	0.45	A	H-47.2-0.60A	135.00
45.0-50.0	1.2	1.1	0.90	B	H-47.2-1.2A	162.00
45.0-50.0	3.1	2.7	2.3	C	H-47.2-3.1A	195.00
45.0-50.0	6.0	5.2	4.5	D	H-47.2-6.0A	265.00
45.0-50.0	12.0	10.4	9.0	E	H-47.2-12.0A	470.00
49.5-54.5	0.55	0.50	0.43	A	H-52.0-0.55A	139.00
49.5-54.5	1.1	1.0	0.85	B	H-52.0-1.1A	179.00
54.5-60.0	0.50	0.45	0.38	A	H-57.2-0.50A	139.00
54.5-60.0	1.0	0.90	0.75	B	H-57.2-1.0A	179.00
60.0-66.1	0.50	0.44	0.38	A	H-63.1-0.50A	139.00
60.0-66.1	1.0	0.87	0.75	B	H-63.1-1.0A	179.00
66.1-72.8	0.48	0.41	0.35	A	H-69.5-0.48A	139.00
66.1-72.8	0.95	0.82	0.70	B	H-69.5-0.95A	179.00
72.8-80.1	0.45	0.39	0.33	A	H-76.5-0.45A	139.00
72.8-80.1	0.90	0.77	0.65	B	H-76.5-0.90A	179.00
80.1-88.2	0.40	0.35	0.30	A	H-84.2-0.40A	139.00
80.1-88.2	0.80	0.70	0.60	B	H-84.2-0.80A	179.00
88.2-97.1	0.38	0.33	0.28	A	H-92.6-0.38A	139.00
88.2-97.1	0.75	0.65	0.55	B	H-92.6-0.75A	181.00
97.1-106.8	0.33	0.29	0.25	A	H-102-0.33A	139.00
97.1-106.8	0.65	0.57	0.50	B	H-102-0.65A	181.00
106.8-117.2	0.30	0.26	0.23	A	H-112-0.30A	139.00
106.8-117.2	0.60	0.52	0.45	B	H-112-0.60A	181.00
117.2-128.7	0.28	0.24	0.20	A	H-123-0.28A	139.00
117.2-128.7	0.55	0.47	0.40	B	H-123-0.55A	181.00
128.7-141.6	0.25	0.21	0.18	A	H-135-0.25A	139.00
128.7-141.6	0.50	0.42	0.35	B	H-135-0.50A	181.00
141.6-156.1	0.20	0.18	0.15	A	H-149-0.20A	161.00
141.6-156.1	0.45	0.40	0.35	B	H-149-0.45A	203.00
156.1-172.1	0.20	0.18	0.15	A	H-164-0.20A	161.00
156.1-172.1	0.40	0.35	0.30	B	H-164-0.40A	203.00
172.1-189.6	0.18	0.15	0.13	A	H-181-0.18A	161.00
172.1-189.6	0.35	0.30	0.35	B	H-181-0.35A	203.00
189.6-208.0	0.15	0.14	0.13	A	H-199-0.15A	182.00
189.6-208.0	0.30	0.27	0.25	B	H-199-0.30A	210.00
208.0-228.5	0.15	0.13	0.10	A	H-218-0.15A	182.00
208.0-228.5	0.30	0.25	0.20	B	H-218-0.30A	210.00
228.5-252.0	0.13	0.11	0.10	A	H-240-0.13A	182.00
228.5-252.0	0.25	0.22	0.20	B	H-240-0.25A	210.00

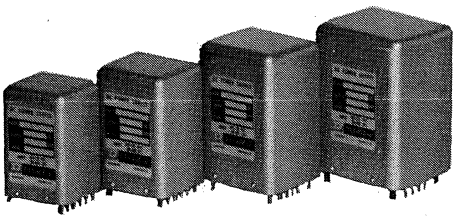
DYNAGE inc.

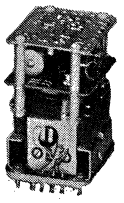
1331 BLUE HILLS AVENUE, BLOOMFIELD, CONN. 06002
TEL: (203) 243-0315 TWX: 710-425-6063

D SERIES

LOW I — HIGH PERFORMANCE SUPPLIES

A MIX'N MATCH PRODUCT
SIZES F, G AND H
POPULAR MODELS CAN BE
SHIPPED WITHIN 72 HOURS





SPECIFICATIONS

Input: 105-125 VAC, 47 - 420 Hz

Output (Floating): See table of Models
Output Voltage Adjustment: ±5% at rated load
±10% at 90% load
Resolution of Adjustment: 0.4% or 30 mv, whichever is greater.

Regulation: Combined ±0.05% or 1.5 mv, whichever is greater, for a ±10 VAC change and 0 to full load variation.

Ripple and Noise: 0.002% or 1 mv, rms, whichever is greater.

Temperature: Operating: −20° to +71°C (Base of supply must be held to 80°C or less by heat sinking)
Storage: −62°C to +85°C
Coefficient: ±0.01%/°C or 1.2 mv/°C, whichever is −20°C to +60°C.

Electronic Short Circuit Protection: Foldback type. Standard, all Units. Max. current approximately 150% of full load current. At short circuit, current is approximately 25% of rated full load current.

Overtemperature Protection: Standard, all Units.

OPTIONS AVAILABLE — SUMMARY

MODEL NUMBER Suffix required	OPTION	PRICE ADDER
A	Regulation ±0.05% — See model chart and costs	
AA	Improved regulation ±0.025% or ±0.75 mv; whichever is greater	$10.00
AAA	Improved regulation ±0.01% or ±0.5 mv, whichever is greater. This option includes suffix T automatically, and must be ordered with FF or R to obtain best results	$50.00
B	Series connection diodes — For units with the same rating to be used in series (4 units maximum)	+5%
F (Specify level)	Fixed output (to ±1%)	N/C
FF (Specify level)	Fixed output (to ±0.25%)	$ 5.00
H	Stability (See Chart, Page 3)* .01%	$30.00
HH	Stability (See Chart, Page 3)* .004%	$50.00
HHH	Stability (See Chart, Page 3)* .001%	$90.00
P	Remote programming (See Chart, Page 3)*	$ 5.00
R	Improved resolution (See Chart, Page 3)*	$10.00
S	Remote sensing	$ 5.00
T	T	$20.00
TT	Lower temperature coefficient (See Chart, page 3) Suffixes TT & TTT must be ordered with FF, R, or P — TT	$25.00
TTT	TTT	$50.00
V	Fungus proofing	$10.00
W	Wide range input (95 VAC-132 VAC) Derate output by 25%	+10%

*In standard Dynage catalog.

Output Voltage ±5.0% Range	Output Current Amps	Case Size	Efficiency % (Approx.)	A Model 0.05% Regulation Model	Price
0.5-1.2	0.200	F	13	D-0.9-0.200A	$ 90.00
0.5-1.2	0.300	G	13	D-0.9-0.300A	91.00
0.5-1.2	0.750	H	13	D-0.9-0.750A	96.00
0.5-1.2	1.0	J	13	D-0.9-1.0A	101.00
1.2-1.8	0.200	F	19	D-1.5-0.200A	90.00
1.2-1.8	0.300	G	19	D-1.5-0.300A	91.00
1.2-1.8	0-750	H	19	D-1.5-0.750A	96.00
1.2-1.8	1.0	J	19	D-1.5-1.0A	101.00
1.8-2.3	0.200	F	24	D-2.1-0.200A	90.00
1.8-2.3	0.300	G	24	D-2.1-0.300A	91.00
1.8-2.3	0.750	H	24	D-2.1-0.750A	96.00
1.8-2.3	1.0	J	24	D-2.1-1.0A	101.00
2.3-2.7	0.200	F	27	D-2.5-0.200A	90.00
2.3-2.7	0.300	G	27	D-2.5-0.300A	91.00
2.3-2.7	0.750	H	27	D-2.5-0.750A	96.00
2.3-2.7	1.0	J	27	D-2.5-1.0A	101.00
2.7-3.1	0.200	F	30	D-2.9-0.200A	90.00
2.7-3.1	0.300	G	30	D-2.9-0.300A	91.00
2.7-3.1	0.750	H	30	D-2.9-0.750A	96.00
2.7-3.1	1.0	J	30	D-2.9-1.0A	101.00
3.1-3.5	0.200	F	32	D-3.3-0.200A	90.00
3.1-3.5	0.300	G	32	D-3.3-0.300A	91.00
3.1-3.5	0.750	H	32	D-3.3-0.750A	96.00
3.1-3.5	1.0	J	32	D-3.3-1.0A	101.00
3.5-3.9	0.200	F	33	D-3.7-0.200A	90.00
3.5-3.9	0.300	G	33	D-3.7-0.300A	91.00
3.5-3.9	0.750	H	33	D-3.7-0.750A	96.00
3.5-3.9	1.0	J	33	D-3.7-1.0A	101.00
3.9-4.3	0.200	F	35	D-4.1-0.200A	90.00
3.9-4.3	0.300	G	35	D-4.1-0.300A	91.00
3.9-4.3	0.750	H	35	D-4.1-0.750A	96.00
3.9-4.3	1.0	J	35	D-4.1-1.0A	101.00
4.3-4.7	0.200	F	36	D-4.5-0.200A	90.00
4.3-4.7	0.300	G	36	D-4.5-0.300A	91.00
4.3-4.7	0.750	H	36	D-4.5-0.750A	96.00
4.3-4.7	1.0	J	36	D-4.5-1.0A	101.00
4.7-5.2	0.200	F	38	D-5.0-0.200A	90.00
4.7-5.2	0.300	G	38	D-5.0-0.300A	91.00
4.7-5.2	0.750	H	38	D-5.0-0.750A	96.00
4.7-5.2	1.0	J	38	D-5.0-1.0A	101.00
5.2-5.8	0.200	F	40	D-5.5-0.200A	90.00
5.2-5.8	0.300	G	40	D-5.5-0.300A	91.00
5.2-5.8	0.750	H	40	D-5.5-0.750A	96.00
5.2-5.8	1.0	J	40	D-5.5-1.0A	101.00
5.8-6.4	0.200	F	41	D-6.1-0.200A	90.00
5.8-6.4	0.300	G	41	D-6.1-0.300A	91.00
5.8-6.4	0.750	H	41	D-6.1-0.750A	96.00
5.8-6.4	1.0	J	41	D-6.1-1.0A	101.00
6.4-7.0	0.200	F	43	D-6.7-0.200A	90.00
6.4-7.0	0.300	G	43	D-6.7-0.300A	91.00
6.4-7.0	0.750	H	43	D-6.7-0.750A	96.00
6.4-7.0	1.0	J	43	D-6.7-1.0A	101.00
7.0-7.7	0.150	F	44	D-7.3-0.150A	90.00
7.0-7.7	0.300	G	44	D-7.3-0.300A	91.00
7.0-7.7	0.750	H	44	D-7.3-0.750A	96.00
7.0-7.7	1.0	J	44	D-7.3-1.0A	101.00
7.7-8.5	0.150	F	45	D-8.1-0.150A	90.00
7.7-8.5	0.300	G	45	D-8.1-0.300A	91.00
7.7-8.5	0.750	H	45	D-8.1-0.750A	96.00
7.7-8.5	1.0	J	45	D-8.1-1.0A	101.00
8.5-9.4	0.150	F	47	D-8.9-0.150A	90.00
8.5-9.4	0.300	G	47	D-8.9-0.300A	91.00
8.5-9.4	0.750	H	47	D-8.9-0.750A	96.00
8.5-9.4	1.0	J	47	D-8.9-1.0A	101.00

DYNAGE inc.
1331 BLUE HILLS AVENUE, BLOOMFIELD, CONN. 06002
TEL: (203) 243-0315 TWX: 710-425-6063

D SERIES

LOW I — HIGH PERFORMANCE SUPPLIES

A MIX'N MATCH PRODUCT
SIZES F, G AND H
POPULAR MODELS CAN BE SHIPPED WITHIN 72 HOURS

Output Voltage ±5.0% Range	Output Current Amps	Case Size	Efficiency % (Approx.)	A Model 0.05% Regulation		Standard Model 0.5% Regulation	
				Model	Price	Model	Price
9.4-10.3	0.150	F	48	D-9.8-0.150A	$ 90.00	D-9.8-0.150	$ 69.00
9.4-10.3	0.300	G	48	D-9.8-0.300A	91.00	D-9.8-0.300	70.00
9.4-10.3	0.500	H	48	D-9.8-0.500A	96.00	D-9.8-0.500	77.00
9.4-10.3	0.750	J	48	D-9.8-0.750A	101.00	D-9.8-0.750	81.00
10.3-11.4	0.200	F	50	D-10.8-0.200A	90.00	D-10.8-0.200	69.00
10.3-11.4	0.300	G	50	D-10.8-0.300A	91.00	D-10.8-0.300	70.00
10.3-11.4	0.500	H	50	D-10.8-0.500A	96.00	D-10.8-0.500	77.00
10.3-11.4	0.750	J	50	D-10.8-0.750A	101.00	D-10.8-0.750	81.00
11.4-12.6	0.100	F	51	D-12.0-0.100A	76.00	D-12.0-0.100	69.00
11.4-12.6	0.300	G	51	D-12.0-0.300A	81.00	D-12.0-0.300	70.00
11.4-12.6	0.500	H	51	D-12.0-0.500A	89.00	D-12.0-0.500	77.00
11.4-12.6	0.750	J	51	D-12.0-0.750A	105.00	D-12.0-0.750	81.00
12.6-13.9	0.150	F	52	D-13.2-0.150A	76.00	D-13.2-0.150	69.00
12.6-13.9	0.200	G	52	D-13.2-0.200A	81.00	D-13.2-0.200	70.00
12.6-13.9	0.500	H	52	D-13.2-0.500A	89.00	D-13.2-0.500	77.00
12.6-13.9	0.750	J	52	D-13.2-0.750A	105.00	D-13.2-0.750	81.00
13.9-15.3	0.150	F	53	D-14.6-0.150A	76.00	D-14.6-0.150	69.00
13.9-15.3	0.200	G	53	D-14.6-0.200A	81.00	D-14.6-0.200	70.00
13.9-15.3	0.500	H	53	D-14.6-0.500A	89.00	D-14.6-0.500	77.00
13.9-15.3	0.750	J	53	D-14.6-0.750A	105.00	D-14.6-0.750	81.00
15.3-16.9	0.150	F	54	D-16.1-0.150A	76.00	D-16.1-0.150	69.00
15.3-16.9	0.200	G	54	D-16.1-0.200A	81.00	D-16.1-0.200	70.00
15.3-16.9	0.500	H	54	D-16.1-0.500A	89.00	D-16.1-0.500	77.00
15.3-16.9	0.750	J	54	D-16.1-0.750A	105.00	D-16.1-0.750	81.00
16.9-18.7	0.150	F	55	D-17.8-0.150A	76.00	D-17.8-0.150	69.00
16.9-18.7	0.200	G	55	D-17.8-0.200A	81.00	D-17.8-0.200	70.00
16.9-18.7	0.300	H	55	D-17.8-0.300A	89.00	D-17.8-0.300	77.00
16.9-18.7	0.750	J	55	D-17.8-0.750A	105.00	D-17.8-0.750	81.00
18.7-20.6	0.150	F	56	D-19.6-0.150A	76.00	D-19.6-0.150	69.00
18.7-20.6	0.200	G	56	D-19.6-0.200A	81.00	D-19.6-0.200	70.00
18.7-20.6	0.300	H	56	D-19.6-0.300A	89.00	D-19.6-0.300	77.00
18.7-20.6	0.750	J	56	D-19.6-0.750A	105.00	D-19.6-0.750	81.00
20.6-22.7	0.100	F	57	D-21.6-0.100A	76.00	D-21.6-0.100	69.00
20.6-22.7	0.200	G	57	D-21.6-0.200A	81.00	D-21.6-0.200	70.00
20.6-22.7	0.300	H	57	D-21.6-0.300A	89.00	D-21.6-0.300	77.00
20.6-22.7	0.750	J	57	D-21.6-0.750A	105.00	D-21.6-0.750	81.00
22.7-25.0	0.100	F	58	D-23.8-0.100A	80.00	D-23.8-0.100	73.00
22.7-25.0	0.200	G	58	D-23.8-0.200A	83.00	D-23.8-0.200	74.00
22.7-25.0	0.300	H	58	D2-3.8-0.300A	93.00	D-23.8-0.300	83.00
22.7-25.0	0.500	J	58	D-23.8-0.500A	108.00	D-23.8-0.500	87.00
25.0-27.6	0.100	F	59	D-26.2-0.100A	80.00	D-26.2-0.100	73.00
25.0-27.6	0.200	G	59	D-26.2-0.200A	83.00	D-26.2-0.200	74.00
25.0-27.6	0.300	H	59	D-26.2-0.300A	93.00	D-26.2-0.300	83.00
25.0-27.6	0.500	J	59	D-26.2-0.500A	108.00	D-26.2-0.500	87.00
27.6-30.4	0.100	F	59	D-29.0-0.100A	80.00	D-29.0-0.100	73.00
27.6-30.4	0.200	G	59	D-29.0-0.200A	85.00	D-29.0-0.200	74.00
27.6-30.4	0.300	H	59	D-29.0-0.300A	96.00	D-29.0-0.300	83.00
27.6-30.4	0.500	J	59	D-29.0-0.500A	111.00	D-29.0-0.500	87.00
30.4-33.6	0.100	F	60	D-32.0-0.100A	80.00	D-32.0-0.100	73.00
30.4-33.6	0.200	G	60	D-32.0-0.200A	85.00	D-32.0-0.200	74.00
30.4-33.6	0.300	H	60	D-32.0-0.300A	96.00	D-32.0-0.300	83.00
30.4-33.6	0.500	J	60	D-32.0-0.500A	111.00	D-32.0-0.500	87.00
33.6-37.0	0.100	F	60	D-35.2-0.100A	80.00	D-35.2-0.100	73.00
33.6-37.0	0.200	G	60	D-35.2-0.200A	85.00	D-35.2-0.200	74.00
33.6-37.0	0.300	H	60	D-35.2-0.300A	96.00	D-35.2-0.300	83.00
33.6-37.0	0.500	J	60	D-35.2-0.500A	111.00	D-35.2-0.500	87.00
37.0-40.8	0.100	F	61	D-38.8-0.100A	80.00	D-38.8-0.100	73.00
37.0-40.8	0.200	G	61	D-38.8-0.200A	85.00	D-38.8-0.200	74.00
37.0-40.8	0.300	J	61	D-38.8-0.300A	111.00	D-38.8-0.300	87.00

Output Voltage ±5.0% Range	Output Current Amps	Case Size	Efficiency % (Approx.)	A Model 0.05% Regulation		Standard Model 0.5% Regulation	
				Model	Price	Model	Price
40.8-45.0	0.075	F	62	D-42.8-0.075A	80.00	D-42.8-0.075	73.00
40.8-45.0	0.150	G	62	D-42.8-0.150A	85.00	D-42.8-0.150	74.00
40.8-45.0	0.200	H	62	D-42.8-0.200A	96.00	D-42.8-0.200	83.00
40.8-45.0	0.300	J	62	D-42.8-0.300A	111.00	D-42.8-0.300	87.00
45.0-49.5	0.075	F	62	D-47.2-0.075A	80.00	D-47.2-0.075	73.00
45.0-49.5	0.150	G	62	D-47.2-0.150A	85.00	D-47.2-0.150	74.00
45.0-49.5	0.200	H	62	D-47.2-0.200A	96.00	D-47.2-0.200	83.00
45.0-49.5	0.300	J	62	D-47.2-0.300A	111.00	D-47.2-0.300	87.00
49.5-54.5	0.075	F	63	D-52.0-0.075A	80.00	D-52.0-0.075	73.00
49.5-54.5	0.100	G	63	D-52.0-0.100A	85.00	D-52.0-0.100	74.00
49.5-54.5	0.200	H	63	D-52.0-0.200A	96.00	D-52.0-0.200	83.00
49.5-54.5	0.300	J	63	D-52.0-0.300A	111.00	D-52.0-0.300	87.00
54.5-60.0	0.075	F	63	D-57.2-0.075A	80.00	D-57.2-0.075	73.00
54.5-60.0	0.100	G	63	D-57.2-0.100A	85.00	D-57.2-0.100	74.00
54.5-60.0	0.200	H	63	D-57.2-0.200A	96.00	D-57.2-0.200	83.00
60.0-66.1	0.075	F	64	D-63.0-0.075A	97.00	D-63.0-0.075	95.00
60.0-66.1	0.100	G	64	D-63.0-0.100A	105.00	D-63.0-0.100	102.00
60.0-66.1	0.200	H	64	D-63.0-0.200A	125.00	D-63.0-0.200	122.00
66.1-72.8	0.050	F	64	D-69.5-0.050A	97.00	D-69.5-0.050	95.00
66.1-72.8	0.100	G	64	D-69.5-0.100A	105.00	D-69.5-0.100	102.00
66.1-72.8	0.200	H	64	D-69.5-0.200A	125.00	D-69.5-0.200	122.00
72.8-80.1	0.050	F	64	D-76.5-0.050A	97.00	D-76.5-0.050	95.00
72.8-80.1	0.100	G	64	D-76.5-0.100A	105.00	D-76.5-0.100	102.00
72.8-80.1	0.150	H	64	D-76.5-0.150A	125.00	D-76.5-0.150	122.00
80.1-88.2	0.050	F	64	D-84.2-0.050A	97.00	D-84.2-0.050	95.00
80.1-88.2	0.100	G	64	D-84.2-0.100A	105.00	D-84.2-0.100	102.00
80.1-88.2	0.150	H	64	D-84.2-0.150A	125.00	D-84.2-0.150	122.00
88.2-97.1	0.050	F	64	D-92.6-0.050A	97.00	D-92.6-0.050	95.00
88.2-97.1	0.100	G	64	D-92.6-0.100A	105.00	D-92.6-0.100	102.00
88.2-97.1	0.150	H	64	D-92.6-0.150A	125.00	D-92.6-0.150	122.00
97.1-106.8	0.025	F	64	D-102-0.025A	97.00	D-102-0.025	95.00
97.1-106.8	0.050	G	64	D-102-0.050A	105.00	D-102-0.050	102.00
97.1-106.8	0.100	H	64	D-102-0.100A	125.00	D-102-0.100	122.00
106.8-117.2	0.025	F	64	D-112-0.025A	97.00	D-112-0.025	95.00
106.8-117.2	0.050	G	64	D-112-0.050A	105.00	D-112-0.050	102.00
106.8-117.2	0.100	H	64	D-112-0.100A	125.00	D-112-0.100	122.00
117.2-128.7	0.025	F	64	D-123-0.025A	97.00	D-123-0.025	95.00
117.2-128.7	0.050	G	64	D-123-0.050A	105.00	D-123-0.050	102.00
117.2-128.7	0.100	H	64	D-123-0.100A	125.00	D-123-0.100	122.00
128.7-141.6	0.050	G	64	D-135-0.050A	115.00	D-135-0.050	112.00
128.7-141.6	0.100	H	64	D-135-0.100A	146.00	D-135-0.100	137.00
141.6-156.1	0.050	G	64	D-149-0.050A	115.00	D-149-0.050	112.00
141.6-156.1	0.075	H	64	D-149-0.075A	146.00	D-149-0.075	137.00
156.1-172.1	0.050	G	64	D-164-0.050A	115.00	D-164-0.050	112.00
156.1-172.1	0.075	H	64	D-164-0.075A	146.00	D-164-0.075	137.00
172.1-189.6	0.025	G	64	D-181-0.025A	125.00	D-181-0.025	117.00
172.1-189.6	0.075	H	64	D-181-0.075A	150.00	D-181-0.075	142.00
189.6-208.0	0.025	G	64	D-199-0.025A	125.00	D-199-0.025	117.00
189.6-208.0	0.050	H	64	D-199-0.025A	150.00	D-199-0.050	142.00
208.0-228.5	0.025	G	64	D-218-0.025A	130.00	D-218-0.025	122.00
208.0-228.5	0.050	H	64	D-218-0.050A	155.00	D-199-0.050	142.00
228.5-252	0.025	G	64	D-240-0.025A	130.00	D-240-0.025	122.00
228.5-252	0.050	H	64	D-240-0.050A	155.00	D-240-0.050	147.00

DYNAGE inc.

1331 BLUE HILLS AVENUE, BLOOMFIELD, CONN. 06002
TEL: (203) 243-0315 TWX: 710-425-6063

DC VOLTAGE REFERENCES

AC OR DC INPUT

201 SERIES, DC INPUT, NO COMMON TERMINALS, dimensions in Figure 1

Model No.	Input Volts	VA	Output DC Volts ±5%	Load Ohms Constant	†Short Term Thermal Stability %/°C	†Short Term Voltage Regulation %/2 min.	†Long Term Voltage Regulation %/hr.	Temp. Range °C	Price
201	28	.8	6.2	6200	±.001	±.0015	±.005	10 to 50	$47.00
201A	28	.8	6.2	6200	±.0005	±.0015	±.0035	10 to 50	52.00
201B	28	.8	6.2	6200	±.001	±.0015	±.005	−25 to 75	52.00
201C	28	.8	6.2	6200	±.0002	±.0015	±.0026	20 to 30	52.00

210 SERIES, DC INPUT, POSITIVE TERMINALS COMMON, dimensions in Figure 2

211	30	.8	6.2	6200	±.001	±.0005	±.004	10 to 50	$55.00
211A	30	.8	6.2	6200	±.0005	±.0005	±.0025	10 to 50	61.00
211B	30	.8	6.2	6200	±.001	±.0005	±.004	−25 to 75	61.00
211C	30	.8	6.2	6200	±.0002	±.0005	±.0016	20 to 30	61.00
212	38	1.0	12.4	11700	±.001	±.0005	±.004	10 to 50	60.00
212A	38	1.0	12.4	11700	±.0005	±.0005	±.0025	10 to 50	66.00
212B	38	1.0	12.4	11700	±.001	±.0005	±.004	−25 to 75	66.00
212C	38	1.0	12.4	11700	±.0002	±.0005	±.0016	20 to 30	66.00
213	46	1.3	18.6	17900	±.001	±.0005	±.004	10 to 50	65.00
213A	46	1.3	18.6	17900	±.0005	±.0005	±.0025	10 to 50	72.00
213B	46	1.3	18.6	17900	±.001	±.0005	±.004	−25 to 75	72.00
213C	46	1.3	18.6	17900	±.0002	±.0005	±.0016	20 to 30	72.00

230 SERIES, DC INPUT, POSITIVE TERMINALS COMMON, dimensions in Figure 2

231	38	1.5	6.2	620	±.001	±.0005	±.004	10 to 50	$55.00
231A	38	1.5	6.2	620	±.0005	±.0005	±.0025	10 to 50	61.00
231B	38	1.5	6.2	620	±.001	±.0005	±.004	−25 to 75	61.00
231C	38	1.5	6.2	620	±.0002	±.0005	±.0016	20 to 30	61.00
232	46	1.8	12.4	1170	±.001	±.0005	±.004	10 to 50	60.00
232A	46	1.8	12.4	1170	±.0005	±.0005	±.0025	10 to 50	66.00
232B	46	1.8	12.4	1170	±.001	±.0005	±.004	−25 to 75	66.00
232C	46	1.8	12.4	1170	±.0002	±.0005	±.0016	20 to 30	66.00

202 SERIES, AC INPUT, 50-400 CPS, OUTPUT ISOLATED,* RIPPLE 0.023% (rms), dimensions in Figure 3

Model No.	Input Volts	VA	Output DC Volts ±5%	Load Ohms Constant	†Short Term Thermal Stability %/°C	†Short Term Voltage Regulation %/2 min.	†Long Term Voltage Regulation %/hr.	Temp. Range °C	Price
202	117	3.5	6.2	6200	±.001	±.0015	±.005	10 to 50	$71.00
202A	117	3.5	6.2	6200	±.0005	±.0015	±.0035	10 to 50	78.00
202B	117	3.5	6.2	6200	±.001	±.0015	±.005	−25 to 75	78.00
202C	117	3.5	6.2	6200	±.0002	±.0015	±.0026	20 to 30	78.00

220 SERIES, AC INPUT, 50-400 CPS, OUTPUT ISOLATED,* RIPPLE 0.003% (rms), dimensions in Figure 3

221	117	3.5	6.2	6200	±.001	±.0005	±.004	10 to 50	$79.00
221A	117	3.5	6.2	6200	±.0005	±.0005	±.0025	10 to 50	87.00
221B	117	3.5	6.2	6200	±.001	±.0005	±.004	−25 to 75	87.00
221C	117	3.5	6.2	6200	±.0002	±.0005	±.0016	20 to 30	87.00
222	117	3.5	12.4	11700	±.001	±.0005	±.004	10 to 50	84.00
222A	117	3.5	12.4	11700	±.0005	±.0005	±.0025	10 to 50	93.00
222B	117	3.5	12.4	11700	±.001	±.0005	±.004	−25 to 75	93.00
222C	117	3.5	12.4	11700	±.0002	±.0005	±.0016	20 to 30	93.00
223	117	3.5	18.6	17900	±.001	±.0005	±.004	10 to 50	89.00
223A	117	3.5	18.6	17900	±.0005	±.0005	±.0015	10 to 50	98.00
223B	117	3.5	18.6	17900	±.001	±.0005	±.004	−25 to 75	98.00
223C	117	3.5	18.6	17900	±.0002	±.0005	±.0016	20 to 30	98.00

240 SERIES, AC INPUT, 50-400 CPS, OUTPUT ISOLATED,* RIPPLE 0.002% (rms), dimensions in Figure 3

241	117	4.4	6.2	620	±.001	±.0005	±.004	10 to 50	$79.00
241A	117	4.4	6.2	620	±.0005	±.0005	±.0025	10 to 50	87.00
241B	117	4.4	6.2	620	±.001	±.0005	±.004	−25 to 75	87.00
241C	117	4.4	6.2	620	±.0002	±.0005	±.0016	20 to 30	87.00
242	117	4.4	12.4	1170	±.001	±.0005	±.004	10 to 50	84.00
242A	117	4.4	12.4	1170	±.0005	±.0005	±.0025	10 to 50	93.00
242B	117	4.4	12.4	1170	±.001	±.0005	±.004	−25 to 75	93.00
242C	117	4.4	12.4	1170	±.0002	±.0005	±.0016	20 to 30	93.00

* Output Isolation: 0.5 μa (rms) ac leakage current through one (1) megohm resistor connected from either output to ground.
† Voltage Regulation: For a ±10% input change.

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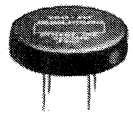
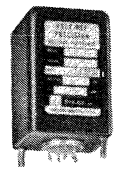


210, 230 SERIES DC INPUT

201 SERIES DC INPUT



202, 220, 240 SERIES AC INPUT

FEATURING

- Reference voltages of 6.2, 12.4, 18.6 vdc
- ±50 ppm or better, long term stability (See optional features)
- Voltage Regulation (short term) against line changes ±5 ppm for ±10% input changes (except 201 & 202 series)
- Models available for either AC or DC inputs
- Temperature coefficient to 1 ppm/C (See optional features)

OPTIONAL FEATURES

Improved Temperature Coefficient, Suffixes "T", "TT", & "TTT"

Suffix	Temperature Coefficient	(A and C models only) Range, °C	Added Cost
T	±0.0003%/°C	10 to 50	+30%
TT	±0.0002%/°C	10 to 50	+60%
TTT	±0.0001%/°C	20 to 30	+60%

Improved Long Term Stability, Suffixes "S", "SS" & "SSS"

Suffix	Long Term Stability	Added Cost
None	±50ppm/1 year	None
S	±30ppm/1000 hrs.	+10%
SS	±20ppm/1000 hrs.	+30%
SSS	±10ppm/1000 hrs.	+60%

Common Negative Terminals, Suffix CN

The 210 and 230 Series can be furnished with common negative input and output terminals. **Added Cost $3.00.**

LOAD TOLERANCE

Load value may be changed up to ±1% on 10 ma units, ±5% on 1 ma units. Good quality wire wound resistors should be used. Change in load resistance also causes change in output voltage.

OUTLINES

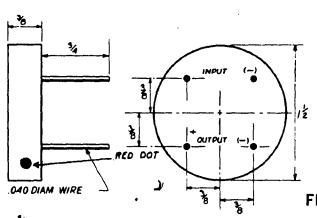


FIG. 1

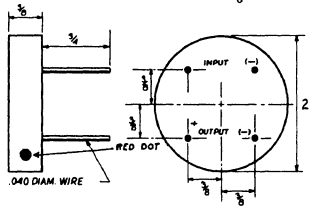


FIG. 2

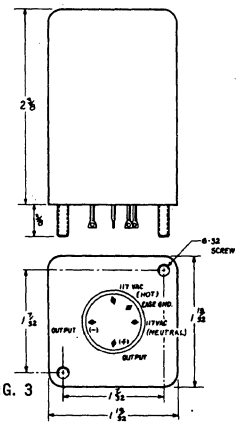


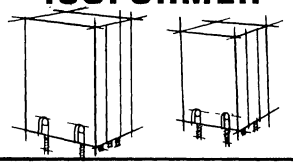
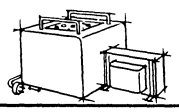
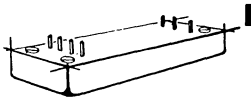
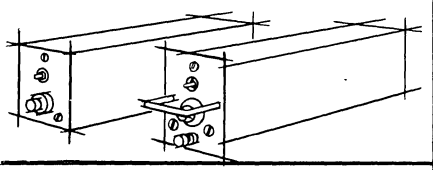
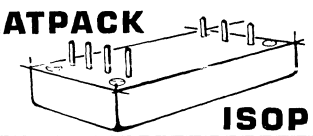
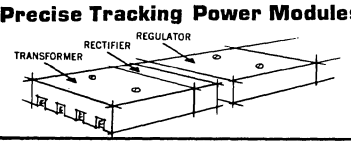
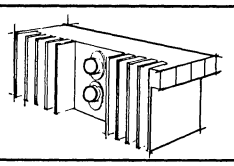
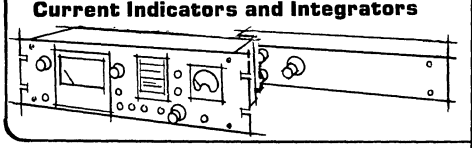
FIG. 3

CONSTRUCTION

Series 201, 210 and 230 are encapsulated in cups with silicone rubber. Series 202, 220 and 240 are potted in silicone rubber in MIL-T-27 transformer cases.

Elcor ISOLATION*...LOW NOISE

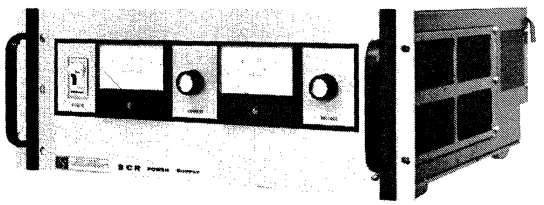
DC POWER AND TRANSFORMER MODULES

PRODUCT	FEATURES	USES
ISOLATION TRANSFORMERS		
ISOFORMER® 	■ High degree of direct capacitive and conductive isolation. ■ Efficient transfer of energy. ■ Low leakage current. ■ Low primary to secondary capacitance. ■ Line isolation to secondary <.001 pF. ■ Leakage resistance—$10^{12}\Omega$. ■ 6.3 to 600 volt output for 4 and 25 watt models. ■ Unique air-gap construction eliminates primary-to-secondary shorts.	■ Low-noise power supplies. ■ Bridge circuits. ■ Medical instrumentation. ■ Systems ground loop elimination. ■ Electrometer circuits, tube filament supplies.
POWER Isolation Transformers 	■ Eliminate unwanted noise in ground circuits. ■ Provide low leakage currents. ■ Isolate measurement circuits from common-mode noise. ■ Available up to 6 KVA.	■ Hospital safety programs. ■ Low noise applications. ■ Instrument isolation.
FLATPACK Isolation Transformers 	■ Small—1.25 in. x 2.5 in. x 3.5 in. ■ Low leakage current. ■ Interwinding capacitance <.05 pfd. ■ PC board pins—cables optional. ■ Dual output—5 to 60 volts—combined for 10 to 120 volts. ■ 7.5 VA Series available.	■ Medical instrumentation. ■ Compact low-noise power supplies. ■ Bridge circuit supplies.
DC POWER MODULES		
ISOPLY® Power Modules 	■ Highly isolated dc supplies. ■ Input to output coupling <.05 pfd. ■ From 1 to 300 vdc, 2 to 800 ma output. ■ Ripple less than 0.005%. ■ Regulation to 0.02%. ■ Low temperature coefficient. ■ Remote sensing. ■ Plug-in, chassis, or rack mounted. ■ 1.5 and 8 watt Series available.	■ Battery substitutes. ■ Precision measurement circuits. ■ Bridge circuits. ■ Low-level measurements. ■ Ungrounded amplifiers. ■ Hall effect power isolation. ■ Ground loop decoupling. ■ Voltage references.
FLATPACK ISOPLY 	■ Small—1.25 in. x 2.5 in. x 6.25 in. ■ Floating—isolated output. ■ Low leakage. ■ Input (ac) to output (dc) coupling <0.1 pfd. ■ Single dc output @ 4.5 and 24 watts. ■ Encapsulated in steel can. ■ PC board pin connections.	■ Medical instrumentation. ■ Small low-noise power supplies. ■ Low level dc circuits.
DUAL ISOPLY® Precise Tracking Power Modules 	■ ±15 vdc; 150 ma output. ■ Isolated power for op-amps. ■ —15 V output tracks +15 V output. ■ Separate transformer, rectifier, and regulator modules. ■ 1.25 in. x 2.5 in. x 7 in.	■ Op-amp supply. ■ Low noise circuits. ■ Compact power for PC board mounting.
SPECIAL POWER SUPPLIES 	■ Designed and produced to your specifications. ■ Isolated, floating or grounded. ■ Multiple or single outputs. ■ From 1 to 100 watts. ■ Convection, conduction or forced air cooling. ■ Fast response for prototypes.	■ OEM power supplies. ■ System or instrument power. ■ Laboratory or field environment supplies.
INSTRUMENTS		
Current Indicators and Integrators 	■ Integrates any proportional current or voltage. ■ Sensitive and accurate current meter (to 3×10^{-10} amp sensitivity.) ■ Internal calibration. ■ Developed for use with high voltage particle accelerators. ■ Pulsed current filter also available.	■ Precision measurement. ■ Integration of proportional current or voltage, such as radiation, temperature, etc. ■ Automatic process control.

*Power modules with output circuitry highly isolated conductively and capacitively from ground (case) and ac input. Battery equivalent with variable voltage.

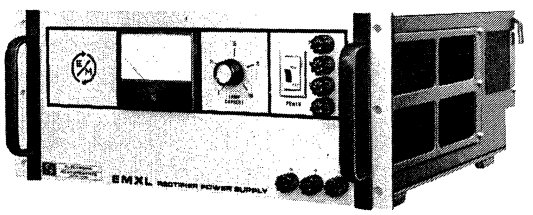
Elcor 2431 Linden Lane, P.O. Box 986, Silver Spring, Maryland 20910/(301) 589-6614
Products by Welex Electronics, A Halliburton Company

The SCR Power Supplies are high efficiency, high power units designed for a wide range of applications where both precise constant current and constant voltage operation are required. Competitive comparison shows E/M power supplies have lowest voltage ripple, more watts per cubic inch and per pound.

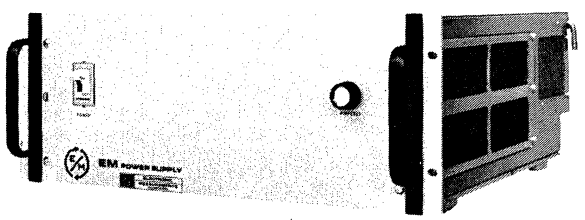


The EMX Power Supplies are specifically designed as constant current sources for Xenon and other high pressure lamps. The EMX series provides stable light output and features automatic starting, igniter pulse timing control, output current adjustment and provisions for certain remote functions. Low lamp current ripple insures maximum life.

EMX 1600	$ 795	— 1600W Lamp
2500	895	— 2500W Lamp
6000	1,150	— 6000W Lamp



The EM Power Supplies have the same advantages and the same applications where the precise regulation of the SCR Power Supply is not required. The EM Power Supplies are a low-cost 1% regulated voltage and current DC source in the medium power ranges up to 10 kw.



		Price				Price				Price	
Rating	Height*	EM	SCR	Rating	Height*	EM	SCR	Rating	Height*	EM	SCR
10V-250A	7	$1,100	$1,300	40V-125A	8¾	$1,150	$1,375	160V-15A	7	$ 850	$ 995
10V-500A	8¾	1,350	1,700	40V-250A	12¼	1,975	2,500	160V-30A	8¾	1,150	1,500
20V-125A	7	1,000	1,150	50V-200A	12¼	1,975	2,500	160V-60A	12¼	1,975	2,500
20V-250A	8¾	1,250	1,500	80V-30A	7	850	995	250V-10A	7	850	995
20V-500A	12¼	1,975	2,500	80V-60A	8¾	1,150	1,500	250V-20A	8¾	1,200	1,500
30V-100A	7	950	1,050	100V-100A	12¼	1,975	2,500	250V-40A	12¼	1,975	2,500
30V-200A	8¾	1,250	1,500	120V-20A	7	850	995	500V-5A	7	1,100	1,300
40V-60A	7	850	1,010	120V-40A	8¾	1,150	1,500	500V-10A	8¾	1,350	1,700

*19" Rack mounted, 20" depth. Voltage and current adjustable over wide range.

GUARANTEED FOR FIVE YEARS

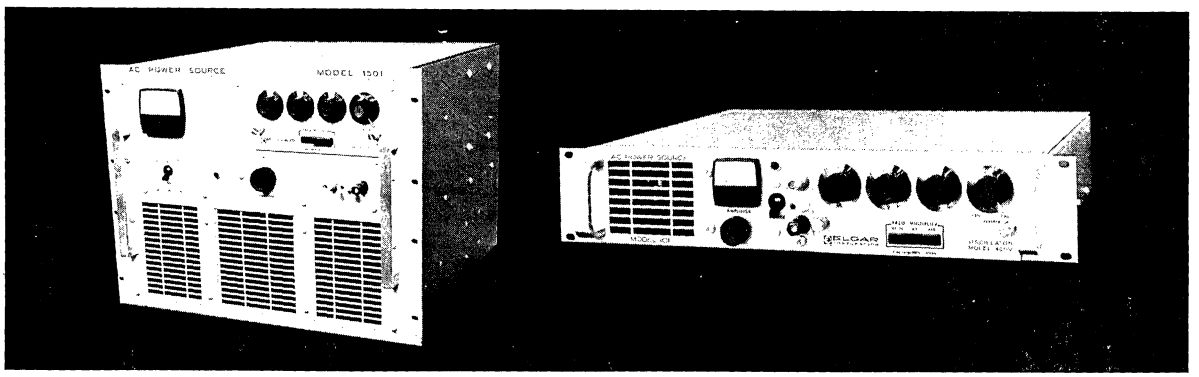
CALL TOLL FREE 800-631-4298. Write for your copy of our 1971 Power Supply Catalog with complete specifications, accessories, options/modifications and prices for all models.

ELECTRONIC MEASUREMENTS INC.
405 Essex Road, Neptune, New Jersey 07753

WHEN THINKING PRECISE kw POWER SUPPLIES . . . IT'S E/M

ELGAR CORPORATION
8159 ENGINEER ROAD SAN DIEGO, CALIFORNIA 92111 TEL. (714) 279-0800

Precision Solid-State AC Power Sources



FEATURES

- ALL SOLID STATE CIRCUITRY
- MULTIPLE OUTPUT VOLTAGES 0-32, 130, 260
- SHORT CIRCUIT PROTECTION
- MID BAND DISTORTION - .5%
- REGULATED OUTPUT VOLTAGE ±1%
- LOW NOISE –60DB RATED OUTPUT

ELECTRICAL AND MECHANICAL SPECIFICATIONS
MAIN FRAME AMPLIFIERS

MODEL	OUTPUT			INPUT			DIMENSIONS				
	POWER VA	PHASE	FREQ HZ	VOLTAGE VAC	FREQ HZ	PHASE	H IN	W IN	D IN	WGT LBS	PRICE $
101	100	1	45-10000	105-125/210-250	47-63	1	3½	19	15	45	525
201	200	1	45-5000	105-125/210-250	47-63	1	5¼	19	15	60	590
501	500	1	45-5000	105-125/210-250	47-63	1	7	19	19	105	1380
751	750	1	45-5000	105-125/210-250	47-63	1	7	19	19	115	1725
1001	1000	1	45-5000	105-125/210-250	47-63	1	12¼	19	20	210	2250
1501	1500	1	45-5000	190-230/210-250	47-63	1	14	19	20	230	3050
153	150	3	350-10000	105-125/210-250	47-63	3	5¼	19	14	75	1050
1503	1500	3	45-5000	190-230/210-250	47-63	3	14	19	20	230	3150

- Single phase amplifiers with appropriate oscillator may be combined to provide 1, 2 or 3 phase systems with higher power outputs
- Cabinets and/or units to operate from 375-425 Hz input power can be provided at slight increase in price

PLUG-IN OSCILLATOR MODULES

FIXED FREQUENCY

MODEL	FREQ HZ	ACCURACY %	PHASE	PRICE $
451-.1	50	±.1	1	175
452-.1	50	±.1	2	275
453-.1	50	±.1	3	275
451-.01	50	±.01	1	300
452-.01	50	±.01	2	405
453-.01	50	±.01	3	405
461-.1	60	±.1	1	175
462-.1	60	±.1	2	275
463-.1	60	±.1	3	275
461-.01	60	±.01	1	300
462-.01	60	±.01	2	405
463-.01	60	±.01	3	405
441-.1	400	±.1	1	175
442-.1	400	±.1	2	275
443-.1	400	±.1	3	275
441-.01	400	±.01	1	300
442-.01	400	±.01	2	405
443-.01	400	±.01	3	405

VARIABLE FREQUENCY

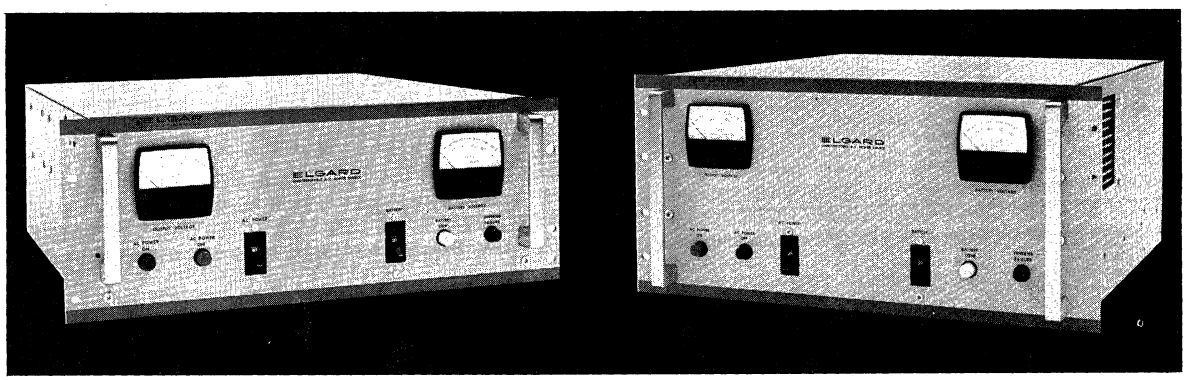
MODEL	FREQ HZ	ACCURACY %	PHASE	PRICE $
401-V	45-10000	±.1	1	300
402-V	45-10000	±.1	2	450
403-V	45-10000	±.1	3	450
461-V	45-70	±.5	1	300
463-V	45-70	±.5	3	450
431-V	300-500	±.5	1	300
441-V	350-450	±.25	1	300
433-V	300-500	±.5	3	450
443-V	350-450	±.25	3	450
4641-V	45-70 350-450	±.5	1	550
4543-V	45-70 350-450	±.5	3	650
400-A	External Oscillator Adapter			50
400-B	Blank OSC Module (3 Phase Systems)			25
400-C	Blank OSC Module			25

- Oscillator modules with .01% amplitude stability and greater frequency stability can be provided — consult factory
- Decoder programmer oscillators which permit remote BCD programming of amplitude, frequency and phase are available for use in automatic test systems — consult factory

ELGAR® CORPORATION

8159 ENGINEER ROAD SAN DIEGO, CALIFORNIA 92111 TEL. (714) 279-0800

"ELGARD" Uninterruptible Power Sources



FEATURES

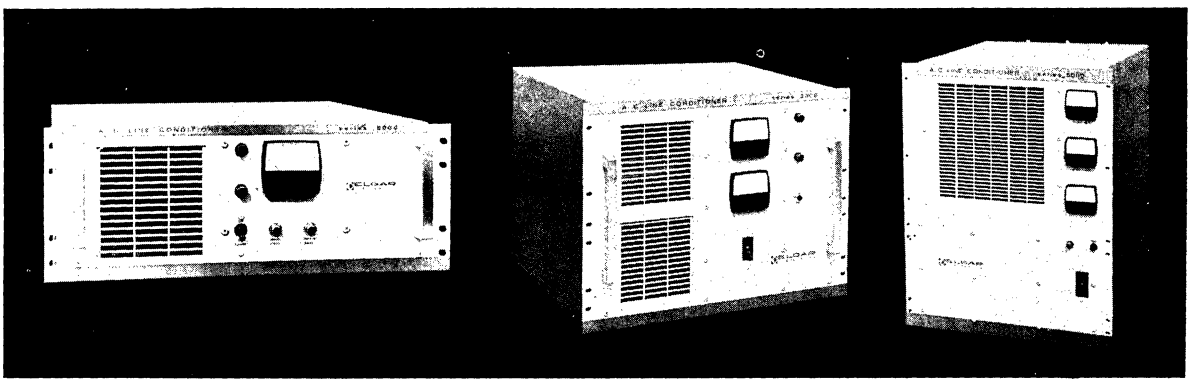
- NO-BREAK AC POWER OUTPUT
- COMPLETELY SELF-CONTAINED
- MAINTENANCE-FREE SEALED BATTERIES
- LOW OUTPUT DISTORTION
- REGULATED OUTPUT VOLTAGE
- ELECTRONIC OVERLOAD PROTECTION
- AUTOMATIC BATTERY RECHARGE
- REMOTE ALARM SIGNALS

ELECTRICAL AND MECHANICAL SPECIFICATIONS

	UPS - 501	UPS - 1001	UPS - 2501
STANDARD AC INPUT			
VOLTAGE (Vac)	105-130	105-130	105-130
CURRENT (Amp)	12 max	20 max	50 max
FREQUENCY (Hz)	59-61	59-61	59-61
PHASE	Single	Single	Single
STANDARD INTERNAL BATTERY			
NOMINAL VOLTAGE (VDC)	84	84	84
RECHARGE	Automatic	Automatic	Automatic
RECHARGE TIME -50%	3 hrs	3 hrs	3 hrs
-100%	10 - 12 hrs	10 - 12 hrs	10 - 12 hrs
STANDARD AC OUTPUT			
POWER (KVa)	0 - .5	0-1.0	0 - 2.5
VOLTAGE (Vac)	110-120	110-120	110-120
REGULATION	±2%	±2%	±2%
HARMONIC DIST (max)	5%	5%	5%
PHASE	Single	Single	Single
LOAD POWER FACTOR	±.7	±.7	±.7
BACK-UP TIME (min)	15	15	15
FREQUENCY ACCURACY	60HZ± .25%	60HZ± .25%	60HZ± .25%
REMOTE ALARM INDICATION			
TYPE OF ALARM SIGNALS	Contact closures	Contact closures	Contact closures
INPUT AC POWER FAILURE	Yes	Yes	Yes
BATTERY LOW	Yes	Yes	Yes
LOSS OF INVERTER OUTPUT	Yes	Yes	Yes
MECHANICAL CONFIGURATION			
HEIGHT (in.)	7	12¼	32
WIDTH (in.)	19	19	19
DEPTH (in.)	19	19	24
NET WEIGHT (lbs.)	130	210	600
PRICE	$1500	$2175	$5150

ELGAR CORPORATION
8159 ENGINEER ROAD SAN DIEGO, CALIFORNIA 92111 TEL. (714) 279-0800

AC Line Conditioners



FEATURES

- ELIMINATES TRANSIENTS
- 50 μSEC RESPONSE
- .2% HARMONIC DISTORTION
- PRECISE VOLTAGE REGULATION
- CREST FACTOR –2.5
- 100 DB ISOLATION

ELECTRICAL AND MECHANICAL SPECIFICATIONS

INPUT				OUTPUT			DIM.			WGT.	PRICE
MODEL	RANGES (VAC)	FREQ (Hz)	CURRENT (AMPS)	VOLTAGE (VAC)	POWER (KVA)	REGULATION %	H IN.	W IN.	D IN.	NET LBS	$
7006A	95-135	57-63	7.5	115	0.5	±.025	3½	19	14	50	925
6006A	95-135	57-63	15	115	1	±.025	7	19	17½	105	1500
6005A	95-135	47-53	15	115	1	±.025	7	19	17½	105	1500
6004A	95-135	380-420	15	115	1	±.10	7	19	17½	105	1650
6236A	190-270	57-63	7.5	230	1	±.025	7	19	17½	105	1650
6235A	190-270	47-53	7.5	230	1	±.025	7	19	17½	105	1650
3006A	95-135	57-63	37.5	115	2.5	±.05	14	19	19	175	3425
3005A	95-135	47-53	37.5	115	2.5	±.05	14	19	19	175	3425
3004A	95-135	380-420	37.5	115	2.5	±.2	14	19	19	175	3525
3236A	190-270	57-63	18.75	230	2.5	±.05	14	19	19	175	3650
3235A	190-270	47-63	18.75	230	2.5	±.05	14	19	19	175	3650
5006A	95-135	57-63	75	115	5	±.05	24½	19	20	400	6800
5005A	95-135	47-53	75	115	5	±.05	24½	19	20	400	6800
5236A	190-270	57-63	37.5	230	5	±.05	24½	19	20	400	7025
5235A	190-270	47-53	37.5	230	5	±.05	24½	19	20	400	7025

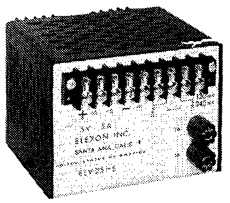
NOTE 1: Selected by Tap Switch.

NOTE 2: 230 VAC input with 115 VAC output is available on request.

ELEXON INC. MODULAR POWER SUPPLIES

MODEL ELV-25

COMPUTER GRADE OEM

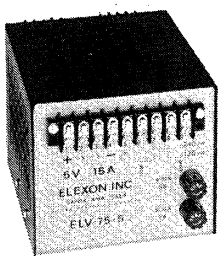


Fold Back Current Limiting
Mechanical Size
4 x 5½ x 6½

$66.00

MODEL ELV-75

COMPUTER GRADE OEM

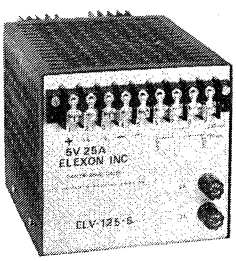


Fold Back Current Limiting
Mechanical Size 5⅛ x 5¾ x 8

$90.00

MODEL ELV-125

COMPUTER GRADE OEM

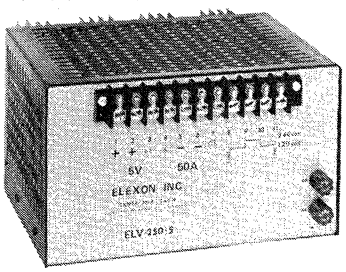


Fold Back Current Limiting
Mechanical Size
6 x 6½ x 11

$148.00

MODEL ELV-250

COMPUTER GRADE OEM



Fold Back Current Limiting
Mechanical Size
6 x 10½ x 11

$190.00

ALL MODELS HAVE INPUT VOLTAGES OF 120 VAC OR 240 VAC, ±10% 47-420Hz

.1% Line Regulation
.1% Load Regulation
.1% Ripple and Noise
Over Voltage Protection**
Remote Sensing Capabilities
Electrostatically Shielded Transformer
Operating Temperature 0°C to 55°C

Now there are sixty models available *with the following output specifications:

ELV-25

Model Number	Output Volts	Current Rating Amps
Model ELV-25-3	3	5
Model ELV-25-4	4	5
Model ELV-25-5	*5	5
Model ELV-25-6	6	4.2
Model ELV-25-8	8	3.2
Model ELV-25-9	9	2.8
Model ELV-25-10	10	2.6
Model ELV-25-12	*12	3
Model ELV-25-14	14	2.6
Model ELV-25-15	15	2.4
Model ELV-25-16	16	2.2
Model ELV-25-18	*18	2
Model ELV-25-20	20	1.8
Model ELV-25-22	22	1.6
Model ELV-25-24	*24	1.5

ELV-75

Model Number	Output Volts	Current Rating Amps
Model ELV-75-3	3	15
Model ELV-75-4	4	15
Model ELV-75-5	*5	15
Model ELV-75-6	6	12.6
Model ELV-75-8	8	9.6
Model ELV-75-9	9	8.4
Model ELV-75-10	10	7.8
Model ELV-75-12	*12	7
Model ELV-75-14	14	6.1
Model ELV-75-15	15	5.8
Model ELV-75-16	16	5.5
Model ELV-75-18	*18	5
Model ELV-75-20	20	4.6
Model ELV-75-22	22	4.3
Model ELV-75-24	*24	4

ELV-125

Model Number	Output Volts	Current Rating Amps
Model ELV-125-3	3	25
Model ELV-125-4	4	25
Model ELV-125-5*	*5	25
Model ELV-125-6	6	21
Model ELV-125-8	8	16
Model ELV-125-9	9	14
Model ELV-125-10	10	13
Model ELV-125-12*	*12	12
Model ELV-125-14	14	10.3
Model ELV-125-15	15	9.6
Model ELV-125-16	16	9
Model ELV-125-18	*18	8
Model ELV-125-20	20	7.2
Model ELV-125-22	22	6.5
Model ELV-125-24*	*24	6

ELV-250

Model Number	Output Volts	Current Rating Amps
Model ELV-250-3	3	50
Model ELV-250-4	4	50
Model ELV-250-5	*5	50
Model ELV-250-6	6	42
Model ELV-250-8	8	32
Model ELV-250-9	9	28
Model ELV-250-10	10	25
Model ELV-250-12	*12	20
Model ELV-250-14	14	18
Model ELV-250-15	15	17
Model ELV-250-16	16	16
Model ELV-250-18	*18	14
Model ELV-250-20	20	12.5
Model ELV-250-22	22	11.4
Model ELV-250-24	*24	10.4

*These models are F.O.B. your nearest Newark Distributor — off the shelf delivery! Other models direct from factory — 3 weeks delivery — OEM contracts available!

Quantities and Prices

Model	1-9	10-24	25-49	50-99
ELV-25	$66.00	$62.20	$58.40	$54.60

Quantities and Prices

Model	1-9	10-24	25-49	50-99
ELV-75	$90.00	$85.00	$80.00	$75.00

Quantities and Prices

Model	1-9	10-24	25-49	50-99
ELV-125	$148.00	$140.00	$132.00	$124.30

Quantities and Prices

Model	1-9	10-24	25-49	50-99
ELV-250	$190.00	$185.00	$180.00	$175.00

**Crowbar Optional — $10.00.

FOR FURTHER INFORMATION AND SPECIFICATIONS CONTACT OUR LOCAL REPRESENTATIVE IN YOUR AREA OR . . .

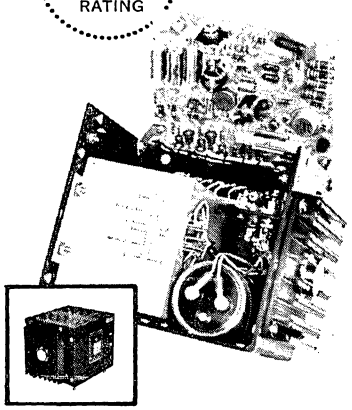
ELEXON INC.
1422 E. St. Gertrude • Santa Ana, California 92705
• (714) 540-9510

Transpac® Power Supplies

MIL SPEC SILICON, REPAIRABLE POWER MODULES

Fully Meets MIL-E-4158, MIL-E-5400, MIL-E-16400, MIL-E-5272, MIL-T-21200

75°C FREE AIR RATING



0 through 310 VDC, 50 MA through 8 Amps

Transpac **CERTIFIED*** *Militarized Line*

Input: 103.5-126.5 VAC (standard) or 108-132 VAC (specify) 50-440 cps
Ripple: Less than 800 μv RMS except 50 through 310 VDC where ripple is less than 0.005% RMS
Line Regulation: Less than ±0.01% or 5 mv, whichever is greater, for full input change
Load Regulation: Less than 0.05% or 8 mv for 0-100% load change
Transient Response: Less than 50 μsec for step line or load change
Maximum Case Temperature: 115°C
Free Air Operating Temperature: —55°C to +75°C (full tantalum type up to 1 ampere most models) —40°C to +75°C (semi-tantalum type above 1 ampere) full ratings, no external heat sinking
Temperature Coefficient: Less than 0.01% per degree C or 3 mv
Long Term Stability: Within 5 mv for 8 hours after 20 minute warm-up (line, load, temperature constant)
Interconnection: Series or parallel operation
Voltage Adjustment: External screwdriver voltage control
Remote Voltage Control: Provision for external control of output voltage
Remote Sensing: Remote sensing facilities provided
Short Circuit Protection: Automatic short circuit protection and automatic recovery
Output Connection: Ungrounded outputs, either positive or negative terminals may be grounded
Transistor Types: MIL-STD-701 and MIL-S-19500
Military Specs: MIL-E-4158, MIL-E-5400, MIL-E-16400, MIL-E-5272, MIL-T-21200 where applicable

*Certificate of Conformity by independent laboratory supplied on request.

OUTPUT VOLTAGE (DC)	CURRENT	SIZE W x D x H (INCHES)	MODEL	PRICE*
0-7 VDC	0-500 MA	3-5/16 x 4-3/16 x 5-1/2	MS07P5	$425.00
0-7 VDC	0-1 AMP	4 x 4-3/4 x 5-15/16	MS071	$435.00
0-7 VDC	0-2 AMP	5-3/4 x 7-3/16 x 5-1/4	MS072	$445.00
0-7 VDC	0-4 AMP	6 x 8-15/16 x 6-5/16	MS074	$550.00
0-7 VDC	0-8 AMP	6 x 10-5/16 x 6-5/16	MS078	$725.00
0-10 VDC	0-50 MA	3 x 3 x 3-1/4	MS01P05	$250.00
10-20 VDC	0-250 MA	3-1/4 x 3-1/4 x 4-31/32	MS10P3	$315.00
11-12 VDC	0-4 AMP	6 x 8-15/16 x 6-5/16	MS124	$550.00
11-12 VDC	0-8 AMP	6 x 10-5/16 x 6-5/16	MS128	$725.00
11-13 VDC	0-500 MA	3-5/16 x 4-3/16 x 5-1/2	MS12P5	$425.00
11-13 VDC	0-1 AMP	4 x 4-3/4 x 5-15/16	MS121	$435.00
11-13 VDC	0-2 AMP	5-3/4 x 7-3/16 x 5-1/4	MS122	$445.00
17-18 VDC	0-4 AMP	6 x 8-15/16 x 6-5/16	MS184	$550.00
17-18 VDC	0-8 AMP	6-15/16 x 10-5/8 x 6-5/16	MS188	$725.00
17-19 VDC	0-500 MA	3-5/16 x 4-3/16 x 5-1/2	MS18P5	$425.00
17-19 VDC	0-1 AMP	4 x 4-3/4 x 5-15/16	MS181	$435.00
17-19 VDC	0-2 AMP	5-3/4 x 7-3/16 x 5-1/4	MS182	$445.00
20-30 VDC	0-50 MA	3 x 3 x 3-1/4	MS20P05	$255.00
20-30 VDC	0-250 MA	3-1/4 x 3-1/4 x 4-31/32	MS20P3	$320.00
23-24 VDC	0-4 AMP	6 x 8-15/16 x 6-5/16	MS244	$550.00
23-24 VDC	0-8 AMP	6-15/16 x 10-5/8 x 6-5/16	MS248	$725.00
23-25 VDC	0-500 MA	3-5/16 x 4-3/16 x 5-1/2	MS24P5	$425.00
23-25 VDC	0-1 AMP	4 x 4-3/4 x 5-15/16	MS241	$435.00
23-25 VDC	0-2 AMP	5-3/4 x 7-3/16 x 5-1/4	MS242	$445.00
27-28 VDC	0-4 AMP	6 x 8-15/16 x 6-5/16	MS284	$550.00
27-28 VDC	0-8 AMP	6-15/16 x 10-5/8 x 6-5/16	MS288	$725.00

OUTPUT VOLTAGE (DC)	CURRENT	SIZE W x D x H (INCHES)	MODEL	PRICE*
27-29 VDC	0-500 MA	3-5/16 x 4-3/16 x 5-1/2	MS28P5	$425.00
27-29 VDC	0-1 AMP	4 x 4-3/4 x 5-15/16	MS281	$435.00
27-29 VDC	0-2 AMP	5-3/4 x 7-3/16 x 5-1/4	MS282	$445.00
30-40 VDC	0-250 MA	3-5/16 x 4-3/16 x 5-1/2	MS30P3	$320.00
31-32 VDC	0-4 AMP	6-15/16 x 9-1/4 x 6-5/16	MS324	$550.00
31-33 VDC	0-500 MA	3-5/16 x 4-3/16 x 5-1/2	MS32P5	$425.00
31-33 VDC	0-1 AMP	4 x 4-3/4 x 5-15/16	MS321	$435.00
40-50 VDC	0-50 MA	3-1/4 x 3-1/4 x 4-31/32	MS40P05	$275.00
40-50 VDC	0-250 MA	3-5/16 x 4-2/16 x 5-1/2	MS40P3	$325.00
44-45 VDC	0-4 AMP	6-15/16 x 9-1/4 x 6-5/16	MS454	$725.00
44-46 VDC	0-500 MA	4 x 4-3/4 x 5-15/16	MS45P5	$435.00
44-46 VDC	0-1 AMP	5-3/4 x 7-3/16 x 5-1/4	MS451	$445.00
44-46 VDC	0-2 AMP	6 x 8-15/16 x 6-5/16	MS452	$550.00
50-60 VDC	0-50 MA	3-1/4 x 3-1/4 x 4-31/32	MS50P05	$280.00
50-60 VDC	0-250 MA	3-5/16 x 4-3/16 x 5-1/2	MS50P3	$375.00
60-70 VDC	0-100 MA	3-1/4 x 3-1/4 x 4-31/32	MS60P1	$355.00
70-80 VDC	0-100 MA	3-1/4 x 3-1/4 x 4-31/32	MS70P1	$360.00
80-90 VDC	0-100 MA	3-1/4 x 3-1/4 x 4-31/32	MS80P1	$365.00
90-100 VDC	0-100 MA	3-1/4 x 3-1/4 x 4-31/32	MS90P1	$370.00
100-110 VDC	0-100 MA	3-1/4 x 3-1/4 x 4-31/32	MS100P1	$375.00
150-160 VDC	0-100 MA	5 x 5-3/4 x 6	MS150P1	$460.00
200-210 VDC	0-100 MA	5 x 5-3/4 x 6	MS200P1	$460.00
250-260 VDC	0-100 MA	5 x 5-3/4 x 6	MS250P1	$460.00
300-310 VDC	0-100 MA	5 x 5-3/4 x 6	MS300P1	$460.00

*Quantities 5-9 Write for discount schedule other quantities.

Other voltages and currents available in this series.

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67 Sand Park Road, Cedar Grove, N.J. 07009 • (201) 239-3000 TWX 710-994-5789
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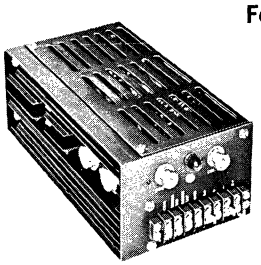
IC Logic Power Modules

For powering IC's, strain gauge, telemetry and computer circuitry



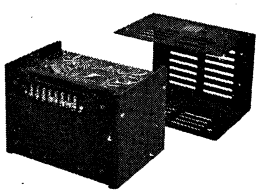
SPECIFICATIONS

Dual Input: 105-125 VAC and 210-250 VAC, 47-440 Hz
Line Regulation: 0.05% + 4 millivolts
Load Regulation: 0.03% + 3 millivolts, 0-100% load change
Ripple: < 800 microvolts RMS or 0.005%, whichever is greater
Temperature Coefficient: Less than .03% per °C
Operating Temperature: —25°C to +71°C, free air
Storage Temperature: —62°C to +85°C
Voltage Adjustment: ±5% or ± 1 volt, whichever is less local or remote
Current Limiting: Adjustable
Overvoltage Protection: Adjustable
Recovery Time: Less than 50 microseconds
Remote Sensing: Standard
Interconnection: Series or parallel operation
Finish: Black anodized, per Mil-A-8625

OUTPUT VOLTAGE VDC	CURRENT AMPS	SIZE W x D x H INCHES	MODEL	PRICE*
3.0	3.3	3-3/8 x 4-15/16 x 6-1/4	CP3-2P5	$135.00
3.0	6.5	3-3/8 x 4-15/16 x 8-15/16	CP3-5	$150.00
3.0	13.0	4-15/16 x 7-1/2 x 8-7/8	CP3-10	$220.00
3.0	22.0	4-15/16 x 7-1/2 x 10-7/8	CP3-17	$270.00
3.0	32.0	4-15/16 x 7-1/2 x 14-7/8	CP3-25	$365.00
3.6	3.3	3-3/8 x 4-15/16 x 6-1/4	CP3P6-2P5	$135.00
3.6	6.5	3-3/8 x 4-15/16 x 8-15/16	CP3P6-5	$150.00
3.6	13.0	4-15/16 x 7-1/2 x 8-7/8	CP3P6-10	$220.00
3.6	22.0	4-15/16 x 7-1/2 x 10-7/8	CP3P6-17	$270.00
3.6	32.0	4-15/16 x 7-1/2 x 14-7/8	CP3P6-25	$365.00
4.0	3.3	3-3/8 x 4-15/16 x 6-1/4	CP4-2P5	$135.00
4.0	6.5	3-3/8 x 4-15/16 x 8-15/16	CP4-5	$150.00
4.0	13.0	4-15/16 x 7-1/2 x 8-7/8	CP4-10	$220.00
4.0	22.0	4-15/16 x 7-1/2 x 10-7/8	CP4-17	$270.00
4.0	32.0	4-15/16 x 7-1/2 x 14-7/8	CP4-25	$365.00
4.5	3.3	3-3/8 x 4-15/16 x 6-1/4	CP4P5-2P5	$135.00
4.5	6.5	3-3/8 x 4-15/16 x 8-15/16	CP4P5-5	$150.00
4.5	13.0	4-15/16 x 7-1/2 x 8-7/8	CP4P5-10	$220.00
4.5	22.0	4-15/16 x 7-1/2 x 10-7/8	CP4P5-17	$270.00
4.5	32.0	4-15/16 x 7-1/2 x 14-7/8	CP4P5-25	$365.00
5	3.3	3-3/8 x 4-15/16 x 6-1/4	CP5-2P5	$135.00
5	6.5	3-3/8 x 4-15/16 x 8-15/16	CP5-5	$150.00
5	13.0	4-15/16 x 7-1/2 x 8-7/8	CP5-10	$220.00
5	22.0	4-15/16 x 7-1/2 x 10-7/8	CP5-17	$270.00
5	32.0	4-15/16 x 7-1/2 x 14-7/8	CP5-25	$365.00
6	3.2	3-3/8 x 4-15/16 x 6-1/4	CP6-2P4	$135.00
6	6.5	3-3/8 x 4-15/16 x 8-15/16	CP6-4P8	$150.00
6	12.8	4-15/16 x 7-1/2 x 8-7/8	CP6-9P6	$220.00
6	21.7	4-15/16 x 7-1/2 x 10-7/8	CP6-16P3	$270.00
6	31.0	4-15/16 x 7-1/2 x 14-7/8	CP6-24	$365.00
8	3.0	3-3/8 x 4-15/16 x 6-1/4	CP8-2P3	$135.00
8	6.0	3-3/8 x 4-15/16 x 8-15/16	CP8-4P6	$150.00
8	12.0	4-15/16 x 7-1/2 x 8-7/8	CP8-9P2	$220.00
8	20.4	4-15/16 x 7-1/2 x 10-7/8	CP8-15P6	$270.00
8	30.0	4-15/16 x 7-1/2 x 14-7/8	CP8-23	$365.00

OUTPUT VOLTAGE VDC	CURRENT AMPS	SIZE W x D x H INCHES	MODEL	PRICE*
10	2.8	3-3/8 x 4-15/16 x 6-1/4	CP10-2P1	$135.00
10	5.8	3-3/8 x 4-15/16 x 8-15/16	CP10-4P2	$150.00
10	11.6	4-15/16 x 7-1/2 x 8-7/8	CP10-8P4	$220.00
10	19.7	4-15/16 x 7-1/2 x 10-7/8	CP10-14P3	$270.00
10	28.0	4-15/16 x 7-1/2 x 14-7/8	CP10-21	$365.00
12	2.6	3-3/8 x 4-15/16 x 6-1/4	CP12-1P9	$135.00
12	5.2	3-3/8 x 4-15/16 x 8-15/16	CP12-3P8	$150.00
12	10.4	4-15/16 x 7-1/2 x 8-7/8	CP12-7P6	$220.00
12	17.7	4-15/16 x 7-1/2 x 10-7/8	CP12-12P9	$270.00
12	26.0	4-15/16 x 7-1/2 x 14-7/8	CP12-19	$365.00
15	2.3	3-3/8 x 4-15/16 x 6-1/4	CP15-1P7	$135.00
15	4.6	3-3/8 x 4-15/16 x 8-15/16	CP15-3P4	$150.00
15	9.2	4-15/16 x 7-1/2 x 8-7/8	CP15-6P8	$220.00
15	15.6	4-15/16 x 7-1/2 x 10-7/8	CP15-11P6	$270.00
15	23.0	4-15/16 x 7-1/2 x 14-7/8	CP15-17	$365.00
18	2.0	3-3/8 x 4-15/16 x 6-1/4	CP18-1P6	$135.00
18	4.0	3-3/8 x 4-15/16 x 8-15/16	CP18-3P2	$150.00
18	8.0	4-15/16 x 7-1/2 x 8-7/8	CP18-6P4	$220.00
18	13.6	4-15/16 x 7-1/2 x 10-7/8	CP18-10P9	$270.00
18	20.0	4-15/16 x 7-1/2 x 14-7/8	CP18-16	$365.00
20	1.8	3-3/8 x 4-15/16 x 6-1/4	CP20-1P5	$135.00
20	3.6	3-3/8 x 4-15/16 x 8-15/16	CP20-3	$150.00
20	7.2	4-15/16 x 7-1/2 x 8-7/8	CP20-6	$220.00
20	12.2	4-15/16 x 7-1/2 x 10-7/8	CP20-10P2	$270.00
20	18.0	4-15/16 x 7-1/2 x 14-7/8	CP20-15	$365.00
24	1.6	3-3/8 x 4-15/16 x 6-1/4	CP24-1P3	$135.00
24	3.2	3-3/8 x 4-15/16 x 8-15/16	CP24-2P6	$150.00
24	6.4	4-15/16 x 7-1/2 x 8-7/8	CP24-5P2	$220.00
24	10.9	4-15/16 x 7-1/2 x 10-7/8	CP24-8P8	$270.00
24	16.0	4-15/16 x 7-1/2 x 14-7/8	CP24-12	$365.00
28	1.4	3-3/8 x 4-15/16 x 6-1/4	CP28-1P2	$135.00
28	2.8	3-3/8 x 4-15/16 x 8-15/16	CP28-2P4	$150.00
28	5.6	4-15/16 x 7-1/2 x 8-7/8	CP28-4P8	$220.00
28	9.5	4-15/16 x 7-1/2 x 10-7/8	CP28-8P2	$270.00
28	14.0	4-15/16 x 7-1/2 x 14-7/8	CP28-2	$365.00

***Quantities 5-9. Write for quotations other quantities.**



71°C FREE AIR RATING

WIDE RANGE LOW COST DC POWER MODULE

4 through 60 VDC, 1 Amp through 12.5 Amps

Input: 105-125 VAC, 50-400 cps
DC Output: 4-32 VDC or 30-60 (see table)
Regulator Type: Solid-state, all silicon semi-conductors
Ripple: Less than 800 microvolts RMS or .005%, whichever is greater
Line Regulation: Better than ±0.01% or 5 mv for full input change
Load Regulation: Better than 0.05% or 8 mv for 0-100% load change
Transient Response: Less than 50 microseconds
Operating Temperature: —20°C to +71°C free air, full ratings
Temperature Coefficient: Less than 0.01% per degrees C or 3 millivolts
Long-Term Stability: Within 8 millivolts (8 hours reference)

Features of all ERA Wide Range Modules

- Low and high current models
- Single model serves all voltage requirements
- All silicon
- Compact, fully repairable
- Automatic over-current protection
- Minimal temperature coefficient
- Wide-input range
- Series or parallel operation
- Ungrounded outputs
- Short circuit and transient protected

Output Voltage (DC)	Current Rating Table (Amps) 35°C	55°C	71°C	Size WxDxH (Inches)	Weight (lbs.)	Model	Price*
4-32	1	1	0.75	4 x 4 x 6-1/2	6.2	LC32P7	$120.00
4-32	2.5	2.5	2	5 x 5 x 7	8.5	LC322	$155.00
4-32	6.5	6	5	6-3/4 x 8-1/2 x 7-1/4	16.8	LC325	$235.00
4-32	12.5	11	10	8-3/4 x 9-1/2 x 7-1/2	29.0	LC3210	$259.00
30-60	1.25	1.25	1	5 x 5 x 7	8.5	LC601	$165.00

Over-Voltage Protector Option: Add $37.00 to above prices and Suffix V to Model No. (i.e. LC325V, etc.)
***Quantities 5-9. Write for discount schedule other quantities**

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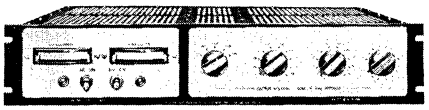


MODEL HVA 515 - $515.00

Silicon/Hybrid Wide Range High-Voltage Supply

0-5,000 VDC @ 0-15 MA

Features
- New Hybrid Solid-State/Vacuum Tube Designs
- All Silicon Semi-conductors
- High Stability, High Temperature Performance
- Closely Regulated
- Low Ripple Content
- Wide Range Adjustable Output
- Fast Transient Response
- Accurate Calibration and Resolution
- Overload, Short Circuit, Transient Protected
- Compact Space-Saving Designs
- Precision Engineered
- Moderately Priced
- Reverse Polarity Switch

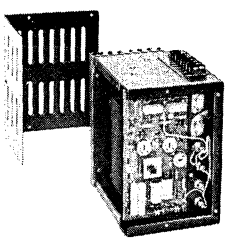
GENERAL SPECIFICATIONS

Input: 105-125 VAC, 50-400 cps
Output: 0-5 KV DC at 0-15 ma
Line and Load Regulation: 0.01% or 50 mv, whichever is greater
Ripple (RMS): 0.0001% or 5 mv whichever is greater
Temperature Coefficient: 0.01%/°C or 10 mv/°C, whichever is greater
Long Term Stability: Less than 25 mv, constant line, load and temperature (8 hours)
Transient Response: Less than 50 microseconds
Operating Temperature: 0°C to 50°C
Output Polarity: Either positive or negative grounding
Metering: Voltage and current meters
Cooling: Convection
Physical: Bench or relay rack mounting
Panel Size: 3½ x 19 x 15⅛

APPLICATIONS
- Cathode Ray indicators
- Klystron, Traveling Wave Tubes
- Microwave and Laser Equipment
- Geiger, Scintillation Counters
- Dielectric Testing
- Electron Accelerators
- Corona, Plasma Discharges
- Electro-Static Deposition
- All HV Laboratory and Equipment Applications

SOLID STATE AC REGULATOR Sinusoidal Output, Modular Design

Model	Rating	Weight	Price*
RT 250	250 VA	14 lbs.	$140.00
RT 500	500 VA	27 lbs.	$185.00
RT 1000	1000 VA	43 lbs.	$255.00



Model RT 250

FEATURES
- **Sinusoidal output**
- **Precision RMS regulation**
- **Compact, modular design**
- **Minimum magnetic field or RFI**
- **Wide input range 47-440 cps**
- **Wide load power factor range**
- **Remote sensing**
- **Overload and short-circuit protected**
- **71°C Free air rating**
- **Fully repairable**

Input: 105-130 VAC, 47-440 cps.
Line Regulation (RMS): Within ± 0.1% for full input change, resistive load or within ± 0.2% for +0.7 to —0.7 PF load.
Load Regulation (RMS): Within 0.2% for full load change, resistive, or within 0.5% for +0.7 to —0.7 load PF change.
Wave Form Distortion: Less than 5% (115 VAC input, unity through 0.7 load PF.)
Efficiency: Better than 75% rated load, 115 VAC input.
Load Power Factors Range: +0.7 PF through —0.7 PF.
Response Time: Less than 16 millisec.
Operating Temperature: —20°C to 71°C free air, full ratings.
Heat Sinking: Internal, convection cooled.

TRANSPAC® SOLID-STATE DC to AC INVERTERS

UNREGULATED (Square Wave) IT-B TYPES

Wave form approximately square wave
Self-excited designs with isolating feed-back transformers
Output voltage, RMS value at nominal input with taps provided for 105, 115, 125 VAC
Output voltage and frequency vary proportionately with input voltage change
Voltage regulation is within approximately 6% and frequency regulation within approximately ±2% for 50-100% load change
Unit can be synchronized externally

REGULATED (Square Wave) SB TYPES

Wave form approximately square wave
MOPA designs, regulated oscillator-driver and isolating power amplifier
Output voltage, RMS value at nominal input with taps provided for 105, 115, 125 VAC
Output voltage varies proportionately with input voltage change
Output voltage regulation within approximately 5% for a 50-100% load change
Frequency regulation within approximately ±1% for ±10% input change or 0-100% load change
Unit can be synchronized externally

REGULATED (Sine Wave) RS TYPES

Sinusoidal wave form, approximately 7% RMS distortion
MOPA designs, stabilized oscillator and isolating power amplifier
Output taps provided for 105, 115, 125 VAC
Voltage variation less than ±1% for full input voltage change
Load voltage variation with 0-100% change is less than 6%
Frequency regulation within ±1% for either 10% input change or 0-100% load change
Magnetic regulator provides voltage regulation
Unit can be synchronized externally

	POWER OUTPUT	INPUT VDC	OUTPUT (NOM.)	SIZE W x D x H (INCHES)	MODEL	PRICE*
	15 VA	5-7	115 VAC	2-5/8 x 3-1/16 x 4-1/2	IT616B	$ 80.00
60 CPS	25 VA	10-14	115 VAC	3-1/16 x 3-9/16 x 4-7/8	IT126B	$ 95.00
OUTPUT	50 VA	19-29	115 VAC	3-7/8 x 3-7/8 x 4-3/4	IT256B	$100.00
	100 VA	19-29	115 VAC	3-1/4 x 4 x 5-15/16	IT2106B	$115.00
	15 VA	5-7	115 VAC	2-3/8 x 2-3/4 x 3-13/16	IT614B	$ 90.00
400 CPS	25 VA	10-14	115 VAC	2-5/8 x 3-1/16 x 4-1/2	IT124B	$ 95.00
OUTPUT	50 VA	19-29	115 VAC	3-1/16 x 3-9/16 x 4-7/8	IT254B	$120.00
	100 VA	19-29	115 VAC	3-1/4 x 4 x 5-15/16	IT2104B	$130.00
	50 VA	20-29	115 VAC	5-1/2 x 6-1/16 x 6-5/32	IT256SB	$220.00
	100 VA	20-29	115 VAC	5-1/2 x 6-1/16 x 6-5/32	IT2106SB	$260.00
60 CPS	250 VA	10-14	115 VAC	6-1/8 x 5-15/16 x 6-1/2	IT2256SB(12)	$280.00
OUTPUT	250 VA	19-29	115 VAC	6-1/8 x 5-15/16 x 6-1/2	IT2256SB(24)	$285.00
	500 VA	10-14	115 VAC	7-13/32 x 9 x 6-3/16	IT2506SB(12)	$305.00
	500 VA	19-29	115 VAC	7-13/32 x 9 x 6-3/16	IT2506SB(24)	$315.00
	50 VA	20-29	115 VAC	6-1/8 x 5-15/16 x 6-1/2	IT254SB	$230.00
400 CPS	100 VA	20-29	115 VAC	6-1/8 x 5-15/16 x 6-1/2	IT2104SB	$260.00
OUTPUT	250 VA	20-29	115 VAC	6-1/8 x 5-15/16 x 6-1/2	IT2254SB	$275.00
	500 VA	20-29	115 VAC	7-13/32 x 9 x 6-3/16	IT2504SB	$350.00
	50 VA	26-29	115 VAC	6-1/8 x 5-15/16 x 6-1/2	IT256RS	$265.00
60 CPS	100 VA	26-29	115 VAC	7-13/32 x 9 x 6-3/16	IT2106RS	$390.00
OUTPUT	250 VA	26-29	115 VAC	12 x 9 x 8	IT2256RS	$365.00
	500 VA	26-29	115 VAC	11 x 14 x 7	IT2506RS	$505.00
	50 VA	26-29	115 VAC	6-1/8 x 5-15/16 x 6-1/2	IT254RS	$270.00
400 CPS	100 VA	26-29	115 VAC	7-13/32 x 9 x 6-3/16	IT2104RS	$305.00
OUTPUT	250 VA	26-29	115 VAC	12 x 9 x 8	IT2254RS	$390.00
	500 VA	26-29	115 VAC	11 x 14 x 7	IT2504RS	$520.00

*Frequency changers available in VA ratings listed above.
*Quantities 5-9. Write for quotations other quantities.

Note: All prices F.O.B. Cedar Grove, New Jersey
Subject to change without notice

ERA Transpac® Corporation

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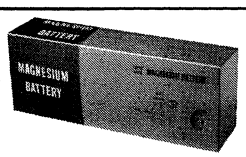
RECOMMEND THE RIGHT EVEREADY® BATTERY FOR THE RIGHT JOB!

"EVEREADY" BATTERY SYSTEMS AND THEIR PROMINENT FEATURES

... From the manufacturer of the most complete dry battery line in the world.

	FEATURES	APPLICATIONS
CARBON ZINC	Low cost, voltage drops gradually with use, variety of shapes and sizes ranging from 1.5 to 510 volts.	Radios, barricade flashers, telephone amplifiers, marine depth finders, toys, lighting systems, signaling circuits, novelties, flashlights, cameras and flash guns, paging devices, laboratory instruments, cassette tape recorders and players.
ALKALINE MANGANESE Primary-Secondary	Good low temperature performance, voltage falls gradually with use, good shelf life, low impedance, 50 to 100 percent more energy than carbon-zinc batteries, high efficiency under continuous or heavy-duty high-drain conditions.	Radios, heated clothing, bicycle lights and horns, shavers, electronic photoflash, lighting systems, movie cameras, radio-controlled models, model-plane ignition, toys, television sets, cassette tape recorders and players. Portable communication systems.
NICKEL CADMIUM	Hermetically sealed, maintenance free, relatively constant discharge voltage, good high and low-temperature performance, competitive in terms of cost per hour of use, high resistance to shock and vibration, button/cylindrical/rectangular configurations, long life, low self-discharge rate, high effective capacitance.	Portable hand tools and appliances, shavers, toothbrushes, photoflash equipment, dictating machines, movie cameras, instruments, portable communication equipment, tape recorders, slide projectors, radios, television sets, blenders, office equipment.
MERCURIC OXIDE	Excellent high-temperature performance, constant voltage under discharge, long shelf life.	Secondary voltage standard, radios, walkie-talkies, paging devices, radiation detection, test equipment, hearing aids, transistorized instruments, electric watches.
SILVER OXIDE	Constant voltage under discharge, good low-temperature performance, excellent shelf life.	Hearing aids, electric watches, reference voltage source, photo-electric exposure devices, instruments, wireless microphones, electronic thermometers.
MAGNESIUM 	Reliable, lightweight, high performance, excellent high temperature storage capabilities.	Military electronic communications and portable radar equipment.
LEAD-ACID	Spill-resistant, lightweight, pressure vented construction, no maintenance, high discharge rate capability, relatively high cycle life, economical.	Portable TV sets, portable light systems, camping and underwater sport equipment, portable power tools, radios, transmitters and receivers, emergency lighting, portable lawn and garden tools, tape recorders, record players, toys, alarm systems.

Union Carbide Corporation provides a consulting service of experienced battery engineers as an aid to manufacturers in need of special battery designs. For help with your specific battery problems, call (212) 551-3833 or write Battery Engineering Dept. No. 18 in New York (address shown below).

"Eveready", "Energizer", Cat with "Nine Lives", "Mini-Max", "Hot Shot", "Ignitor", "Columbia", and "Gray Label" are registered trademarks of

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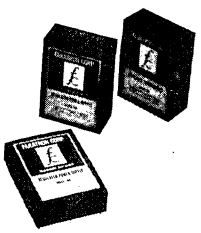
UNION CARBIDE
The Discovery Company

FARATRON

FARATRON CORPORATION
290 LODI STREET
HACKENSACK, N.J. 07601
(201) 488-1440
710-990-5022

LOW COST OP-AMP AND IC SUPPLIES

ENCAPSULATED



This Faratron Series offers performance characteristics adequate for almost all op-amp applications at the lowest price yet for supplies of this type. All power supplies are encapsulated in rugged epoxy modules which may be soldered directly into printed circuit boards or plugged into optional mating sockets. Dual output voltages are available from ±6 V to ±24 VDC with current ratings up to 0.10 A.

Modules include short circuit and overload protection. Either output can be shorted to common or to each other without damage.

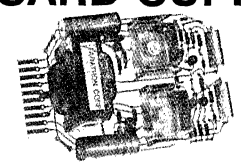
Model No.	Case Style	Voltage	Current (mA)	Price (1-9)
DP- 6-.025	A	± 6.0	25	$35.00
DP- 6-.050	A	± 6.0	50	38.00
DP- 6-.100	B	± 6.0	100	48.00
DP-10-.025	A	±10.0	25	35.00
DP-10-.050	A	±10.0	50	38.00
DP-10-.100	B	±10.0	100	48.00
DP-12-.025	A	±12.0	25	35.00
DP-12-.050	A	±12.0	50	38.00
DP-12-.100	B	±12.0	100	48.00
DP-15-.025	A	±15.0	25	35.00
DP-15-.050	A	±15.0	50	38.00
DP-15-.100	B	±15.0	100	48.00
DP-18-.025	A	±18.0	25	38.00
DP-18-.050	B	±18.0	50	48.00
DP-24-.025	A	±24.0	25	38.00
DP-24-.050	B	±24.0	50	48.00

OPTIONS

INPUT: ALL UNITS AVAILABLE WITH 210-250 VAC INPUT
ADD SUFFIX "K" TO MODEL NO.—$5.00 ADDITIONAL CHARGE

MATING CONNECTOR: MATING SOCKET SO2133
$2.50

DUAL CARD SUPPLIES



Faratron low cost "Regulated Dual Card Supplies" are all-silicon, self-contained, plug-in power units designed especially for the O.E.M. user offering the utmost in quality, dependability, performance and versatility. These unique plug-in power supplies offer unlimited advantages and flexibility compatible with modern packaging techniques.

Model No.	Voltage	Current (mA)	Price (1-9)
2C- 6-.05	± 6.0	50mA	$28.00
2C- 6-.10	± 6.0	100mA	38.00
*2C- 6-.20	± 6.0	200mA	58.00
2C-10-.05	±10.0	50mA	28.00
2C-10-.10	±10.0	100mA	38.00
2C-12-.05	±12.0	50mA	28.00
2C-12-.10	±12.0	100mA	38.00
*2C-12-.15	±12.0	150mA	48.00
*2C-12-.20	±12.0	200mA	58.00
2C-15-.05	±15.0	50mA	28.00
2C-15-.10	±15.0	100mA	38.00
*2C-15-.15	±15.0	150mA	48.00
*2C-15-.20	±15.0	200mA	58.00
2C-24-.05	±24.0	50mA	28.00
*2C-24-.10	±24.0	100mA	38.00
2C-28-.05	±28.0	50mA	28.00
*2C-28-.10	±28.0	100mA	38.00

SPECIFICATIONS

INPUT: 105-125 VAC, 47-420 HZ
OUTPUT VOLTAGES: DUAL OUTPUTS FROM 6.0 TO 28 VDC
REGULATION:
LINE—0.01% OR 1 MV (WHICHEVER IS GREATER) FROM 105-125 VAC
LOAD—0.05% (NO LOAD TO FULL LOAD)
RIPPLE: 1 MV RMS
TEMPERATURE COEFFICIENT: 0.02%/°C
OPERATING TEMPERATURE: —20°C TO +71°C
STORAGE TEMPERATURE: —55°C TO +85°C
VOLTAGE SETTING: VOLTAGES ARE FACTORY PRESET TO 1%
INPUT ISOLATION: 50 MEGOHMS

FARATRON

FARATRON CORPORATION
290 LODI STREET
HACKENSACK, N.J. 07601
(201) 488-1440
710-990-5022

WR SERIES

Package "A" 3 11/64 x 3 19/32 x 6 1/2

Model	OUTPUT VOLTAGE	CURRENT vs AMBIENT 40°C	50°C	60°C	71°C	Price
WRA-7-1	0-7	1.00	0.90	0.85	0.70	$ 75.
WRA-7-2	0-7	1.80	1.60	1.50	1.20	85.
WRA-7-3	0-7	2.20	2.00	1.60	1.40	95.
WRA-15-1	0-15	0.50	0.45	0.40	0.30	75.
WRA-15-2	0-15	1.00	0.90	0.80	0.60	85.
WRA-15-3	0-15	1.30	1.20	1.10	0.90	95.
WRA-24-1	0-24	0.75	0.70	0.65	0.50	85.
WRA-24-2	0-24	0.85	0.80	0.75	0.65	95.
WRA-32-1	0-32	0.60	0.50	0.45	0.35	85.
WRA-32-2	0-32	0.75	0.70	0.60	0.40	95.
WRA-60-1	0-60	0.38	0.35	0.30	0.27	105.
WRA-120-1	0-120	0.12	0.11	0.10	0.08	105.
WRA-120-2	0-120	0.17	0.15	0.13	0.12	115.
WRA-15-4	8-15	1.90	1.70	1.45	1.20	95.
WRA-24-3	14-24	1.35	1.20	1.00	0.85	95.
WRA-32-3	22-32	1.16	1.00	0.90	0.75	95.
WRA-60-2	30-60	0.65	0.6	0.50	0.40	105.
WRA-120-3	50-120	0.25	0.22	0.19	0.16	115.

Weights: Net 4¾ Shipping 5¾

Package "B" 3 11/64 x 4 19/32 x 6 1/2

Model	OUTPUT VOLTAGE	CURRENT vs AMBIENT 40°C	50°C	60°C	71°C	Price
WRB-7-1	0-7	3.0	2.8	2.6	2.3	105.
WRB-15-1	0-15	1.7	1.5	1.4	1.2	105.
WRB-24-1	0-24	1.1	1.0	0.95	0.82	105.
WRB-32-1	0-32	0.82	0.77	0.70	0.62	105.
WRB-60-1	0-60	0.47	0.43	0.40	0.35	115.
WRB-120-1	0-120	0.24	0.22	0.20	0.18	125.
WRB-15-2	8-15	2.6	2.4	2.2	1.9	115.
WRB-24-2	14-24	1.8	1.7	1.6	1.4	115.
WRB-32-2	22-32	1.6	1.5	1.35	1.2	115.
WRB-60-2	30-60	0.90	0.82	0.77	0.68	125.
WRB-120-2	50-120	0.35	0.33	0.30	0.26	125.

Weights: Net 5¾ Shipping 6¾

Package "C" 3 11/64 x 4 19/32 x 8 45/64

Model	OUTPUT VOLTAGE	CURRENT vs AMBIENT 40 C	50 C	60 C	71 C	Price
WRC-7-1	0-7	4.0	3.8	3.5	3.1	135.
WRC-15-1	0-15	2.25	2.1	1.9	1.67	135.
WRC-24-1	0-24	1.5	1.38	1.26	1.1	135.
WRC-32-1	0-32	1.1	1.0	0.94	0.83	135.
WRC-60-1	0-60	0.63	0.58	0.53	0.47	135.
WRC-120-1	0-120	0.32	0.29	0.27	0.24	155.
WRC-15-2	8-15	3.5	3.25	3.0	2.6	135.
WRC-24-2	14-24	2.5	2.3	2.1	1.9	135.
WRC-32-2	22-32	2.2	2.0	1.8	1.6	135.
WRC-60-2	30-60	1.2	1.1	1.0	0.90	145.
WRC-120-2	50-120	0.47	0.44	0.40	0.35	155.

Weights: Net 8½ Shipping 9½

WEIGHTS

WEIGHTS	NET	SHIPPING
PACKAGE A	4¾	5¾
PACKAGE B	5¾	6¾
PACKAGE C	8½	9½
PACKAGE D	19	21
PACKAGE E	26	28
PACKAGE F	35	37

Package "D" 4 29/32 x 7½ x 9⅜

Model	OUTPUT VOLTAGE	CURRENT vs AMBIENT 40°C	50°C	60°C	71°C	Price
WRD-7-1	0-7	8.5	7.9	6.7	5.8	195.
WRD-15-1	0-15	5.0	4.3	3.6	3.1	195.
WRD-24-1	0-24	3.3	2.8	2.4	2.1	205.
WRD-32-1	0-32	2.5	2.2	1.8	1.5	215.
WRD-60-1	0-60	1.4	1.2	1.0	0.79	235.
WRD-120-1	0-120	0.7	0.6	0.5	0.4	235.
WRD-15-2	8-15	7.8	6.8	5.7	4.9	195.
WRD-24-2	14-24	5.7	5.1	4.1	3.6	205.
WRD-32-2	22-32	4.8	4.2	3.5	3.0	215.
WRD-60-2	30-60	2.7	2.3	1.95	1.7	235.

Weights: Net 19 Shipping 21

Package "E" 4 29/32 x 7½ x 11¾

Model	OUTPUT VOLTAGE	CURRENT vs AMBIENT 40°C	50°C	60°C	71°C	Price
WRE-7-1	0-7	12.6	11.3	9.8	7.9	245.
WRE-15-1	0-15	7.4	6.7	5.7	4.8	245.
WRE-24-1	0-24	4.9	4.4	3.8	3.0	245.
WRE-32-1	0-32	3.7	3.2	2.8	2.3	245.
WRE-60-1	0-60	2.1	1.8	1.6	1.3	245.
WRE-120-1	0-120	1.0	0.95	0.82	0.66	255.
WRE-15-2	8-15	11.6	10.4	9.0	7.3	245.
WRE-24-2	14-24	8.4	7.5	6.6	5.3	245.
WRE-32-2	22-32	7.2	6.4	5.6	4.5	245.
WRE-60-2	30-60	4.0	3.6	3.1	2.5	245.
WRE-120-2	50-120	1.55	1.4	1.2	1.0	255.

Weights: Net 26 Shipping 28

Package "F" 4 29/32 x 7½ x 16½

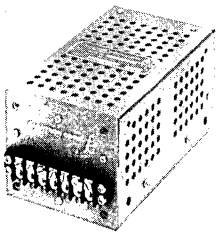
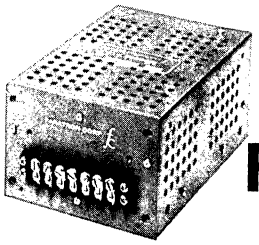
Model	OUTPUT VOLTAGE	CURRENT vs AMBIENT 40 C	50 C	60°C	71 C	Price
WRF-7-1	0-7	17.3	15.4	13.4	10.9	315.
WRF-15-1	0-15	10.2	9.0	7.9	6.4	315.
WRF-24-1	0-24	6.7	6.0	5.2	4.2	315.
WRF-32-1	0-32	5.0	4.4	3.6	3.1	315.
WRF-60-1	0-60	2.8	2.5	2.2	1.8	315.
WRF-120-1	0-120	1.4	1.25	1.1	0.9	325.
WRF-15-2	8-15	15.9	14.2	12.4	10.0	315.
WRF-24-2	14-24	11.6	10.3	9.0	7.3	315.
WRF-32-2	22-32	9.8	8.7	7.6	6.2	315.
WRF-60-2	30-60	5.5	4.9	4.2	3.4	315.
WRF-120-2	50-120	2.1	1.9	1.6	1.3	325.

Weights: Net 35 Shipping 37

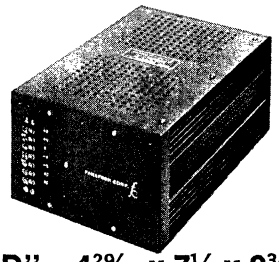
WEIGHTS AND SPECIFICATIONS APPLY TO BOTH FR AND WR SERIES.

SPECIFICATIONS

Input ..... 105-132 VAC, 47-420 Hz
Line Regulation .....0.01% for line variations from 105-132 VAC
Load Regulation ..... 0.01% for load variations from 0 to full load
Ripple ..... Less than 0.5MV rms, 3.0MV peak to peak
Stability ..... 0.02% or 10MV—whichever is greater
Temperature Coefficient ..... 0.02%/ C ·· 1MV
Temperature Range ..... —20°C to + 71 C
Storage Temperature Range ..... —55 C to + 85°C
Response Time ..... 20 microseconds
Remote Programming (Resistive) ..... 1000 ohms/volt
Remote Programming (Voltage) ..... 1 volt/volt
Remote Sensing ..... Sensing leads available at barrier strip
Overload Protection ..... Factory preset
Thermal Protection ..... Automatic resetting thermostat protects unit against operation in excessive ambients
Connections ..... Seven connector barrier strip

FR SERIES



Package "A" 3 11/64 x 3 19/32 x 6½

Model	OUTPUT VOLTAGE	CURRENT vs AMBIENT 40°C	50°C	60°C	71°C	Price
FR-A-3	3.0	3.0	2.7	2.2	1.3	$105.
FR-A-3.6	3.6	3.0	2.7	2.2	1.3	105.
FR-A-4	4.0	3.0	2.7	2.2	1.3	105.
FR-A-4.5	4.5	2.9	2.6	2.1	1.25	105.
FR-A-5	5.0	2.8	2.5	2.0	1.2	105.
FR-A-6	6.0	2.7	2.4	1.9	1.4	105.
FR-A-8	8.0	2.3	2.1	1.7	1.1	105.
FR-A-10	10.0	2.0	1.8	1.4	.9	105.
FR-A-12	12.0	1.8	1.6	1.3	.8	105.
FR-A-15	15.0	1.6	1.4	1.1	.7	105.
FR-A-18	18.0	1.4	1.2	.9	.6	105.
FR-A-20	20.0	1.3	1.1	.8	.5	105.
FR-A-24	24.0	1.0	.9	.7	.4	105.
FR-A-28	28.0	.9	.7	.55	.35	105.
FR-A-36	36.0	.7	.55	.51	.3	105.
FR-A-48	48.0	.56	.45	.35	.22	105.
FR-A-100	100.0	.27	.22	.18	.2	120.
FR-A-120	120.0	.22	.20	.16	.12	120.
FR-A-150	150.0	.18	.16	.13	.1	120.

Package "B" 3 11/64 x 4 19/32 x 6½

Model	OUTPUT VOLTAGE	CURRENT vs AMBIENT 40°C	50°C	60°C	71°C	Price
FR-B-3	3.0	4.0	3.5	2.8	1.8	$115.
FR-B-3.6	3.6	4.0	3.5	2.8	1.8	115.
FR-B-4	4.0	4.0	3.5	2.8	1.8	115.
FR-B-4.5	4.5	3.9	3.4	2.7	1.7	115.
FR-B-5	5.0	3.9	3.4	2.7	1.7	115.
FR-B-6	6.0	3.4	3.1	2.6	1.6	115.
FR-B-8	8.0	3.4	3.1	2.6	1.6	115.
FR-B-10	10.0	2.9	2.7	2.4	1.6	115.
FR-B-12	12.0	2.7	2.5	2.3	1.5	115.
FR-B-15	15.0	2.4	2.2	2.0	1.5	115.
FR-B-18	18.0	2.2	2.0	1.9	1.5	115.
FR-B-20	20.0	2.0	1.8	1.7	1.4	115.
FR-B-24	24.0	1.6	1.5	1.4	1.3	115.
FR-B-28	28.0	1.5	1.4	1.3	1.2	115.
FR-B-36	36.0	1.3	1.2	1.1	1.0	115.
FR-B-48	48.0	1.1	1.0	.90	.85	115.
FR-B-100	100.0	.50	.40	.32	.30	134.
FR-B-120	120.0	.40	.30	.27	.25	134.
FR-B-150	150.0	.30	.25	.21	.20	134.

Package "C" 3 11/64 x 4 19/32 x 8 45/64

Model	OUTPUT VOLTAGE	CURRENT vs AMBIENT 40°C	50°C	60°C	71°C	Price
FR-C-3	3.0	5.5	4.8	3.9	2.7	$135.
FR-C-3.6	3.6	5.4	4.7	3.8	2.7	135.
FR-C-4	4.0	5.4	4.7	3.8	2.7	135.
FR-C-4.5	4.5	5.3	4.6	3.7	2.6	135.
FR-C-5	5.0	5.3	4.5	3.6	2.6	135.
FR-C-6	6.0	5.0	4.3	3.5	2.6	135.
FR-C-8	8.0	4.8	4.1	3.4	2.3	135.
FR-C-10	10.0	4.4	3.8	3.2	2.2	135.
FR-C-12	12.0	4.2	3.7	3.1	2.1	135.
FR-C-15	15.0	3.7	3.4	3.0	2.1	135.
FR-C-18	18.0	3.4	3.2	2.9	2.1	135.
FR-C-20	20.0	3.3	3.1	2.8	2.0	135.
FR-C-24	24.0	2.7	2.6	2.4	1.7	135.
FR-C-28	28.0	2.5	2.3	2.2	1.6	135.
FR-C-36	36.0	2.2	2.0	1.9	1.5	155.
FR-C-48	48.0	1.8	1.6	1.5	1.2	155.
FR-C-100	100.0	.70	.60	.51	.45	155.
FR-C-120	120.0	.60	.50	.45	.41	155.
FR-C-150	150.0	.5	.40	.35	.32	155.

Package "D" 4 29/32 x 7½ x 9⅜

Model	OUTPUT VOLTAGE	CURRENT vs AMBIENT 40°C	50°C	60°C	71°C	Price
FR-D-3	3.0	13.5	11.7	9.6	6.6	$205.
FR-D-3.6	3.6	13.5	11.7	9.6	6.6	205.
FR-D-4	4.0	13.5	11.7	9.6	6.6	205.
FR-D-4.5	4.5	13.5	11.7	9.6	6.6	205.
FR-D-5	5.0	13.0	11.2	9.6	6.5	205.
FR-D-6	6.0	12.8	11.0	9.3	6.4	205.
FR-D-8	8.0	12.6	10.7	9.2	6.3	205.
FR-D-10	10.0	11.2	10.1	8.9	6.1	205.
FR-D-12	12.0	10.4	9.6	8.7	6.1	205.
FR-D-15	15.0	9.4	8.8	8.3	5.7	215.
FR-D-18	18.0	8.3	7.8	7.3	5.4	215.
FR-D-20	20.0	7.8	7.3	6.9	5.3	215.
FR-D-24	24.0	7.1	6.7	6.2	5.2	215.
FR-D-28	28.0	6.4	6.0	5.6	5.1	215.
FR-D-36	36.0	5.8	5.4	5.1	4.7	235.
FR-D-48	48.0	4.5	4.3	4.0	3.5	235.
FR-D-100	100.0	2.0	1.8	1.6	1.4	235.
FR-D-120	120.0	1.7	1.5	1.3	1.1	235.
FR-D-150	150.0	1.3	1.2	1.1	.9	235.

Package "E" 4 29/32 x 7½ x 11¾

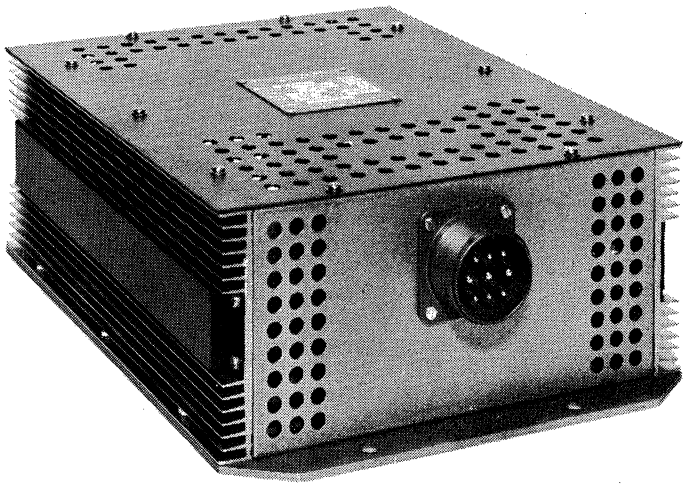
Model	OUTPUT VOLTAGE	CURRENT vs AMBIENT 40°C	50°C	60°C	71°C	Price
FR-E-3	3.0	23.0	21.0	17.5	11.0	$265.
FR-E-3.6	3.6	22.0	20.0	17.5	11.0	265.
FR-E-4	4.0	22.0	20.0	17.5	11.0	265.
FR-E-4.5	4.5	21.0	19.0	17.4	11.0	265.
FR-E-5	5.0	21.0	19.0	17.4	11.0	265.
FR-E-6	6.0	20.0	18.3	16.6	11.0	265.
FR-E-8	8.0	19.0	17.4	15.7	11.0	265.
FR-E-10	10.0	17.0	15.5	14.0	10.5	265.
FR-E-12	12.0	16.0	14.6	13.3	10.5	265.
FR-E-15	15.0	15.0	13.7	12.5	9.6	265.
FR-E-18	18.0	14.0	12.8	11.6	9.6	265.
FR-E-20	20.0	13.0	11.9	10.8	9.5	265.
FR-E-24	24.0	12.0	11.0	10.0	8.6	265.
FR-E-28	28.0	11.0	10.0	9.0	8.1	265.
FR-E-36	36.0	9.0	8.3	7.5	6.7	265.
FR-E-48	48.0	7.0	6.4	5.9	5.3	295.
FR-E-100	100.0	2.2	1.9	1.8	1.7	295.
FR-E-120	120.0	1.8	1.6	1.5	1.3	295.
FR-E-150	150.0	1.5	1.4	1.3	1.1	295.

Package "F" 4 29/32 x 7½ x 16½

Model	OUTPUT VOLTAGE	CURRENT vs AMBIENT 40°C	50°C	60°C	71°C	Price
FR-F-3	3.0	34.0	30.0	26.0	21.5	$315.
FR-F-3.6	3.6	33.0	27.0	23.0	19.3	315.
FR-F-4	4.0	33.0	27.0	23.0	19.3	315.
FR-F-4.5	4.5	32.0	25.6	21.8	18.3	315.
FR-F-5	5.0	32.0	25.6	21.8	18.3	315.
FR-F-6	6.0	31.0	25.6	21.8	18.3	315.
FR-F-8	8.0	29.0	24.5	20.7	17.5	315.
FR-F-10	10.0	25.0	21.4	17.8	14.8	315.
FR-F-12	12.0	22.0	20.0	17.1	14.2	315.
FR-F-15	15.0	20.0	19.0	16.5	13.7	315.
FR-F-18	18.0	17.5	15.8	13.4	11.1	315.
FR-F-20	20.0	16.2	14.7	12.8	10.7	315.
FR-F-24	24.0	15.0	13.5	11.8	10.0	315.
FR-F-28	28.0	14.0	12.5	10.8	9.2	315.
FR-F-36	36.0	11.4	10.8	9.6	8.1	315.
FR-F-48	48.0	8.7	8.1	7.5	6.5	315.
FR-F-100	100.0	3.6	3.3	2.8	2.4	345.
FR-F-120	120.0	3.3	3.0	2.5	2.1	345.
FR-F-150	150.0	2.4	2.2	1.9	1.6	345.

FLITE-TRONICS

60 Hz 400 Hz STATIC INVERTERS



Other Inverters Available:

- **Model PC-14 100 VA**
- **Model PC-14A 60 VA**
- **Model PC-14B 125 VA**
- **Model PC-15A 250 VA**
  Specifications same as PC-17A
- **12V to 24V Converters**
- **24V to 12V Converters**

For applications requiring greater than 750 VA of continuous power, the Flite-Tronics' Model PC-17A Inverter can be paralleled as necessary to double, triple, or quadruple the output power of a single unit. This is simply done by phase locking the oscillator in the PC-17A. Malfunction of a single unit when connected in this manner will not damage the other units in parallel. Each unit has its own overload protection. Each device is capable of self-preservation.

SPECIFICATIONS MODEL PC-17A (750 VA) STATIC INVERTER

INPUT VOLTAGE:
28 VDC ±2.0 VDC

INPUT CURRENT:
39A — full load
1.5A — no load

OUTPUT VOLTAGES:
115 VAC +5% −7%
26 VAC +5% −7%

OUTPUT FREQUENCY:
400 Hz ±1%

OUTPUT POWER:
750 VA continuous for 115 VAC output
150 VA continuous for 26 VAC output
NOTE: Total continuous output power 750 VA.

OUTPUT WAVEFORM:
Sine Wave, Single Phase

HARMONIC DISTORTION:
7% maximum (Typically 3%)

POWER FACTOR:
.8 to −.95

ALTITUDE:
45,000 feet

EFFICIENCY:
70% typical

TEMPERATURE:
−65°F to 160°F

WEIGHT:
16.2 lbs.

SIZE:
Width 8½″
Length 12″
Height 4 1/16″

INPUT OVERVOLTAGE:
Withstands 130% overvoltage (37 VDC) for five minutes minimum while delivering full rated 750 VA output power. Output voltage under this condition 115 VAC +5% −7%.

EMISSION RFI:
Radiated & Conducted . . . 90KC to 1000MC.
Far below levels specified in Appendix A of RTCA Paper 120-61/DO-108 Category "A".

HUMIDITY:
Greater than 95% for ten days, temperature cycled between 75°F to 160°F.

VIBRATION:
To withstand at least 10 G's from 10 to 500 cycles per second in three directions for 90 minutes each direction.

SHOCK:
To withstand at least 10 G's for 11 milliseconds in three directions.

OVERLOAD CAPABILITY:
Deliver 150% of rated output current at rated output voltage for a duration of not less than 5 minutes (i.e., 900 volt amp load).

INPUT VOLTAGE PROTECTION:
Unit withstands transients of 88 volts lasting 1 millisecond on the 28.0 VDC input line.

EXCESSIVE OVERLOAD & OUTPUT SHORT CIRCUIT:
Withstands without damage or degradation loads exceeding 150% nominal to an output short circuit. Unit delivers rated output on removal of above condition.

SPECIFICATIONS MODEL PC-16 STATIC INVERTER

POWER OUTPUT:
250 VA Continuous
150% Overload 5 minutes
pf — .8 to 1.0

VOLTAGE INPUT:
1. 28 VDC ±2 Volts
2. Withstands 88 Volt Transient for 1 Millisecond

INPUT CURRENT:
14 Amp — full load
1 Amp — no load

FREQUENCY:
60 HZ ±1 Hz

VOLTAGE OUTPUT:
115 VAC RMS +5% −7%

AMPLITUDE DISTORTION:
Less than 7%

WAVE FORM:
Sine Wave

PHASE:
Single

SHORT CIRCUIT
Withstand for 1 minute or longer

TEMPERATURE:
−10°F to +160°F

ALTITUDE:
45,000 Ft.

WEIGHT:
16 lbs.

SIZE:
7½″ x 12″ x 4″ overall dimensions

For application requiring greater than 250 VA of continuous power Model PC-16 can be paralleled to double or triple the output power of a single unit.

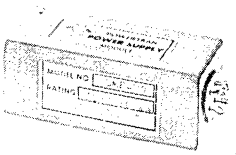
FLITE-TRONICS, co., inc. 3312 Burton Avenue., Burbank, Calif. 91502 U.S.A.
Phone: (213) 849-1552

FERROTRAN ELECTRONICS CO., INC.

SOLID STATE POWER SUPPLY MODULES

All silicon, long-life semi-conductor, regulated POWERTRAN power supply modules. Guaranteed 3 years. Gives single, fixed D.C. output voltages.

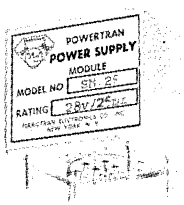
INPUT VOLTAGE — 115 volts A.C.
SUBMINIATURE MODELS



SMF-70

Case; 3"x1 3/16"x1 1/4"; Mounts on a chassis with 2 ea. 4-40 blind inserts; no projecting studs; ideal for printed circuit boards; fixed voltage. 4 pin connector.

Model	D.C. Volts	D.C. Current	% Reg.	% Ripple	Price
SMF-5	5	40ma	2.	.2	$39
SMF-6	6	40	1.3	.15	39
SMF-10	10	40	1.	.15	39
SMF-12	12	40	1.	.1	39
SMF-15	15	40	1.	.1	39
SMF-20	20	30	1.2	.25	40
SMF-24	24	30	1.2	.2	40
SMF-28	28	25	1.2	.3	40
SMF-30	30	20	1.5	.3	41
SMF-40	40	15	1.5	.2	41
SMF-50	50	15	1.5	.2	41
SMF-60	60	10	1.5	.1	41
SMF-70	70	10	1.2	.1	41

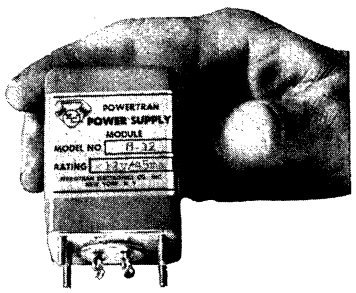


SM-28

Case; 1 5/8"x1 7/8"x1 5/8"; Mounts on a chassis with 4 ea. 6-32 studs. 5/8" diam. connector in cover. 4 pin connector.

Model	D.C. Volts	D.C. Current	% Reg.	% Ripple	Price
SM-5	5	40ma	2.	.2	$39
SM-6	6	40	1.3	.15	39
SM-10	10	40	1.	.15	39
SM-12	12	40	1.	.1	39
SM-15	15	40	1.	.1	39
SM-20	20	30	1.2	.25	40
SM-24	24	30	1.2	.2	40
SM-28	28	25	1.2	.3	40

INPUT VOLTAGE — 115 volts A.C.
MIDGET MODULES



M-12 MIDGET MODULE

Low priced; all silicon; very small fixed voltage modules, will operate to 80°C. without derating.

Model	D.C. Volts	D.C. Current	% Reg.	% Ripple	Price
M- .5	.5	30ma	4.	.9	$32
M-1.0	1.0	30	4.	.9	32
M-1.5	1.5	30	4.	.9	32
M-2.0	2.0	30	4.	.45	32
M-2.5	2.5	30	4.	.5	32
M-3.0	3.0	30	6.	.6	34
M-4.0	4.0	30	5.	.5	34
M-5	5	50	3.	.3	34
HM-5	5	50	2.	.08	38
M-6	6	50	1.8	.18	34
HM-6	6	50	1.5	.06	38
MC-7*	7	175	1.3	.1	48
MCH-7*	7	280	1.7	.3	53
M-8	8	50	2.	.15	34
M-9	9	50	1.6	.2	34
M-10	10	50	1.4	.12	34
HM-10	10	50	1.	.03	38
MC-10	10	175	1.3	.08	48
MCH-10*	10	280	1.3	.3	53
M-12	12	45	1.3	.12	34
HM-12	12	50	1.	.03	38
MC-12	12	150	1.3	.08	48
MCH-12	12	250	1.3	.1	53
M-15	15	45	1.5	.13	36
HM-15	15	50	1.	.05	38
MC-15	15	140	1.3	.1	48
MCH-15	15	250	1.3	.1	53
M-18	18	45	1.5	.18	36
MC-18	18	140	1.5	.1	48
MCH-18	18	225	1.3	.1	53
M20	20	45ma	1.5	.15	$36
HM-20	20	50	1.	.05	39
MC-20	20	140	1.3	.05	48
MCH-20	20	225	1.5	.1	53
M-22	22	45	1.5	.15	36
MC-22	22	130	1.3	.08	48
MCH-22	22	225	1.5	.1	53
MC-23	23	130	1.3	.05	47
M-24	24	40	1.5	.15	36
HM-24	24	45	1.2	.02	39
MC-24	24	125	1.3	.05	48
MCH-24	24	200	1.8	.1	53
M-25	25	40	1.5	.15	36
MC-25	25	125	1.3	.05	49
MC-26	26	125	1.3	.05	47
MCH-26	26	200	1.8	.1	52
M-27	27	40	1.5	.15	36
MC-27	27	125	1.3	.05	48
MCH-27	27	180	1.8	.1	53
M-28	28	40	1.5	.15	36
HM-28	28	45	1.5	.05	39
MC-28	28	125	1.3	.05	50
MCH-28	28	180	1.8	.1	55
M-30	30	40	1.5	.15	36
HM-30	30	40	1.5	.05	39
MC-30	30	110	1.5	.1	48
MCH-30	30	160	1.8	.1	53
M-35	35	40	1.5	.15	38
M-40	40	40	1.5	.22	38
M-45	45	35	1.5	.2	38
MC-45	45	100	1.5	.1	48
MCH-45	45	140	1.8	.1	53
M-50	50	30	1.5	.2	39
M-75	75	5	1.5	.1	42
M-100	100	2	1.5	.1	42

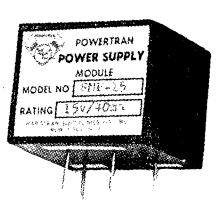
M Units in EB Case; 1 3/4"x1 7/8"x2 3/8".
HM Units in FB Case: 2 1/8"x2"x2 1/2".
MC Units in HB Case; 2 1/2"x3"x3 1/8".
MCH Units in JB Case; 3 1/2"x3"x3 7/8".

*MC-7 in GB Case.
*MCH-7 and MCH-10 in HB Case.

MIL SPEC MODULES

All power supplies described on these pages may be militarized. Will meet all environmental specs. of MIL-E-5272C. Call us for an estimate.

INPUT VOLTAGE — 115 volts A.C. — PRINTED CIRCUIT MODULES



SMP-15

FOR PRINTED CIRCUIT BOARDS

Epoxy encapsulated power modules in an epoxy shell; incorporates 4 pins for direct soldering to printed circuit boards.

SMP Units; 1 5/8"x1 7/8"x1 1/2" case.
MP Units; 2 1/8"x1 7/8"x1 5/8" case.

Model	D.C. Volts	D.C. Current	% Reg.	% Ripple	Price
SMP-5	5	40ma	2.0	.30	$39
MP-5	5	50	3.0	.30	36
SMP-6	6	40	1.3	.15	39
MP-6	6	50	1.8	.18	36
SMP-10	10	40	1.0	.15	39
MP-10	10	50	1.4	.12	36
SMP-12	12	40	1.0	.10	39
MP-12	12	45	1.3	.12	36
SMP-15	15	40	1.0	.10	39
MP-15	15	45	1.5	.13	37
SMP-20	20	30ma	1.2	.25	$40
MP-20	20	45	1.5	.15	38
SMP-24	24	30	1.2	.20	40
MP-24	24	40	1.5	.15	38
SMP-28	28	25	1.2	.30	40
MP-28	28	40	1.5	.15	38
MP-30	30	40	1.5	.15	38
MP-40	40	40	1.5	.22	39
MP-50	50	30	1.5	.20	40
MP-100	100	2	1.5	.10	44

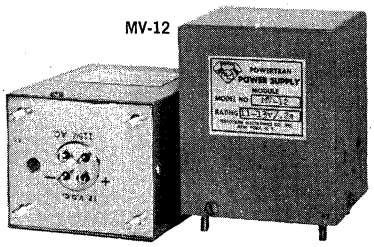
FERROTRAN ELECTRONICS COMPANY, INC.
683 BROADWAY ▪ NEW YORK, N.Y. 10012 ▪ PHONE 212-254-5810

FERROTRAN ELECTRONICS CO., INC.

SOLID STATE POWER SUPPLY MODULES

All silicon, long-life, semi-conductor POWERTRAN power supply modules. Guaranteed 3 years.

INPUT VOLTAGE — 115 volts A.C.
ADJUSTABLE OUTPUT MODULES

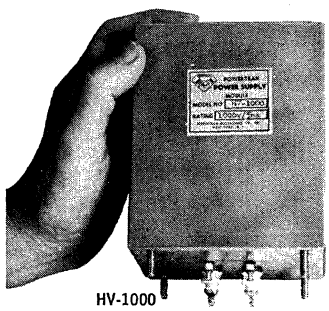


Variable D.C. output; repairable; output voltage adjustable thru screwdriver control on stud side of case. Compact series regulated modules with short circuit protection; all silicon.

MV Units in HA Case: 3″x2⅝″x3½″.
MCS Units in JB Case: 3½″x3″x3⅞″.
HCV Units in JA Case: 3¾″x3″x4⅞″.

Model	D.C. Volts	D.C. Current	% Reg.	% Rip.	Case	Price
MV-3	2.5-3.8	200ma	.8	.1	HA	$52
MCS-3	2.5-3.8	450	.8	.1	JB	60
MV-4	3.5-4.5	200	.8	.1	HA	52
MCS-4	3.5-4.5	450	.8	.1	JB	60
MV-5	4.5-5.5	200	.7	.1	HA	52
MCS-5	4.5-5.5	450	.8	.1	JB	60
HCV-5	4.5-5.5	1a	.4	.2	JA	80
MV-6	5.8-7	200	.6	.2	HA	52
MCS-6	5.8-7	450	.8	.3	JB	60
HCV-6	5.5-6.8	1a	.4	.2	JA	80
MV-10	9-12	200	.4	.03	HA	52
MCS-10	9-11	450	.5	.1	JB	60
HCV-10	8.5-11.8	1a	.4	.1	JA	80
MV-12	11-13	200	.2	.025	HA	52
MCS-12	11-13	400	.5	.05	JB	60
HCV-12	11-14.5	1a	.4	.05	JA	80
MV-15	14-16	200	.5	.03	HA	52
MCS-15	14-16	400	.5	.05	JB	60
HCV-15	14-18	800	.4	.1	JA	80
MV-20	19-22	180	.5	.03	HA	53
MCS-20	19-22	350	.5	.05	JB	62
HCV-20	18-24	700	.4	.3	JA	81
MV-24	23-26	180	.5	.04	HA	53
MCS-24	23-26	350	.5	.05	JB	62
MV-28	27-29	150	.5	.04	HA	53
MCS-28	27-29	300	.4	.04	JB	62
HCV-28	26.5-29	600	.25	.3	JA	81

INPUT VOLTAGE — 115 volts A.C.
HIGH VOLTAGE MODULES



HV-1000

All silicon components; solid state regulator; floating outputs; ideal for photomultipliers and indicator tubes.

Model	D.C. Volts	D.C. Current	% Reg.	% Rip.	Case	Price
HV-45	45	40ma	1.5	.15	GA	$45
HV-48	48	60	1.5	.15	GA	45
HV-50	50	40	1.5	.15	GA	45
HV-55	55	40	1.5	.15	GA	45
HV-60	60	40	1.5	.15	GA	45
HVA-60	60	90	1.5	.2	JA	70
HV-67	67	40	1.5	.15	GA	45
HV-70	70	40	1.5	.15	GA	45
HV-75	75	60	1.3	.1	GA	55
HV-90	90	60	1.2	.1	GA	55
HM-100	100	6	1	.05	HB	47
HV-100	100	60	1.5	.1	GA	55
HVA-100	100	90	1.5	.2	JA	85
HV-120	120	55	1.3	.12	HA	65
HV-150	150	45	1	.1	HA	65
HVA-150	150	90	1.5	.2	JA	90
HV-175	175	40	1.2	.12	HA	65
HM-200	200	5	.5	.05	HB	50
HV-200	200	40	1.3	.12	HA	65
HV-250	250	40	1.5	.05	JA	70
HM-300	300	3	1	.05	JB	60
HV-300	300	35	1.5	.1	JA	70
HV-400	400	20	1.5	.2	JA	80
HM-500	500	1.8	1	.05	JB	65
HV-500	500	15	1.5	.2	JA	80
HM-750	750	1.2	1	.1	JB	75
HV-750	750	8.5	1.2	.3	LB	115
HM-1000	1000	1	1.	.1	JB	75
HV-1000	1000	5	1.3	.3	LB	130

All power supplies with output volts of 750 or higher have special ceramic high voltage terminals.

INPUT VOLTAGE — 115 volts A.C.
UNREGULATED MODULES

Ideal raw D.C. supplies containing transformer, rectifiers and capacitor filter. Simply attach series regulator or zener diode to convert to a regulated power supply; all solid state.

Model	D.C. Volts	D.C. Current	Case	Price
SU-5A	5	2amp	HA	$36
SU-5B	5	6	JA	47
SU-6A	6	1	GB	34
SU-6B	6	2	HA	36
SU-6C	6	6	JA	47
SU-10A	10	1.5	HA	36
SU-10B	10	.5	GB	34
SU-10C	10	6	JA	47
SUM-10	10	.15	EB	26
SU-12A	12	1.5	HA	38
SU-12B	12	.5	HA	36
SU-12C	12	.25	HA	34
SU-12D	12	4	JA	47
SU-15A	15	1	HA	36
SU-15B	15	.5	GB	34
SU-15C	15	.25	FB	32
SU-15D	15	3.2	JA	47
SUM-15	15	.1	EB	26
SU-20A	20	.8	HA	36
SU-20B	20	.3	GA	34
SU-20C	20	1.2	HA	37
SU-20D	20	2.4	JA	47
SUM-20	20	.075	EB	26
SU-24C	24	2	JA	47
SU-25A	25	.8	HA	38
SU-25B	25	.3	HA	36
SUM-25	25	.06	EB	26
SU-28A	28	.8	HA	38
SU-28B	28	.3	GB	34
SU-28C	28	1.8	JA	47
SU-30A	30	.7	HA	38
SU-30B	30	.3	GB	34
SU-40A	40	.5	HA	40
SU-40B	40	.2	GB	34
SU-48	48	.4	HA	38
SU-50A	50	.4	HA	36
SU-50B	50	.2	GA	34
SU-50C	50	1	JA	47
SU-60	60	.38	HA	36
SU-75	75	.3	HA	36
SU-90A	90	.25	HA	36
SU-90B	90	.1	HA	34
SU-100	100	.2	HA	36
SU-120A	120	.2	HA	36
SU-120B	120	.3	JA	47
SU-120C	120	.5	JA	47
SU-150	150	.1	HA	34
SU-200A	200	.09	HA	38
SU-250	250	.065	HA	38
SU-300	300	.06	HA	40
SU-400	400	.06	HA	40
SU-500	500	.05	LB	50
SU-750	750	.03	LB	60
SU-900	900	.025	LB	60
SU-1000	1000	.02	LB	60
SU-1250	1250	10ma	LB	60
SU-1400	1400	5ma	LB	60

115 V. A.C. INPUT— INDICATOR TUBE SUPPLIES

All solid-state, silicon, power supply modules used to operate indicator display devices, numeral lights, etc. for digital read-out. Also for power decoder drivers and diode counters.

Model	D.C. Volts	D.C. Current	Case	Price
NI-1	175	20ma	AJ*	$30
NI-2	175	18	AJ*	30
NI-3	180	15	AJ*	30
NI-4	200	12	AJ*	30
NI-5	170	35	EB	30
NI-6	175	35	EB	30
NI-7	180	30ma	EB	$30
NI-8	200	25	FB	30
NI-9	170	50	FB	30
NI-10	175	48	FB	30
NI-11	180	45	FB	31
NI-12	200	40	FB	31

* Models NI-1 through NI-4 also available in epoxy encapsulated plastic case for PC board mounting 1⅝″x1⅞″x1½″. NI-5 through NI-12 in case 2″x2¾″x2″ for PC board mounting.

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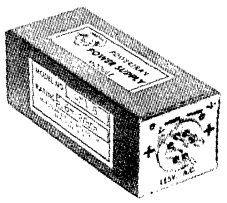
FERROTRAN
ELECTRONICS CO., INC.

SOLID STATE POWER SUPPLY MODULES

All silicon, long-life, semi-conductor POWERTRAN power supply modules. Guaranteed 3 years. Gives dual, fixed D.C. output voltages.

INPUT VOLTAGE — 115 volts A.C.
SUBMINIATURE DUAL OUTPUT



SMA-6

Case; 3"x1 3/16"x1 1/4"; Mounts on a chassis with 2 ea. 4-40 blind inserts; no projecting studs; ideal for printed circuit boards; fixed voltage. 6 pin connector.

Model	D.C. Volts	D.C. Current	% Reg.	% Ripple	Price
SMA-6	6, 6	20ma	1.0	.3	$44
SMA-10	10, 10	20	1.0	.1	44
SMA-12	12, 12	20	1.0	.1	44
SMA-15	15, 15	20	1.5	.1	44
SMA-20	20, 20	15	1.5	.2	45
SMA-24	24, 24	15	1.5	.2	45
SMA-28	28, 28	12	1.5	.2	45

Case; 1 5/8"x1 7/8"x1 5/8"; Mounts on a chassis with 4 ea. 6-32 studs. 5/8" diam. connector in cover. 6 pins; case style similar to SM units (see photo).

Model	D.C. Volts	D.C. Current	% Reg.	% Ripple	Price
SMAC-6	6, 6	20ma	1.0	.3	$44
SMAC-10	10, 10	20	1.0	.1	44
SMAC-12	12, 12	20	1.0	.1	44
SMAC-15	15, 15	20	1.5	.1	44
SMAC-20	20, 20	15	1.5	.2	45
SMAC-24	24, 24	15	1.5	.2	45
SMAC-28	28, 28	12	1.5	.2	45

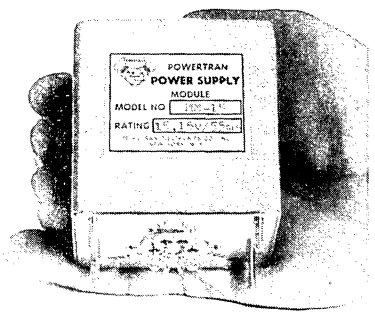
PRINTED CIRCUIT DUAL OUTPUT

Epoxy encapsulated dual output units for direct soldering to PC boards.

SMMP Units in Case: 1 5/8"x1 7/8"x1 1/2"; 6-pins.
MMP Units in Case: 2"x2 3/4"x2".

Model	D.C. Volts	D.C. Current	% Reg.	% Ripple	Price
SMMP-6	6, 6	20ma	1.	.3	$44
MMP-6	6, 6	45	2.	.100	42
SMMP-10	10, 10	20	1.	.1	44
MMP-10	10, 10	45	1.2	.005	42
SMMP-12	12, 12	20	1.	.1	44
MMP-12	12, 12	45	1.2	.005	42
SMMP-15	15, 15	20	1.5	.1	44
MMP-15	15, 15	45	1.2	.005	42
SMMP-20	20, 20	15	1.5	.2	45
MMP-20	20, 20	40	1.2	.01	43
SMMP-24	24, 24	15	1.5	.2	45
MMP-24	24, 24	35	1.5	.01	43
SMMP-28	28, 28	12	1.5	.2	45

INPUT VOLTAGE — 115 volts A.C.
DUAL OUTPUT MIDGET MODULES



MM15 DUAL OUTPUT OP-AMP MODULE

These precision engineered modules furnish two matched output voltages from independent power supply units. The current shown is available from each tap. Ideal for OP-AMPS — 6 pin connector.

Model	D.C. Volts	D.C. Cur.	% Reg.	% Rip.	Case	Price
MM-3	3,3	45ma	3	.4	GB	$50
MM-5	5,5	50	1.7	.08	GB	50
MM-6	6,6	50	1.6	.05	GB	50
MM-7	7,7	55	1.4	.05	GB	50
HMC-7	7,7	150	1.5	.15	JB	68
MM-10	10,10	60	1.2	.005	GB	50
HMC-10	10,10	150	1.2	.05	JB	68
MM-12	12,12	60	1.2	.005	GB	50
HMC-12	12,12	150	1.5	.02	JB	68
MM-15	15,15	55	1	.006	GB	52
HMC-15	15,15	150	1.5	.02	JB	68
MM-18	18,18	50	1	.01	GB	53
MM-20	20,20	50	1	.01	GB	53
HMC-20	20,20	120	1.2	.04	JB	68
MM-24	24,24	45	1	.01	GB	53
HMC-24	24,24	110	1.3	.04	JB	68
MM-25	25,25	45	1	.01	GB	53
MM-27	27,27	45	1	.01	HB	55
MM-28	28,28	45	1	.01	HB	55
HMC-28	28,28	110	1.4	.05	JB	68
MM-30	30,30	45	1	.01	HB	55
HMC-30	30,30	100	1,5	.15	JB	68
HMC-45	45,45	80	1.5	.15	JB	68
HHV-45	45,45	40	1	.2	JA	60
HHV-50	50,50	40	1	.2	JA	60
HHV-55	55,55	40	1	.2	JA	60
HHV-60	60,60	40	1	.2	JA	60
HHV-65	65,65	40	1	.2	JA	60
HHV-67	67,67	40	1	.2	JA	60
HHV-70	70,70	40	1	.2	JA	60
HHV-90	90,90	35	1	.1	JA	70
HHV-100	100,100	30	1	.08	JA	75
HHV-120	120,120	25	1	.05	JA	75

INPUT VOLTAGE — 115 volts A.C.
UNSYMMETRICAL DUAL OUTPUT

These modules contain two independent power supply units which furnish two dissimilar outputs.

Model	D.C. Volts	D.C. Current	% Reg.	% Ripple	Price
MA-515	5, 15	50ma	1.7	.1	$56
MA-612	6, 12	50	1.6	.1	56
MA-615	6, 15	50	1.6	.1	56
HMJ-10	10	50	1.5	.10	68
	10	250	2.0	.20	
HMJ-12	12	50	1.5	.15	68
	12	250	2.0	.20	
HMJ-15	15	50	1.5	.15	68
	15	250	2.0	.20	

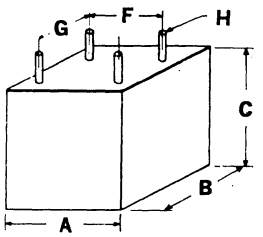
MA units in GB case.
HMJ units in JB case.

220 V. A.C. INPUT — MIDGET MODULES

These all-silicon, solid state modules operate from either 115 v. a.c. or 220 v. a.c. line voltage to furnish the d.c. outputs shown below. They will operate to 70°C without derating.
EB Case: 1 3/4"x1 7/8"x2 3/8". Wt. Ea., 3/4 lb.

Model	D.C. Volts	D.C. Current	% Reg.	% Ripple	Price
M-5-2	5	50	3	.3	$42
M-6-2	6	50	1.8	.18	42
M-10-2	10	50	1.4	.12	42
M-12-2	12	45	1.3	.12	42
M-15-2	15	45	1.5	.13	42
M-20-2	20	45	1.5	.15	42
M-24-2	24	40	1.5	.15	43
M-27-2	27	40	1.5	.15	43
M-28-2	28	40	1.5	.15	43

DIMENSIONS PER MIL-T-27A



Case	A	B	C	F	G	H
AH	1 5/16	1 5/16	1 3/4	1 1/4	—	6-32x3/8
AJ	1 5/8	1 5/8	1 3/8	1 3/16	1 3/16	6-32x3/8
EB	1 15/16	1 13/16	2 7/16	1 3/8	1 1/4	6-32x3/8
FB	2 5/16	2 1/16	2 1/2	1 11/16	1 7/16	6-32x3/8
GA	2 3/4	2 3/8	3 13/16	2 1/8	1 3/4	6-32x3/8
GB	2 3/4	2 3/8	2 13/16	2 1/8	1 3/4	6-32x3/8
HA	3 1/16	2 5/8	4 1/4	2 19/64	1 55/64	8-32x3/8
HB	3 1/16	2 5/8	3 3/16	2 19/64	1 55/64	8-32x3/8
JA	3 5/16	3 1/16	4 7/8	2 5/8	2 1/8	8-32x3/8
JB	3 5/16	3 1/16	3 7/8	2 5/8	2 1/8	8-32x3/8
LB	4 5/16	3 11/16	4 1/2	3 5/16	2 11/16	10-32x1/2

FERROTRAN ELECTRONICS COMPANY, INC.
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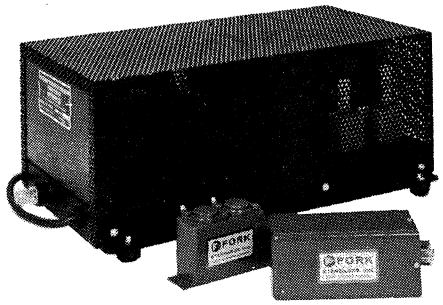
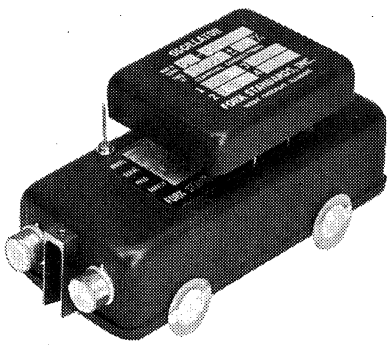
PRECISE FREQUENCY POWER INVERTERS

OFF THE SHELF OR TO YOUR SPECS

- **Line referenced counters**
- **Clocks**
- **Tape transports**
- **Facsimile machines**
- **Chart recorders**
- **Movie cameras**

FORK STANDARDS



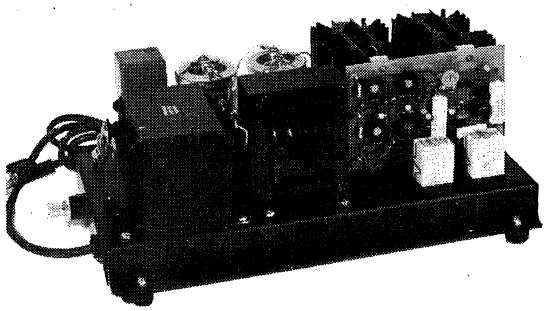


A precise frequency power inverter is a necessity whenever the power source must provide the frequency reference. Fork Standards' power sources use a precision crystal or tuning fork oscillator to control frequency, so frequency is independent of input or load.

The models described below are representative of Fork Standards' extensive experience in this field. A variety of models of the sizes shown or larger, both standard or custom designed, can be supplied to meet specific requirements.

YOUR SOURCE FOR INSTANT HERTZ!

LINEAR AMPLIFIER SERIES



Delivers stable, low distortion sine wave power from unregulated AC lines. Frequency, accuracy determined by plug-in oscillator. Output regulated, adjustable.

Input: 105-130/210-260 VAC, 50-1000 Hz

Output: Sine wave, 0-125 VAC, 75 VA (standard), regulated

Frequency: 50, 60, or 400 Hz standard. 50-1000 Hz available. Also direct-coupled sine wave as low as 10 Hz at reduced voltage

Accuracy: .1 to .005%

Size: 14⅛" x 8¼" x 5½" High; weight: 22 lbs.

Price: (60 Hz output) From $480.00

SYNCHRONOUS MOTOR DRIVERS

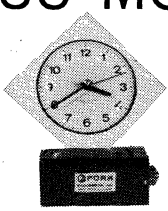
Synchronous motors may be operated at speeds accurate to .001% (less than one second per day error) with Fork Standards compact power inverters. These DC powered units provide square wave AC outputs with frequency accuracies determined by their internal crystal or tuning fork references. A variety of voltages, powers and packages are available.

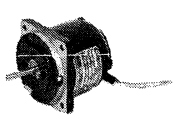
CLOCK MOTOR DRIVERS

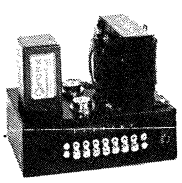
3-5 VA, 115 V rms output. Both plug-in and stud mounted units with solder hooks can be provided.

MEDIUM POWER MOTOR DRIVERS

10 to 35 VA, 12 or 24 V center tapped or 115 V outputs. For chart or stepper motor drives. Custom packaging available for special applications.







SPECIFICATIONS

Model	LMD	HCD	HMD
Freq. Range	10-1000 Hz	40-1000 Hz	50-1000 Hz
Power	35 VA	3-5 VA	35-100 VA
Output Voltage	24 V p-p (C.T.)	115 V rms	115 V rms
Size	4 x 6 x 4" h.	2" sq., 4" h.	Various

ACCURACY (%) VS. TEMPERATURE

Specify	15 to 35°C	Specify	0 to 65°C
2A	.05	2S	.100
4A	.01	4S	.020
7A	.001[1]	7S	.005

[1]Requires special precautions. Consult factory.

Mounting: Octal plug; studs, solder hooks available.

CUSTOM DESIGN POWER INVERTERS

Tape Deck Inverters: Both rack mount and portable models to power instrumentation tape transports in severe field environments.

Stabilized Variable-Speed Stepper Motor Driver: Uses a Controlcraft Corporation counter with crystal oscillator to drive a stepper motor which traverses a telescope at a steady but adjustable speed.

Movie Camera Motor Driver: Compact built-in 35 VA inverter provides precise speed and low voltage drive for battery operated portable movie camera.

Multi-Frequency Laboratory Inverter: Delivers selection of stabilized 115/230 volt line frequencies for testing instruments for overseas use.

See our complete Oscillator Catalog under "Oscillators," page 1387-1390.

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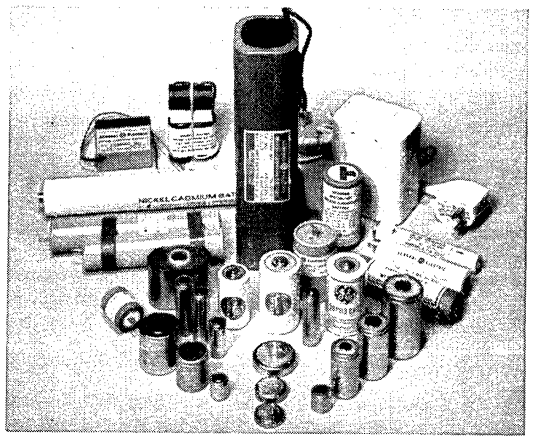
RECHARGEABLE NICKEL-CADMIUM BATTERIES

- Operate over a wide temperature range
- High discharge rate capability with constant voltage output
- Overcharge capability
- Long operating life
- High reliability
- Indefinite storage
- Meet severe environmental requirements
- Customized battery designs available

COMMERCIAL AND MILITARY APPLICATIONS



Typical sealed-cell battery designs.

SEALED CELLS

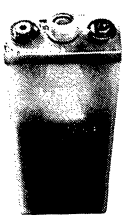
Sealed cylindrical cells and batteries are preferred for most applications requiring long, highly reliable life, high rates of discharge or charge current, complete portability, and safety. The micro-valve resealable pressure-relief safety vent allows higher charge currents, deeper discharges, and operation in higher ambient temperatures without damaging the cell or compromising product safety. The General Electric exclusive edge-weld construction on some types permits higher discharge currents without sacrifice in discharge voltage.

Sealed cells are available in three basic shapes: cylindrical, rectangular, and button. No maintenance is required and these cells will operate in any position. In addition, all cylindrical and rectangular cells in this classification feature a resealable vent mechanism that permits maximum cell life, even under infrequent abnormal operation.

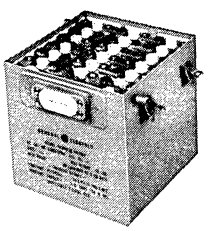
Cylindrical and rectangular sealed cells provide maximum discharge rates and capacity. The special resealing vent mechanism on these cells provides added safety and reliability, making them especially suited for portable, cordless, rechargeable consumer products such as TV sets, radio receivers, and transceivers; appliances; and starting small gas engines. Available ratings run from 0.10 to 4.0 ampere-hours at the one-hour rate.

Button cells are particularly suited for portable radios, flashlights, photo flash equipment, burglar alarms, and other low-drain high-capacity applications. Available ratings run from 0.08 to 1.60 ampere-hours at the one-hour rate.

Write for Sealed Cell Bulletin GEA-9337



Typical vented cell



Typical aircraft battery

VENTED CELLS

Vented cells and batteries — Vented nickel-cadmium cells and batteries are built to achieve the high-rate discharge service associated with jet aircraft engine starting, diesel- and turbine-engine starting, fixed and portable power supplies. These cells provide outstanding performance where large peaks of power and fast recharging are required. In many applications, their performance permits a size reduction over lead-acid batteries and a reduction in maintenance.

Vented cells are available with capacities from 13.5 amp-hours to 170 amp-hours in both steel and nylon cases. Low-maintenance cells are available in the 25 and 40 amp-hour sizes.

A complete listing of models and sizes along with a description of battery operation and proper maintenance procedures will be found in a separate publication GET-3593, "Operating and Service Manual," available at no charge from General Electric Co., Aircraft Battery Sales and Service, P.O. Box 114, Gainesville, Fla. 32601.

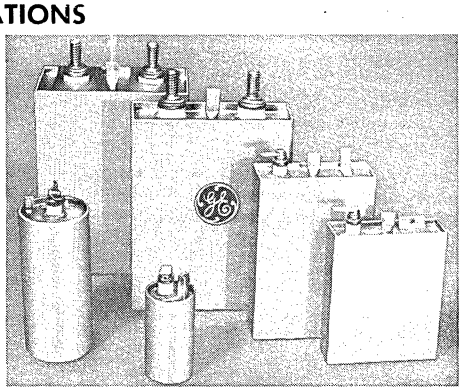
SPECIAL DESIGNS

All of these battery cell types can be customized, through use of special battery design and packaging techniques, to meet individual power and size requirements.

AEROSPACE APPLICATIONS

General Electric nickel-cadmium aerospace batteries are designed to operate for extended periods in an outer space environment. The battery cells employ a hermetic ceramic-to-metal seal (leakage rate less than 1×10^{-8} cc/second of helium per year) construction that effectively insulates the positive terminal or both terminals. The cells are also designed to withstand constant overcharging at specified rates.

Specialized cell and battery designs will be built to meet unusual requirements. This includes special cell terminal arrangements, deep drawn cases, cell case design, and third electrode control circuit to permit faster charging. Available ratings run from 0.75 to 100.0 ampere-hours at the one-hour rate.



Hermetically-sealed aerospace cells are available in stainless-steel cylindrical or rectangular case designs.

For complete information contact your nearby GE Sales Office, or write to General Electric Co., Section 998-80. Schenectady, N. Y. 12305.

GENERAL ELECTRIC

GATES

A single source for all possible types of "brute force" and regulated power supplies that can fill 90% of your design and application needs. Gates Power Supplies give you absolutely lowest cost and long life. The units are excellently constructed of high rated components for trouble free, years of service.

Silicon or Selenium. Single and three-phase units. 1 to 1000 volts, 1 to 1000 Amps. Metered and unmetered Static or variable outputs. Rack, cabinet or chassis mounts. Unit or hundred quantities 48 hour delivery. Two year guarantees. Power supplies for OEM Application, Testing, Prototype, Lab type units, Plating, Motor Control, Cathodic Protection, Transistor power, Anodizing, Battery Charging, Battery Conversions, Marine types, Aircraft Starting.

ECONOMY RANGE DC POWER SUPPLIES — Less Than 1% Ripple - Good Regulation - Rack Mount Type - Heavy Duty Construction - Powerstat - Fused 2% Meters - 115 Vac Input

MODEL GT 12-5: Output 0.12V, 5A .....$ 85.
MODEL GT 12-10: Output 0-12V, 10A .....$ 130.
MODEL GT 12-15: Output 0-12V, 15A .....$ 145.
MODEL GT 12-25: Output 0-12V, 25A .....$ 154.
MODEL GT 12-100: Output 0-12V, 100A .....$ 395.
MODEL GT 14-5: Output 0-14V, 5A .....$ 120.
MODEL GT 14-15: Output 0-14V, 15A .....$ 135.
MODEL GT 14-20: Output 0-14V, 20A .....$ 145.
MODEL GT 14-30: Output 0-14V, 30A .....$ 276.
MODEL GT 14-40: Output 0-14V, 40A .....$ 285.
MODEL GT 14-50: Output 0-14V, 50A .....$ 350.
MODEL GT 14-75: Output 0-14V, 75A .....$ 375.
MODEL GT 14-100: Output 0-14V, 100A .....$ 425.
MODEL GT 16-5: Output 0-16V, 5A .....$ 85.
MODEL GT 16-10: Output 0-16V, 10A .....$ 90.
MODEL GT 16-25: Output 0-16V, 25A .....$ 155.
MODEL GT 16-30: Output 0-16V, 30A .....$ 195.
MODEL GT 16-40: Output 0-16V, 40A .....$ 260.
MODEL GT 16-50: Output 0-16V, 50A .....$ 370.
MODEL GT 16-70: Output 0-16V, 70A .....$ 390.
MODEL GT 16-80: Output 0-16V, 80A .....$ 405.
MODEL GT 28-5: Output 0-28V, 5A .....$ 90.
MODEL GT 28-12: Output 0-28V, 12A .....$ 169.
MODEL GT 28-24: Output 0-28V, 24A .....$ 275.
MODEL GT 32-5: Output 0-32V, 5A .....$ 114.
MODEL GT 32-8: Output 0-32V, 8A .....$ 149.
MODEL GT 32-12: Output 0-32V, 12A .....$ 179.
MODEL GT 32-15: Output 0-32V, 15A .....$ 219.
MODEL GT 32-24: Output 0-32V, 24A .....$ 295.
MODEL GT 32-30: Output 0-32V, 30A .....$ 325.
MODEL GT 32-50: Output 0-32V, 50A .....$ 425.
MODEL GT 32-60: Output 0-32V, 60A .....$ 561.
MODEL GT 48-5: Output 0-48V, 5A .....$ 138.
MODEL GT 48-10: Output 0-48V, 10A .....$ 164.
MODEL GT 48-15: Output 0-48V, 15A .....$ 170.
MODEL GT 48-25: Output 0-48V, 25A .....$ 250.
MODEL GT 48-35: Output 0-48V, 35A .....$ 300.
MODEL GT 48-50: Output 0-48V, 50A .....$ 350.
MODEL GT 48-60: Output 0-48V, 60A .....$ 425.
MODEL GT 48-80: Output 0-48V, 80A .....$ 500.
MODEL GT 48-100: Output 0-48V, 100A .....$ 550.
MODEL GT 80-5: Output 0-80V, 5A .....$ 220.
MODEL GT 80-10: Output 0-80V, 10A .....$ 275.
MODEL GT 80-20: Output 0-80V, 20A .....$ 450.
MODEL GT 115-5: Output 0-115V, 5A .....$ 240.
MODEL GT 115-10: Output 0-115V, 10A .....$ 260.
MODEL GT 115-15: Output 0-115V, 15A .....$ 280.
MODEL GT 115-20: Output 0-115V, 20A .....$ 310.
MODEL GT 115-25: Output 0-115V, 25A .....$ 350.
MODEL GT 115-30: Output 0-115V, 30A .....$ 390.
MODEL GT 115-40: Output 0-115V, 40A .....$ 490.
MODEL GT 115-50: Output 0-115V, 50A .....$ 560.
MODEL GT 115-60: Output 0-115V, 60A .....$ 660.
MODEL GT 115-70: Output 0-115V, 70A .....$ 700.
MODEL GT 130-2: Output 0-130V, 2A .....$ 124.
MODEL GT 120-5: Output 0-120V, 5A .....$ 277.
MODEL GT 130-5: Output 0-130V, 5A .....$ 223.
MODEL GT 130-10: Output 0-130V, 10A .....$ 386.
MODEL GT 200-10: Output 0-220V, 10A .....$ 482.
MODEL GT 80-50: Output 0-80V, 50A ..... Inquire
MODEL GT 80-100: Output 0-80V, 100A ..... Inquire

3 PHASE MODEL POWERSTAT METERS

MODEL GP 125-40: Output 40A, 0-125V ..$ Inquire
MODEL GP 125-80: Output 80A, 0-125V ..$ Inquire
MODEL GP 125-125: Output 125A, 0-125V ..$ Inquire
MODEL GP 250-15: Output 15A, 0-250V ..$ Inquire
MODEL GP 250-25: Output 25A, 0-250V ..$ Inquire
MODEL GP 250-40: Output 40A, 0-250V $ Inquire
MODEL GP 250-75: Output 75A, 0-250V ..$ Inquire
MODEL GP 500-5: Output 5A, 0-500V ..$ Inquire
MODEL GP 500-10: Output 10A, 0-500V ..$ Inquire
MODEL GP 500-25: Output 25A, 0-500V ..$ Inquire
MODEL GP 500-35: Output 35A, 0-500V ..$ Inquire

LOW-COST BASIC/OEM SUPPLIES

MODEL L6.3-30 6.3VDC @ 30A/1% .....$ 125.
MODEL L12-12 12VDC @ 12A/Rip., 1Mv/.01% .....$ 180.
MODEL L12-15 12VDC @ 15A/1% .....$ 170.
MODEL L12-24 12VDC @ 24Amp. .....$ 100.
MODEL L12-24 12VDC @ 24A/1% .....$ 144.
MODEL L12-50 12VDC @ 50Amp. .....$ 133.
MODEL L12-50 12VDC @ 50A/Rip. 1% ....$ 223.
MODEL L24-30 24VDC @ 30A/Rip.1% ....$ 313.
MODEL L28-1 28VDC @ 1A/0.5% .....$ 55.
MODEL L28-2 28VDC @ 1A/Rip. .05%....$ 65.
MODEL L28-5 28VDC @ 5Amp. .....$ 85.
MODEL L28-8 28VDC @ 8Amp. .....$ 110.
MODEL L28-12 28VDC @ 12Amp. .....$ 120.
MODEL L28-24 28VDC @ 24Amp. (N.F.)....$ 115.
MODEL L28-24 28VDC @ 24Amp. .....$ 180.
MODEL L28-30 28VDC @ 30Amp. .....$ 313.
MODEL L28-50 28VDC @ 50Amp. (N.F.)....$ 205.
MODEL L28-50 28VDC @ 50Amp. .....$ 285.
MODEL L28-50 28VDC @ 50Amp. —1% R. .....$ 403.

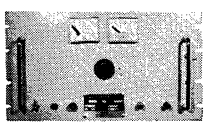
(N.F.) means not filtered

MAGNETICALLY REGULATED D.C. POWER SUPPLIES

REGULATION: Line ±1% for ±15% line voltage change load ±2% for any load change between ½ load and full load. Ripple 1% RMS Maximum. Rack or cabinet types.

VOLTS	D.C. OUTPUT AMPS	VA	CATALOG NUMBER	LOAD REGULATIFON 20% F.L.	50% F.L.	PRICE
6	10	60	6GDCV10	9	7	$130.00
6	15	90	6GDCV15	9	7	140.00
12	5	60	12GDCV5	7	5	92.00
12	10	120	12GDCV10	7	5	120.00
12	15	180	12GDCV15	7	5	155.00
18	5	90	18GDCV5	5	4	96.00
18	10	180	18GDCV10	7	5	141.00
24	6	144	24GDCV6	5	4	116.00
24	10	240	24GDCV10	6	4	144.00
24	15	360	24GDCV15	5	4	200.00
24	25	600	24GDCV25	6	4	275.00
28	8	224	28GDCV8	6	4	144.00
28	15	420	28GDCV15	7	5	200.00
48	4	192	48GDCV4	3.5	2.5	109.00
48	4	480	48GDCV4	4	2	149.00
48	20	960	48GDCV20	3	2	223.00
125	2	250	125GDCV2	2.5	1.5	117.00
150	2	300	150GDCV2	2	1.5	117.00
150	1	200	200GDCV1	3	2	112.00
250	1	250	250GDCV1	3	2	120.00

NEW SCR REGULATED POWER SUPPLIES



GCR32-30 115VAC 24-32 @ 30A 1% Rip. ±1% Reg. Meters 19"Wx17"Dx12¼"H

GCR32-25 115VAC 24-32 @ 25A 1% ±1% Meters 19"Wx17"Dx12¼"H

GCR32-20 115VAC 24-32 @ 20A 1% ±1% Meters 19"Wx17"Dx10¼"H

MODEL L28-100 28VDC @ 100Amp. .....$ 418.
MODEL L115-2.5 115VDC @ 2.5A .....$ 85.
MODEL L115-5 115VDC @ 5A .....$ 124.
MODEL L115-10 115VDC @ 10A (N.F.) .....$ 188.
MODEL L115-10 115VDC @ 10A .....$ 340.
MODEL L220-5 220VDC @ 5A .....$ 223.
MODEL L220-10 220VDC @ 10A .....$ 340.
MODEL L440-5 440VDC @ 5A .....$ 349.

(N.F.) means not filtered

12 VOLT POWER SUPPLIES — 1% Ripple

MODEL GS 12-1, Output 1A, 12V .....$ 35.00
MODEL GS 12-3, Output 3A, 12V .....$ 55.00
MODEL GS 12-5, Output 5A, 12V .....$ 65.00
MODEL GS 12-10, Output 10A, 12V .....$ 85.00
MODEL GS 12-15, Output 15A, 12V $130.00
MODEL GS 12-20, Output 20A, 12V $150.00
MODEL GS 12-25, Output 25A, 12V $170.00
MODEL GS 12-30, Output 30A, 12V $190.00

3 PHASE BENCH MODEL PLATING SUPPLIES

MODEL GL 6-50 6V 50A $204.00
MODEL GL 9-50 9V 50A $212.00
MODEL GL 12-50 12V 50A $220.00
MODEL GL 18-50 18V 50A $236.00
MODEL GL 6-75 6V 75A $256.00
MODEL GL 9-75 9V 75A $264.00
MODEL GL 12-75 12V 75A $276.00
MODEL GL 18-75 18V 75A $292.00
MODEL GL 6-100 6V 100A $268.00
MODEL GL 9-100 9V 100A $284.00
MODEL GL 12-100 12V 100A $300.00
MODEL GL 18-100 18V 100A $316.00
MODEL GL 6-150 6V 150A $300.00
MODEL GL 9-150 9V 150A $328.00
MODEL GL 12-150 12V 150A $352.00
MODEL GL 18-150 18V 150A $372.00
MODEL GL 6-200 6V 200A $330.00
MODEL GL 9-200 9V 200A $352.00
MODEL GL 12-200 12V 200A $372.00
MODEL GL 6-250 6V 250A $372.00
MODEL GL 9-250 9V 250A $396.00
MODEL GL 12-250 12V 250A $460.00

24 VOLT POWER SUPPLIES
Rack Type — 1% Ripple

MODEL G 24-6R 24VDC 6A .....$ 95.00
MODEL G 24-15R 24VDC 15A $105.00
MODEL G 24-25R 24VDC 25A $125.00
MODEL G 24-50R 24VDC 50A $210.00

GR LINE REGULATED POWER SUPPLIES — 2% Meters - 1% Ripple

MODEL GR 12-5 0-12V 5A $120.00
MODEL GR 12-10 0-12V 10A $155.00
MODEL GR 12-20 0-12V 20A ..... Inquire
MODEL GR 12-30 0-12V 30A $175.00
MODEL GR 16-5 0-16V 5A $175.00
MODEL GR 16-10 0-16V 10A $125.00
MODEL GR 8-10 0-8V 10A $155.00
MODEL GR 28-5 0-28V 5A .....$ 95.00
MODEL GR 14-5 0-14V 5A $125.00
MODEL GR 32-4 0-32V 4A .....$ 79.00
MODEL GR 16-8 0-16V 8A $135.00
MODEL GR 32-15 0-32V 15A $225.00
MODEL GR 55-10 0-55V 10A $210.00
MODEL GR 125-1 0-125V 1A $375.00
MODEL GR 125-5 0-125V 5A $215.00
MODEL GR 125-10 0-125V 10A $485.00

INDUSTRIAL POWER UNITS — SINGLE PHASE

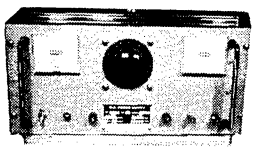
MODEL GK 115-125A Output 115V 125W....$ 63.00
MODEL GK 115-125B Output 115V 125W....$ 63.00
MODEL GK 115-125C Output 115V 125W....$ 63.00
MODEL GK 115-250A Output 115V 250W....$ 72.50
MODEL GK 115-250B Output 115V 250W....$ 72.50
MODEL GK 115-250C Output 115V 250W....$ 72.50
MODEL GK 115-375A Output 115V 375W....$ 89.00
MODEL GK 115-375B Output 115V 375W....$ 89.00

PRICES SUBJECT TO CHANGE — SEE AD IN SECTION 4800

GATES

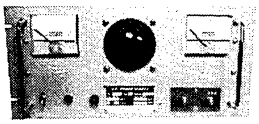
GATES ELECTRONIC COMPANY, INC. • 526 Van Nest Avenue, Bronx, N.Y. 10460 • Telephone: Tulip 1-5900

MODEL GT125-5F



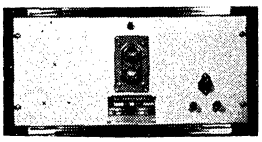
INPUT: 115VAC
OUTPUT: 0-125 @ 5A
RIPPLE: 0.5%
REGULATION: UNREGULATED
METERS: YES
DIMENSIONS: 21″ W x 15″ D x 10½″ H
PRICE: $325.00

MODEL GT14-40



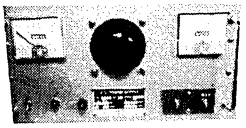
INPUT: 115VAC
OUTPUT: 0-14 @ 40A
RIPPLE: 0.1%
REGULATION: UNREGULATED
METERS: YES
DIMENSIONS: 19″ W x 13½″ D x 8-3/6″ H
PRICE: $275.00 — RACK MOUNTED

MODEL G220-10



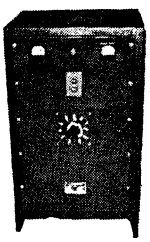
INPUT: 115VAC
OUTPUT: 220VDC @ 10A
RIPPLE: 48%
METERS: NONE
DIMENSIONS: 21″ W x 15″ D x 10″ H
PRICE: $425.00
METERS $50.00 EXTRA

SILICON INDUSTRIAL POWER UNIT
MODEL G30-40F



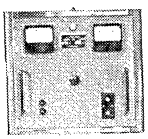
INPUT: 115 Volts AC, 60 cycles, single phase.
OUTPUT: 0-32 Volts DC, 0-40 Amperes DC, continuous duty
RIPPLE: 1% RMS
DIMENSIONS: 12¼″H x 19″W x 13″D
REGULATION: D.C.V. at full load: 32 minimum D.C.V. at 1/10 load: 35 maximum
PRICE: $425.00

SILICON AIRCRAFT BATTERY ELIMINATOR
Model G30-200



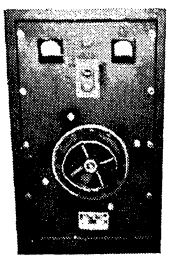
INPUT: 220 Volts AC, 60 cycles, 3 phase
OUTPUT: 0-32 Volts DC, 0-200 amperes continuous duty also avail. 300A
RIPPLE .5% RMS
REGULATION: 5-8% 1/10th load to full load with constant input and maximum output voltage setting
METERS: 2% Accuracy
DIMENSIONS: 25″ x 25″ x 43″

SILICON REGULATED POWER SUPPLY
Model G530-40M



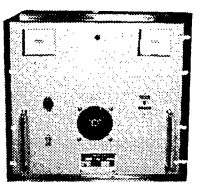
INPUT: 115 Volts AC, 60 cycles, 1 phase
OUTPUT: 5-30 Volts DC, 0-40 amperes
RIPPLE: 1% RMS
REGULATION: ±1% from no load to full load
METERS: 2% Accuracy
DIMENSIONS: 21″ x 15″ 19″

MODEL GT20-200



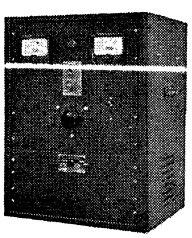
INPUT: 220 VAC 60 cy. 1 Phase
OUTPUT: 0-22 VDC @ 200A
RIPPLE: 1%
CABINET: 35″ x 20″ x 20″
METERS: VOLT & AMP.
PRICE $625.00

SILICON GENERAL PURPOSE RECTIFIER
MODEL G-115



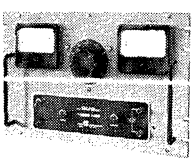
INPUT: 115 Volts AC 60 cycles, 1 Phase
OUTPUT: 0-32 Volts DC, 0-50 Amperes DC, Continuous duty variable over entire range
RIPPLE: 1% RMS
DIMENSIONS: 22″H x 19″W x 15″D
PRICE: $522.00 NET

SILICON POWER RECTIFIER
Model G50-50R



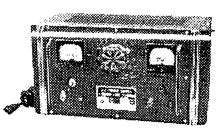
INPUT: 220 Volts AC, 60 cycles, 3 phase
OUTPUT: 0-50 volts DC, 0-50 amperes continuous duty
RIPPLE: 3% RMS
REGULATION: No Load to Full Load 8%
METERS: 2% Accuracy
DIMENSIONS: 21″ x 15″ x 19″

AIRCRAFT BATTERY ELIMINATOR
MODEL G101F



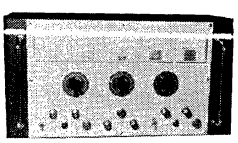
INPUT: 115 Volts AC 60 cycles, single phase
OUTPUT: 0-32 Volts DC, 0-20 Amperes, continuous duty
RIPPLE: 0.5% RMS
Unique overload device prevents needle slam and shows overload condition
REGULATION: D.C.V. at full load: 30
D.C.V. at 1/10 load: 35
METERS: 2% Accuracy
DIMENSIONS: 19″ x 14¼″ x 12¼″
PRICE: $302.50 NET
May be used for Rack or Bench

SILICON POWER RECTIFIER
For transistor circuits electronic equipment
MODEL G92F



INPUT: 115 volts AC 60 cycles, 1 phase
OUTPUT: 0-32 Volts DC, 0-10 Amperes D.C. continuous duty
REGULATION: No load to full load 15%
RIPPLE: Less than 0.3% RMS
METERS: 2% Accuracy
DIMENSIONS: 17″ x 9″ x 9″
PRICE: $169.50 NET
*Also available in 5 Amperes
PRICE: $114.50 NET

VARIABLE AC AND DC POWER SUPPLY



INPUT: 115 Volts AC, 60 HZ, 1 Phase
OUTPUT: (1) 0-22 Volts DC at 4 amperes. (2) 0-22 VAC at 4 amperes. (3) 0-350 Volts DC at 200 MA. All very low filtered.
DIMENSION: 17″ x 9″ x 9″
WEIGHT: 36 Lbs. Approx.

INDUSTRIAL POWER UNITS — SINGLE PHASE Continued

MODEL GK 115-375C	Output 115V	375W....	$ 89.00
MODEL GK 115-500A	Output 115V	500W....	$105.00
MODEL GK 115-500B	Output 115V	500W....	$105.00
MODEL GK 115-500C	Output 115V	500W....	$105.00
MODEL GK 115-750A	Output 115V	750W....	$130.00
MODEL GK 115-750B	Output 115V	750W....	$130.00
MODEL GK 115-750C	Output 115V	750W....	$130.00
MODEL GK 115-1000A	Output 115V	1000W....	$150.00
MODEL GK 115-1000B	Output 115V	1000W....	$150.00
MODEL GK 115-1000C	Output 115V	1000W....	$150.00
MODEL GK 230-125A	Output 230V	125W....	$ 67.00
MODEL GK 230-125A	Output 230V	125W....	$ 67.00

PRICES SUBJECT TO CHANGE

HIGH VOLTAGE DC POWER SUPPLIES — 1% Ripple - Good Regulation - Cabinets - Meters - Heavy Duty Construction - Powerstat - Fused 1% Meters - 115 Vac Input Heavy Duty Line Cord.

MODEL GP 32-20	115V, Out 0-32V	@ 20A..	$ Inquire
MODEL GP 32-40	115V, Out 0-32V	@ 40A..	$ Inquire
MODEL GP 32-100	220V, Out 0-32V	@ 100A	$ Inquire
MODEL GP 32-150	220V, Out 0-32V	@ 150A	$ Inquire
MODEL GP 60-6	115V, Out 0-60V	@ 6A..	$ Inquire
MODEL GP 60-10	115V, Out 0-60V	@ 10A..	$ Inquire
MODEL GP 60-12	115V, Out 0-60V	@ 12A..	$ Inquire
MODEL GP 60-20	115V, Out 0-60V	@ 20A..	$ Inquire
MODEL GP 60-50	220V, Out 0-60V	@ 50A..	$ Inquire
MODEL GP 60-80	220V, Out 0-60V	@ 80A..	$ Inquire
MODEL GP 60-250	220V, Out 0-60V	@ 250A	$ Inquire
MODEL GP 125-3	117V, Out 0-125V	@ 3A....	$ Inquire
MODEL GP 125-5	117V, Out 0-125V	@ 5A....	$ Inquire
MODEL GP 125-10	117V, Out 0-125V	@ 10A..	$ Inquire
MODEL GP 125-20	117V, Out 0-125V	@ 20A..	$ Inquire
MODEL GP 125-24	220V, Out 0-125V	@ 24A..	$ Inquire
MODEL GP 125-40	220V, Out 0-125V	@ 40A..	$ Inquire
MODEL GP 125-80	220V, Out 0-125V	@ 80A..	$ Inquire
MODEL GP 125-120	220V, Out 0-125V	@ 120A	$ Inquire
MODEL GP 250-5	117V, Out 0-250V	@ 5A ..	$ Inquire
MODEL GP 250-10	117V, Out 0-250V	@ 10A..	$ Inquire
MODEL GP 250-12	220V, Out 0-250V	@ 12A..	$ Inquire
MODEL GP 250-20	220V, Out 0-250V	@ 20A..	$ Inquire
MODEL GP 250-40	220V, Out 0-250V	@ 40A..	$ Inquire
MODEL GP 250-60	220V, Out 0-250V	@ 60A..	$ Inquire
MODEL GP 300-1	220V, Out 0-250V	@ 1A....	$ Inquire
MODEL GP 300-2	220V, Out 0-250V	@ 2A ..	$ Inquire
MODEL GP 300-3	220V, Out 0-250V	@ 3A	$ Inquire
MODEL GP 300-5	220V, Out 0-250V	@ 5A....	$ Inquire
MODEL GP 500-1	220V, Out 0-500V	@ 1A....	$ Inquire
MODEL GP 500-2	220V, Out 0-500V	@ 2A....	$ Inquire
MODEL GP 500-3	220V, Out 0-500V	@ 3A....	$ Inquire
MODEL GP 500-5	220V, Out 0-500V	@ 5A....	$ Inquire
MODEL GP 500-5	220V, Out 0-500V	@ 5A....	$ Inquire
MODEL GP 500-10	220V, Out 0-500V	@ 10A..	$ Inquire
MODEL GP 500-20	220V, Out 0-500V	@ 20A..	$ Inquire
MODEL GP 500-30	220V, Out 0-500V	@ 30A..	$ Inquire

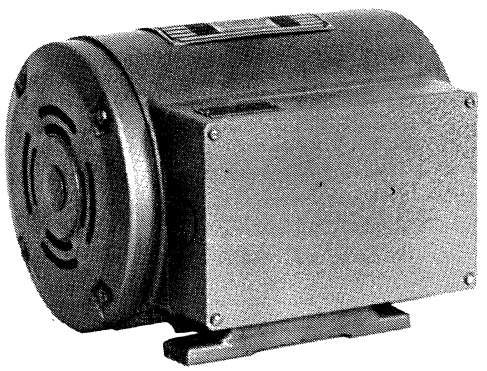
GATES

GATES ELECTRONIC COMPANY, INC. • 526 Van Nest Avenue, Bronx, N.Y. 10460 • Telephone: Tulip 1-5900

NOBRUSH® FREQUENCY

The heart of each "NoBrush" Frequency Converter is a "NoBrush" permanent magnet generator—a revolutionary development in its own right. The "NoBrush" permanent magnet generator features a cast aluminum rotor designed to give amazing voltage stability. It eliminates brushes, commutators, slip rings, resulting in absolute minimum maintenance. Elimination of excitation losses gives amazingly high efficiency, with consequent low heating. Other "NoBrush" advantages are excellent wave form, and immunity to damage by repeated overload or short circuit.

FREQUENCY CONVERTER SERIES 30 UNIT SHELL DESIGN FOR CONVERSION OF 60 TO 400 CYCLES



FEATURES:

Maximum Dependability
Cool Operation
Very Low Audible Noise
Extremely Low R.F. Noise (zero for most applications)
Compact Construction
Light Weight
High Overload Capacity
Minimum Maintenance
Withstands Short Circuit
Stable Output Voltage
Low Internal Impedance (favorable for pulse loads)
Operates in Adverse Environments

The "NoBrush" Unit Shell Frequency Converter was developed in response to the demand for an efficient, compact, dependable quiet unit, for powering electronic and other high frequency equipment. A "NoBrush" generator is mounted with a high quality induction motor within a single shell. Oversize pre-lubricated ball bearings, sealed for life, insure long term maintenance-free operation. Magnetism is permanently "locked in" at a high level. Problems of radio interference, sparking, fouling, etc., have been eliminated. Because of its simple design and rugged construction, the unit withstands extremes of mechanical and electrical operating conditions, resulting in continuous long-life service.

FUNCTION. The Series 30 Converter is a highly compact motor generator set for conversion of 60 cycle to 400 cycle power. CONSTRUCTION. Generator and motor stators contained within aluminum alloy unit shell. Generator and motor rotors pressed on unit shaft, with ball bearings at ends of shaft. Two-bearing construction is utilized, without any projecting shafts, couplings or belts. Single phase input models are provided with starting capacitor and relay, easily accessible in a generous-sized terminal box. APPLICATION. Wherever a dependable, trouble-free source of 400 cycle power within the range of 150 VA to 2.5 KVA is required, where 60 cycles (and in some cases, 50 cycles) is available for primary energy. SPECIFIC APPLICATIONS. As a source of high frequency power for electronic apparatus; for test and research work; for the servicing of aircraft electrical equipment; for portable radio and military electronic devices; for high frequency motors; for isolated power in computers.

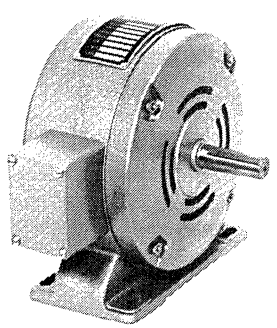
SPECIFICATIONS: INPUT. Low-slip induction motors utilized for drive, available in single and three-phase models. Single phase units are reconnectable for 115 or 230 volts and are capacitor start, induction run. Three phase units normally supplied reconnectable for 208 or 220 or 440 volts. DUTY. Continuous. MOTOR SPEED. 3500 RPM for ratings up to 3/4 KVA. 1750 RPM for ratings from 1 KVA to 2 1/2 KVA. BEARING TYPE. Ball bearings, sealed, lubricated-for-life. ACCESS. In single phase models—to starting capacitor and relay by removal of external terminal box cover. OUTPUT VOLTAGE STABILITY. Within 1% for constant load and constant input frequency. EFFECT OF INPUT VOLTAGE CHANGE ON OUTPUT VOLTAGE. Output voltage will change less than 1% for input changes of plus or minus 10%, or for short period input disturbances as great as 30%. OUTPUT FREQUENCY. See Chart. OUTPUT FREQUENCY STABILITY. Within plus or minus 1/2% at constant load and constant input frequency. TEMPERATURE RISE. 40 degrees, C. (72 degrees F.) R. F. NOISE. Extremely low; may be considered zero for most applications. EXCITATION. Internal, permanent magnet. REGULATION. See typical curves. DIRECTION OF ROTATION. Operates equally well in clockwise or counterclockwise direction. WAVE FORM. No sharp peaks or spikes. Total harmonics, single or three phase, within 4% for ratings 1 KVA or over; 5%-8% for ratings under 1 KVA, depending on model. Improved wave form on special order. OPERATING POSITION. May be operated with shaft horizontal, vertical or at any angle. COOLING. By internally mounted fan. AUDIBLE NOISE. Approximately 70 db. (Measurement on "B" scale, at 3 feet distance from unit, in accordance with ASA Standard No. Z 24.7-1950.) AVAILABLE VARIATIONS. The following variations are available on special order, in most cases at only a modest addition in price. (Not all variations are available in all ratings.) • Re-lubricable bearings • Militarized construction • Other standard single or three phase input voltages • 50 cycle input • Synchronous motor drive • Other output frequencies—180,280,360,840 cycles • Other standard or non-standard output voltages • Reconnectable output windings for full power at either of two voltages • Low voltage taps • Auxiliary D.C. output at low or high voltage • Two phase output • Class "B" insulation for high ambient temperature operation • Carrying handles for easy portability • Screened openings for unfavorable environments.

Model No.	OUTPUT KVA Rating	Phase	Nominal No Load	Voltages Full Load	Nom. Freq. Full Load	INPUT H.P.	Speed	Phase	Voltage	Current Full Load	DIMENSIONS Height	Length	Width	WEIGHT Net Wt. lbs.
30-021	0.15	1	124	115	410	1/4	3500	1		3.0/1.5	8	11	9¾	40
30-004	0.25	3	124/214	115/200	410	1/2	3500	1		6.6/3.3	8	11	9¾	43
30-002	0.5	1	124	115	410	¾	3500	1	115/230 RECONNECTABLE 208-220/440 RECONNECTABLE	11.7/5.6	8	11	9¾	51
30-025	1.0	3	124/214	115/200	410	1½	1750	1		24.0/12.0	11¾	16	14	103
30-026	1.5	3	124/214	115/200	410	2¼	1750	1		30.0/15.0	11¾	16	14	121
30-007	2.0	3	124/214	115/200	410	3	1750	1		34.0/17.0	11¾	16	14	130
30-011	0.50	1	124	115	410	¾	3500	3		3.2/1.6	8	11	9¾	51
30-006	0.75	3	124/214	115/200	410	1.1	3500	3		5.2/2.6	8	11	9¾	51
30-020	2.0	3	124/214	115/200	410	3	1750	3		9.0/4.5	11¾	16	14	112
30-029	2.5	3	124/214	115/200	410	4½	1750	3		12.6/6.3	11¾	16	14	145

CONVERTERS AND GENERATORS

OTHER 400 CYCLE CONVERTERS & GENERATORS

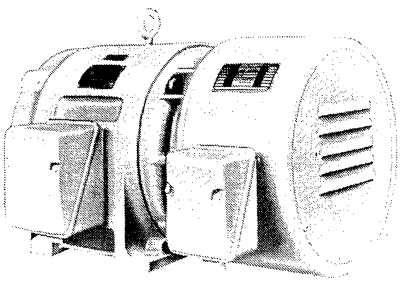
"NoBrush" machines employ permanent magnet excitation—the oldest principle in generator construction—applied in the newest way. By modern principles of engineering design, performance and capabilities previously unheard of in rotating generators are made available—fitting the machine to applications where previously unsuitable. Outstanding advanatges exist over other methods of power generation and frequency conversion. Quality has been tested repeatedly in actual military and industrial applications, under most exacting conditions that would have disabled machines of other types.



ALTERNATORS

The original, revolutionary, "NoBrush" generator. Permanent magnets yield stability, reproducibility, ruggedness and virtually zero R.F. noise. Available in large variety of ratings, frequencies and voltages. Supplementary windings with rectifiers available for D.C. output.

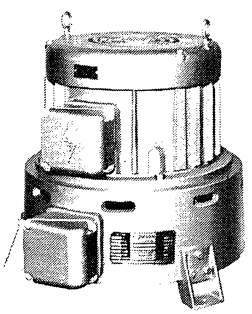
Cat. No.	Rating KVA	Phase	Speed RPM	Height	Length	Width	Weight Lbs.
36-001	.25	1	3428	8⅛″	7 1/16″	9 1/16″	17
36-003	.50	1	3428	8⅛″	7 1/16″	9 1/16″	22
36-030	.50	3	3428	8⅛″	7 1/16″	9 1/16″	21½
36-005	.75	3	3428	8⅛″	7 1/16″	9 1/16″	21½
36-007	1	3	1714	12 3/16″	8⅜″	13⅜″	35½
36-008	2	3	1714	12 3/16″	8⅜″	13⅜″	45
36-011	5	3	1714	17¼″	11 13/16″	18⅜″	103½
36-012	7½	3	1714	17¼″	11 13/16″	18⅜″	120
36-013	10	3	1714	17¼″	11 13/16″	18⅜″	135



SYNC. DRIVEN CONVERTER

The ultimate in frequency converter quality. Drive from 1200 R.P.M. brushless synchronous motor. Direct mounted 40-pole "NoBrush" generator delivers stable, almost pure sine-wave voltage. Immune to voltage disturbances on input line. Militarized versions available. Ratings from 2.5 KVA to 10 KVA.

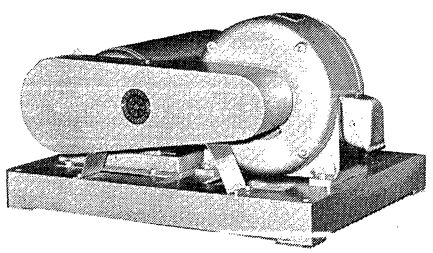
Cat. No.	Rating KVA	Phase	Length	Width	Height	Weight Lbs.
35-001	2.5	1	26″	22″	16½″	470
35-002	5	1	30″	22″	16½″	650
35-003	3	3	26″	22″	16½″	475
35-004	5	3	28″	22″	16½″	590
35-005	10	3	30″	22″	16½″	660



VERTICAL CONVERTER

A rugged 60-400 CPS frequency converter for power output ratings from 2.5 KVA to 10.0 KVA. High quality induction motor is close coupled to a famous "NoBrush" generator for a really outstanding unit. Sealed bearings and totally enclosed motor result in greatly minimized maintenance. Very compact, with high power to weight and size ratio. Available variations include 50 CPS input and other output frequencies.

Cat. No.	Rating KVA	Phase	Dimensions Diameter	Dimensions Height	Weight Lbs.
33-001	2.5	1	19.4″	16.1″	173
33-002	3.5	1	19.4″	16.1″	215
33-003	5.0	1	21.9″	18.1″	277
33-004	5.0	3	21.9″	18.1″	248
33-005	7.5	3	21.9″	18.1″	262
33-006	10.0	3	21.9″	18.8″	334
33-009	3.0	3	19.4″	16.1″	177



MOTOR GENERATOR SETS

"NoBrush" Motor-Generator Sets give maximum flexibility. Units use V-belt or timing belt coupling. Available with either synchronous or induction motor drive. Components rigidly mounted on rust-proofed steel base. For conversion of either 50 or 60 cycle power to 400 cycles.

3 PHASE INPUT AND 1 PHASE OUTPUT BELT DRIVEN

Cat. No.	Rating KVA	Overall Length	Base Length	Height	Width	Weight Lbs.
37-004	1 KVA	32½″	30″	15½″	15″	225
37-024	3 KVA	36″	34″	21½″	18″	370
37-025	5 KVA	41½″	40″	21½″	21″	430

3 PHASE IN AND 3 PHASE OUT

37-026	3 KVA	36″	34″	17½″	18″	350
37-027	5 KVA	41½″	40″	21½″	22″	400
37-028	10 KVA	45″	42″	21½″	25″	500

Note: Single phase input available in some ratings on special order. Specifications subject to change without notice.

GEORATOR CORPORATION
Makers of NOBRUSH power systems
MANASSAS, VIRGINIA 22110 • TELEPHONE: (703) EMpire 8-2102

CUSTOM DESIGNED POWER SUPPLIES
POWER SYSTEMS, INVERTERS AND CONVERTERS

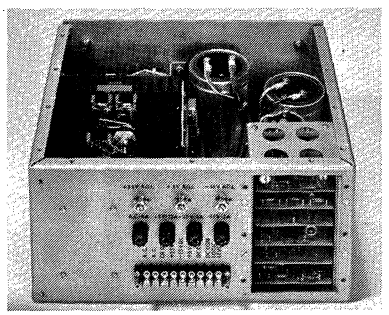
ELECTRONIC PRODUCTS DIVISION

The Electronic Products Division designs, develops and manufactures custom power supplies to meet your performance requirements. Our in-house hybrid thick film facility produces voltage regulators and series-pass/driver transistor modules. This "building-block" approach uses standardized circuits for high reliability and cost reduction. Complete in-house and interdivisional capability for all major components.

SYSTEM INTERFACE GUARANTEE

Hi-G guarantees that the finished supply will work **in the system**, not just to meet the printed specifications. Typical examples of successful system interface are illustrated below.

MAGNETIC DRUM MEMORY POWER SYSTEM



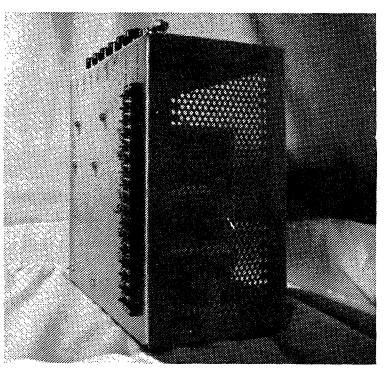
Features:
Regulation, control, protection and sequencing logic all on plug-in boards.
Constructed to meet shock and vibration specifications.

Output:

Voltage	Current-Amps	Regulation
+25VDC	5.0	±3% Total for line,
+ 5VDC	1.0	Load, Temp and
−15VDC	1.0	Drift

Protection:
Sequential Turn-on, Auto-Shutdown, Over-Voltage, Under-Voltage, Line Loss

DISK MEMORY DRIVE SUPPLY



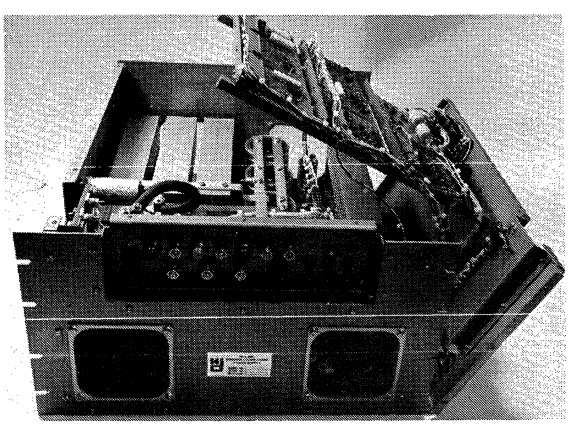
Features:
Input Line Sensing
Sequencing
Memory Protection

Outputs:

Voltages	Current-Amps	Regulation
+ 5VDC	5.0	±1
− 5VDC	0.5	±1
+30VDC	1.0	±3%
−30VDC	0.25	±5%
+75VDC	0.50	±5%

Protection:
Overvoltage, Undervoltage, Line Failure

FOURTH GENERATION COMPUTER POWER SYSTEM



Features:
Optional +5 Volt Expansion Module.
Plug-in P.C. Boards.
AC Input Filtering and Controls.
Memory Protection and Signals.

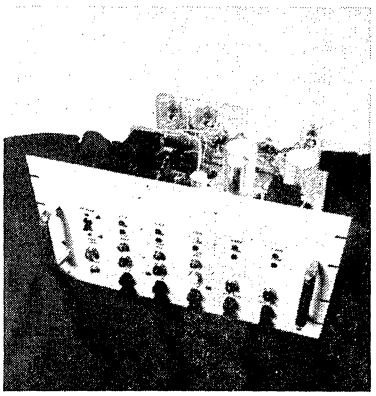
Outputs:

Voltage	Current-Amps	Regulation*
+ 5VDC	60 Normal 90 with Module	±1.5%
+15VDC	6.0	±1.0%
−15VDC	6.0	±1.0%
+12VDC	6.0	±5%

Protection:
Sequencing, Over-Voltage, Current Foldback, Circuit Breakers

*Includes: Line, Load and Temperature

CONSUMER CREDIT VERIFICATION SYSTEM POWER SUPPLY



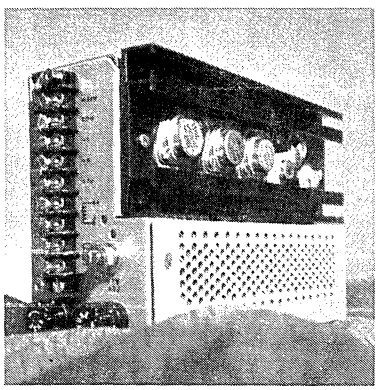
Features:
Separate supplies for logic-I.C. loads and motor-solenoid-lamp loads.
Interlocked outputs for system shut-down.

Output:

Voltage	Current-Amps	Regulation
+ 5VDC	10.0	± 1%
+12VDC	1.0	± 1%
−12VDC	1.0	± 1%
+26VDC	5.0	±10%
+48VDC	5.0	±10%

Protection:
Over-voltage crowbars, Circuit-breaker, Output fuses

PHOTOMETRIC INSTRUMENT LAMP SUPPLY



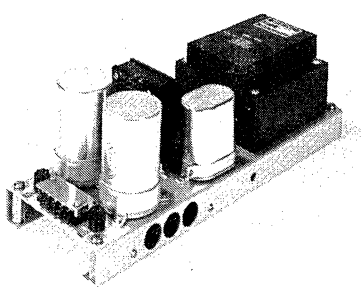
Features
Highly regulated for constant brightness
Fast turn-on into cold filament
Long lamp life
Only 3¼ inches wide

Outputs:

Voltage	Current (Amps)	Regulation
+ 6VDC	8.0 (at 50°C)	±0.01%
+24VDC	1.5	Solenoid Driver
115VAC	50VA	Fans, Indicators

Protection:
Current foldback with delay circuit, Fuses

CONSTANT VOLTAGE FERRORESONANT DC POWER SUPPLIES



Outputs: Single and multiple output voltages
Regulation: ±1% for ±15 VAC line change
Ripple: Less than 1%
Unit Pictured: 48 VDC at 10 amps
Options Available: Open or enclosed chassis L-C Filter; Rack mounted or modular.

TRANSFORMERS *Constant Voltage transformers are also available custom built to your specifications.

IN A HURRY? CALL COLLECT (203) 623-2481

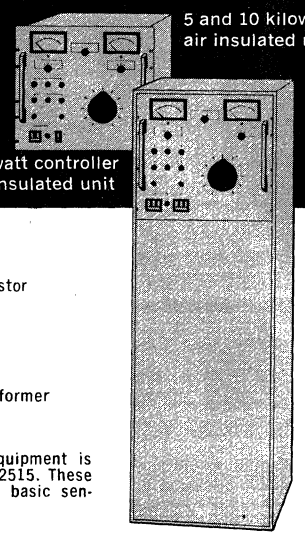
ELECTRONIC PRODUCTS DIVISION

HI-G INCORPORATED
SPRING STREET AND ROUTE 75
WINDSOR LOCKS, CONN. 06096

HV DC power supplies

HIPOTRONICS®

. . . A COMPLETE LINE OF REGULATED AND UNREGULATED HIGH VOLTAGE POWER SUPPLIES FOR ALL HV REQUIREMENTS, INCLUDING PULSED APPLICATIONS AND ACCELERATOR SUPPLIES. OUTPUT CURRENTS RANGE FROM 0.1 MA TO 100 AMPERES. ALL UNITS ARE CONSERVATIVELY DESIGNED FOR CONTINUOUS USE; THEY ARE AVAILABLE WITH FULLY INSTRUMENTED CONTROL CONSOLES, OR WITHOUT CONTROLS FOR USE IN OEM EQUIPMENT OR WITH EXISTING CONTROLLERS.



DESIGN FEATURES

- Reversible polarity
- Output-connected, triple-range voltage meter
- Triple-range current meter in return leg of HV circuit
- Adjustable overload relay, 10% to 110% rated current, with reset button
- Rated current available from zero to rated voltage
- Meter recalibration potentiometers

CUSTOMIZED CAPABILITY

Hipotronics has designed and custom-manufactured a wide variety of power supplies for a wide variety of uses. Customized power supplies include application-oriented units for: electrostatics, accelerators, lasers, high power radar, high voltage component testing, and many more.

PERSONNEL SAFETY FEATURES

- Output shorting solenoid and/or bleeder resistor
- Series-limiting resistor in output circuit
- External interlock provision and pilot light
- Zero start interlock and pilot light

EQUIPMENT SAFETY FEATURES

- Surge protection for meters and relays
- Backup circuit breaker in primary of HV transformer
- Input circuit breakers and pilot light

CORONA TESTING

To assure high reliability and long life, all equipment is tested to Hipotronics' specification #2514 or #2515. These specifications require a corona detector with a basic sensitivity of 1 picocoulomb per centimeter.

SPECIFICATIONS

The following tables list Hipotronics' unregulated series of HV DC power supplies. Every model is also available with two types of reguation: the MR series is electromechanically regulated to 0.5%; ER series electronically regulated to 0.01%.

400-WATT OUTPUT UNITS

Voltage (KV)	Current (ma)	Model No.	Price ($)
1	400	801-400	550
2	200	802-200	555
3	130	803-130	560
4	100	804-100	565
5	80	805- 80	570
6	65	806- 65	575
7.5	50	807.5- 50	580
10	40	810- 40	585
15	25	815- 25	590
20	20	820- 20	595
25	15	825- 15	605
30	12	830- 12	620
40	10	840- 10	760
50	8	850- 8	770
60	6.5	860- 6.5	795
75	5	875- 5	805
90	4.5	890- 4.5	1020
100	4	8100- 4	1070
120	3.5	8120- 3.5	1095
150	2.5	8150- 2.5	
200	2	8200- 2	
250	1.6	8250- 1.6	
300	1.3	8300- 1.3	

INPUT . . . . . 115 volts, 50/60 Hz, 1 phase, 5 amperes
REGULATION . . 15% no load to full load
RIPPLE . . . . . 2% rms
HV OUTPUT . . . 20-foot shielded cable (Bushing available on request)

1 KILOWATT OUTPUT UNITS

Voltage (KV)	Current (ma)	Model No.	Price ($)
1	1000	801-1000	650
2	500	802- 500	660
3	330	803- 330	670
4	250	804- 250	680
5	200	805- 200	690
6	165	806- 165	700
7.5	130	807.5- 130	710
10	100	810- 100	720
15	65	815- 65	730
20	50	820- 50	740
25	40	825- 40	760
30	33	830- 33	775
40	25	840- 25	860
50	20	850- 20	890
60	16	860- 16	910
75	13	875- 13	930
90	11	890- 11	1100
100	10	8100- 10	1135
120	8	8120- 8	1175
150	6.5	8150- 6.5	
200	5	8200- 5	
250	4	8250- 4	
300	3.3	8300- 3.3	

INPUT . . . . . 115 volts, 50/60 Hz, 1 phase, 12 amperes
REGULATION . . 15% no load to full load
RIPPLE . . . . . 2% rms
HV OUTPUT . . . 20-foot shielded cable (Bushing available on request)

1.5 KILOWATT OUTPUT UNITS

Voltage (KV)	Current (ma)	Model No.	Price ($)
1	1500	801-1500	900
2	750	802- 750	920
3	500	803- 500	945
4	375	804- 375	975
5	300	805- 300	1000
6	250	806- 250	1025
7.5	200	807.5- 200	1050
10	150	810- 150	1080
15	100	815- 100	1100
20	75	820- 75	1150
25	60	825- 60	1200
30	50	830- 50	
40	37.5	840- 37.5	
50	30	850- 30	
60	25	860- 25	
75	20	875- 20	
90	17	890- 17	
100	15	8100- 15	
120	12.5	8120- 12.5	
150	10	8150- 10	
200	7.5	8200- 7.5	
250	6.0	8250- 6.0	
300	5.0	8300- 5.0	

INPUT . . . . . 115 volts, 50/60 Hz, 1 phase, 20 amperes
REGULATION . . 15% no load to full load
RIPPLE . . . . . 2% rms
HV OUTPUT . . . 20-foot shielded cable (Bushing available on request)

2.5 KILOWATT OUTPUT UNITS

Voltage (KV)	Current (ma)	Model No.
1	2500	801-2500
2	1250	802-1250
3	830	803- 830
4	625	804- 625
5	500	805- 500
6	425	806- 425
7.5	300	807.5- 300
10	250	810- 250
15	160	815- 160
20	125	820- 125
25	100	825- 100
30	80	830- 80
40	60	840- 60
50	50	850- 50
60	40	860- 40
75	33	875- 33
90	27	890- 27
100	25	8100- 25
120	20	8120- 20
150	16	8150- 16
200	12.5	8200- 12.5
250	10	8250- 10
300	8	8300- 8
400	6	8400- 6
500	5	8500- 5

INPUT . . . . . 115 volts, 50/60 Hz, 1 phase, 30 amperes
REGULATION . . 15% no load to full load
RIPPLE . . . . . 2% rms
HV OUTPUT . . . 20-foot shield cable (Bushing available on request)

5 KILOWATT OUTPUT UNITS

Voltage (KV)	Current (ma)	Model No.	Input
1	5000	801-5000	208/230 V, 3 PHASE, 50/60 Hz, 20 AMPS
2	2500	802-2500	
3	1666	803-1666	
4	1250	804-1250	
5	1000	805-1000	
6	840	806- 840	
7.5	670	807.5- 670	
10	500	810- 500	
15	335	815- 335	
20	250	820- 250	
25	200	825- 200	
30	166	830- 166	
40	125	840- 125	208/220 V, SINGLE PHASE 50/60 Hz, 35 AMPS
50	100	850- 100	
60	84	860- 84	
75	67	875- 67	
90	56	890- 56	
100	50	8100- 50	
120	41.5	8120- 41.5	
150	33.3	8150- 33.3	
200	25.0	8200- 25	
250	20.0	8250- 20	
300	16.6	8300- 16.6	
400	12.5	8400- 12.5	
500	10.0	8500- 10.0	

REGULATION . . 10% 3 phase, 15% 1 phase, no load to full load
RIPPLE . . . . . 1% or 5% rms, 3 phase units; 2% rms, 1 phase units (see chart)
HV OUTPUT . . . 20-foot shielded cable (Bushing available on request)

10 KILOWATT OUTPUT UNITS

Voltage (KV)	Current (ma)	Model No.	Input
1	10 AMP	801- 10A	208/230 V, 3 PHASE, 50/60 Hz, 40 AMPS
2	5 AMP	802- 5A	
3	3300	803-3300	
4	2500	804-2500	
5	2000	805-2000	
6	1650	806-1650	
7.5	1300	807.5-1300	
10	1000	810-1000	
15	650	815- 650	
20	500	820- 500	
25	400	825- 400	
30	330	830- 330	
40	250	840- 250	440/480 V, SINGLE PHASE, 50/60 Hz, 35 AMPS
50	200	850- 200	
60	160	860- 160	
75	130	875- 130	
90	110	890- 110	
100	100	8100- 100	
120	80	8120- 80	
150	65	8150- 65	
200	50	8200- 50	
250	40	8250- 40	
300	33	8300- 33	
400	25	8400- 25	
500	20	8500- 20	
600	16	8600- 16	
750	13	8750- 13	
1000	10	81000- 10	

REGULATION . . 10% 3 phase, 18% 1 phase, no load to full load
RIPPLE . . . . . 1% or 5% rms, 3 phase units; 2% rms, 1 phase units (see chart)
HV OUTPUT . . . Cable to 600 KV; Toroid over 600 KV

Prices and specifications subject to change without notice.

HIPOTRONICS®
HIPOTRONICS, INC.
Brewster, N. Y. 10509 / (914) 279-8091

HV DC power supplies (contd.)

HIPOTRONICS®

15 KILOWATT OUTPUT UNITS

Voltage (KV)	Current (ma)	Model No.	Input
1	15 AMP	801- 15A	440/480 V, 3 PHASE, 50/60 Hz, 25 AMPS
2	7.5 AMP	802- 7.5A	
3	5 AMP	803- 5A	
4	3.75 AMP	804- 3.75A	
5	3 AMP	805- 3A	
6	2.5 AMP	806- 2.5A	
7.5	2 AMP	807.5- 2A	
10	1.5 AMP	810- 1.5A	
15	1000	815-1000	
20	750	820- 750	
25	600	825- 600	
30	500	830- 500	
40	375	840- 375	
50	300	850- 300	
60	250	860- 250	
75	200	875- 200	440/480 V, 1 PHASE, 50/60 Hz, 45 AMPS
90	170	890- 170	
100	150	8100- 150	
120	125	8120- 125	
150	100	8150- 100	
200	75	8200- 75	
250	60	8250- 60	
300	50	8300- 50	
400	37.5	8400- 37.5	
500	30.0	8500- 30	
600	25.5	8600- 25	
750	20.0	8750- 20	
1000	15.0	81000- 15	

REGULATION . . 10% 3 phase, 18% 1 phase, no load to full load
RIPPLE . . . . . 1% or 5% rms, 3 phase units; 2% rms, 1 phase units (see chart)
HV OUTPUT . . Cable to 600 KV; Toroid over 600 KV

25 KILOWATT OUTPUT UNITS

Voltage (KV)	Current (ma)	Model No.	Input
1	25 AMP	801- 25A	440/480 V, 3 PHASE, 50/60 Hz, 45 AMPS
2	12.5 AMP	802- 12.5A	
3	8.8 AMP	803- 8.8A	
4	6.2 AMP	804- 6.2A	
5	5 AMP	805- 5A	
6	4.2 AMP	806- 4.2A	
7.5	3.3 AMP	807.5- 3.3A	
10	2.5 AMP	810- 2.5A	
15	1.7 AMP	815- 1.7A	
20	1.25 AMP	820- 1.25A	
25	1 AMP	825- 1A	
30	830	830-830	
40	620	840-620	
50	500	850-500	
60	420	860-420	
75	335	875-335	
90	280	890-280	
100	250	8100-250	1 PHASE 80 AMPS
120	200	8120-200	
150	170	8150-170	
200	125	8200-125	
250	100	8250-100	
300	85	8300- 85	
400	62	8400- 62	
500	50	8500- 50	
600	42	8600- 42	
750	33	8750- 33	
1000	25	81000- 25	

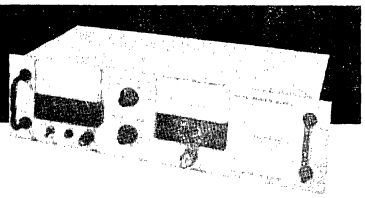
REGULATION . . 10% 3 phase, 18% 1 phase, no load to full load
RIPPLE . . . . . 1% or 5% rms, 3 phase units; 2% rms, 1 phase units (see chart)
HV OUTPUT . . Cable to 600 KV; Toroid over 600 KV

50 KILOWATT OUTPUT UNITS

Voltage (KV)	Current (ma)	Model No.	Input
1	50 AMP	801- 50A	440/480 V, 3 PHASE, 50/60 Hz, 90 AMPS
2	25 AMP	802- 25A	
3	16.6 AMP	803- 16.6A	
4	12.5 AMP	804- 12.5A	
5	10 AMP	805- 10A	
6	8.4 AMP	806- 8.4A	
7.5	6.7 AMP	807.5- 6.7A	
10	5 AMP	810- 5A	
15	3.3 AMP	815- 3.3A	
20	2.5 AMP	820- 2.5A	
25	2 AMP	825- 2A	
30	1.7 AMP	830- 1.7A	
40	1.25 AMP	840- 1.25A	
50	1 AMP	850- 1A	
60	830	860-830	
75	670	875-670	
90	560	890-560	
100	500	8100-500	1 PHASE 160 AMPS
120	420	8120-420	
150	335	8150-335	
200	250	8200-250	
250	200	8250-200	
300	166	8300-166	
400	125	8400-125	
500	100	8500-100	
600	83	8600- 83	
750	67	8750- 67	
1000	50	81000- 50	

REGULATION . . 10% 3 phase, 18% 1 phase, no load to full load
RIPPLE . . . . . 1% or 5% rms, 3 phase units; 2% rms, 1 phase units (see chart)
HV OUTPUT . . Cable to 600 KV; Toroid over 600 KV

metered HV power packs



. . . STANDARD 5-MA AND 2-MA HV POWER PACKS WITH SIMPLIFIE
THEY ARE LOW COST SUPPLIES, DESIGNED FOR RELAY RACK MO
INDUSTRIAL GRADE COMPONENTS.

FEATURES

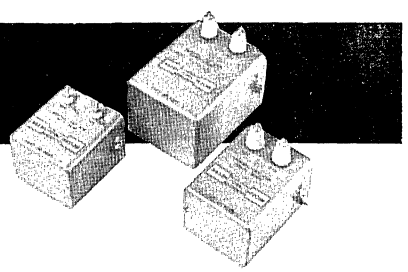
- Output-connected KV meter, 3½" square, 2% accuracy, single range
- Output-connected current meter, 3½" square, 2% accuracy, single range
- Continuously adjustable output control
- AC input switch, fuse, and pilot light
- HV fuse, with blown indicator
- 115-volt, 50/60-Hz input
- Surge and transient protection on all meters and powerstats
- Reversible polarity (except 60 KV)

SPECIFICATIONS

Output (KV)	Current (ma)	Ripple (% rms/ma)	Polarity	Model No.	KV Meter	Current Meter (ma)	Size W-H-D (in.)	Price ($)
0-2.5	5	.5	Reversible	R 2B	0-3	0-5	19x7x8	165.00
0-5	5	.5	Reversible	R 5B	0-6	0-5	19x7x8	175.00
0-10	5	.5	Reversible	R 10B	0-12	0-5	19x7x8	190.00
0-15	5	.5	Reversible	R 15R	0-15	0-5	19x7x8	220.00
0-20	5	.5	Reversible	R 20B	0-25	0-5	19x7x8	250.00
0-30	5	.5	Reversible	R 30B	0-30	0-5	19x12x10	300.00
0-50	5	.5	Reversible	R 50B	0-50	0-5	19x12x10	450.00
0-60	2	.5	Positive	R 60AP	0-60	0-2.5	19x12x10	375.00
0-60	2	.5	Negative	R 60AN	0-60	0-2.5	19x12x10	375.00

OPTIONAL EXTRAS
1. Bench top cabinet $50.00
2. Short circuit limiter — Ideal for capacitor charging, flocking, electrostatic operations, etc. Supply will operate with short circuit on output and limit current to 5 ma . . . . . $ 5.00

standard HV power packs



. . . WIDE RANGE OF COMPACT MINATURIZED HV
POWER PACKS, WITH OUTPUT VOLTAGES FROM 2
TO 100 KV AND CURRENT RATINGS OF 2, 5 OR 10 MA.

FEATURES

- Hermerically sealed, oil-or epoxy-filled
- Solid state rectifiers
- 10-year life
- Low ripple
- Good regulation
- Compact, highly miniaturized
- Reversible polarity

Note:
Inquiries are invited for units with outputs different than our standards, built-in line regulation, short circuit, current-limited features, lower output ripple, 220V, 50/60-cycle inputs, DC to HV DC, or center-tapped output.

SPECIFICATIONS

Input: 0-125 volts, output voltages and currents stated for nominal 117 volt input
Regulation: 10 to 15% no load to full load
Ripple: 0.5% rms per milliampere output
Life: 10 years at 25°C ambient with rated output voltage and current
Terminations: Ceramic bushings on models 30 KV and below. Re-entrant receptacles with 3-foot mating coaxial cables on models 40 KV and up

Output Voltage (KV)	Current (ma)	Model No.	Size HxWxD (in.)	Price ($)	Output Voltage (KV)	Current (ma)	Model No.	Size HxWxD (in.)	Price ($)
2.5	2	2.5A	3½x3¾x2¾	40	15	10	15C	6½x4⅝x4	150
2.5	5	2.5B	3½x3¾x2¾	50	20	2	20A	6½x4⅝x4	120
2.5	10	2.5C	4¼x3⅞x3⅜	70	20	5	20B	6½x4⅝x4	140
5	2	5A	4¼x3⅞x3⅜	60	25	10	25C	10x6x5	350
5	5	5B	4¼x3⅞x3⅜	70	30	2	30A	10x6x5	170
5	10	5C	5¼x3⅞x3⅜	90	30	5	30B	10x6x5	210
7.5	10	7.5C	5¼x3⅞x3⅜	110	40	2	40A	12x6x5	270
10	2	10A	5¼x3⅞x3⅜	65	50	5	50B	10x6x8	390
10	5	10B	5¼x3⅞x3⅜	80	60	2	60A	10x6x8	300
10	10	10C	6⅛x4⅝x4	105	100	2	100A	15½x8⅛x9¼	625
15	5	15B	6⅛x4⅝x4	125					

Prices and specifications subject to change without notice.

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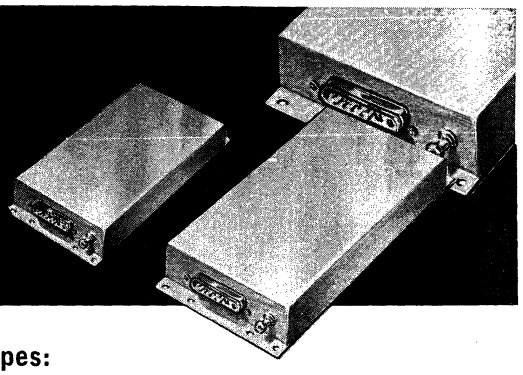
For more information call or write our Marketing Department. See other Hipotronics' listings under Test Instruments, Transformers, and Capacitors.

miniaturized, encapsulated HV power packs (for the OEM)



AC-to-DC (ferro-resonant) types:

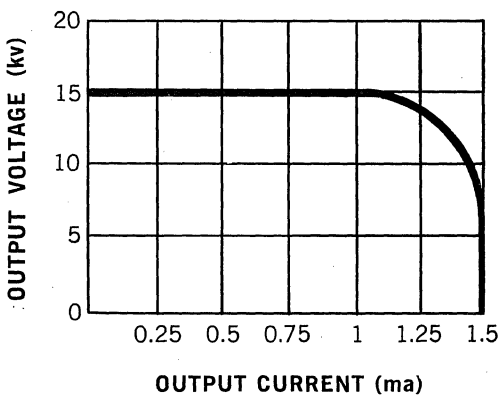
FEATURES

- Models available to 100 KV
- Current limited output
- Reversible polarity
- Corona free
- Solid state rectifiers

NOTE: Customized quantity orders accepted

OPTIONS

- Voltmeter output
- Center tap
- Pilot light



SPECIFICATIONS

Input ..... 110/220 volts @ 50/60 Hz

Output (constant KVA):

15-watt series	1-15 KV
30-watt series	16-30 KV
50-watt series	31-50 KV

Line regulation ..... 0.5%, even with ± 15% change in input

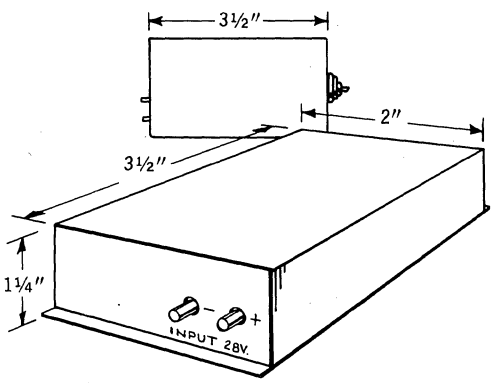
Ripple ..... less than 2%

DC-to-DC types:

FEATURES

- Models available to 100 KV
- Low stored energy
- Current limited output
- Solid state rectifiers
- Shielded . . . no external magnetic field
- High efficiency
- Highly compact

NOTE: Custom miniaturized designs and packaging available for quantity orders



SPECIFICATIONS

Input ..... 12 VDC or 24 VDC

Output (reg./unreg., constant KVA):

2.5-watt series	1-50 KV
10-watt series	3-50 KV
30-watt series	10-50 KV
60-watt series	15-50 KV

Standard regulation ranges:

Unregulated

Regulated:

A series	2%
B series	0.1%

Sizes ..... from 3½" x 2" x 1¼"

APPLICATIONS ■ CRT displays ■ Photo multipliers ■ Ion cooling devices ■ Electrostatic precipitators ■ Emission control devices ■ Other applications requiring HV output in modular packages

Prices and specifications subject to change without notice.

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HEWLETT hp PACKARD

DC POWER

From 10μV to 4000V
From 1μA to 2000A
From $95 to $3,850
From manual to computer controlled.

How to select a Hewlett-Packard DC Power Supply for your application

DC Power Supplies — you might think of them in other terms, such as battery substitutes, rectifiers, AC-DC converters, power amplifiers, operational amplifiers or maybe even SCR's.

No matter what you call them, Hewlett-Packard offers more than 100 models of DC power supplies. These offer a wide range of voltages and currents, a sophisticated variety of control versatility and solid-state reliability. One of them may prove suitable for your application — whether it be for OEM use, a special system, the production table, or the research bench.

To this end, we offer the following guidelines for helping you select the right power supply. See the next three pages for a condensed listing of DC power supplies from Hewlett-Packard.

power supplies

Voltage Output: A power supply with a voltage rating about 10% higher than that required is recommended. This provides the necessary flexibility for testing and adjusting analytical and other systems.

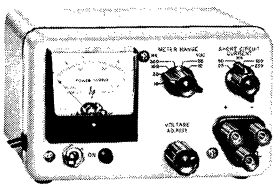
Current Output: For optimum performance, the current rating of the selected power supply should equal or exceed the maximum instantaneous (not average) output demanded by the load. Built-in fast-acting protection circuits in Hewlett-Packard power supplies limit the output current to a preselected value; this protects both the power supply and the load from damage.

Output Mode: Most HP power supplies are designed to provide either a constant voltage or a constant current output. However, many HP power supplies are designed to operate in either mode and to automatically switch (cross over) from one mode to the other at any preselected point in the output range. If flexibility in operating mode is desired, these versatile HP power supplies are recommended.

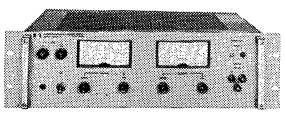
Specifications: Most applications will call for well regulated power supplies. These fluctuate less than 0.01% for a maximum change in input AC line voltage or output load resistance. With no change in load or line conditions, a well regulated supply will drift less than 0.03% in eight hours and experience an output change of less than 0.01%/°C change in room temperature. Ripple and noise are functions of internal filtering and isolation; 200uv RMS is typical of well regulated HP supplies (for a 24V output, this is less than 10 parts per million). Performance specifications a factor of 10 times better are available from more precise units while moderate regulation of .5 to .1% is typical of units with output ratings above 2 kW.

DC power supplies

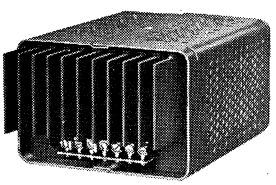
arranged by order of increasing voltage output



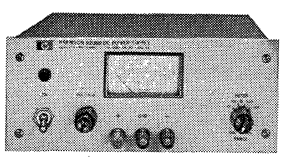
721A



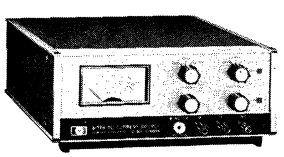
6253A, 6255A,
6256B-6274B,
6427B-6448B



60063A-60246B



6101A-6106A,
6200B-6299A,
6384A, 6515A,
6823A, 6824A



6177B-6186B

Output (volts)	Output (amperes)	Model	Load regulation	Line regulation	RMS ripple & noise (mV)	Remote programming	Bench or Rack*	CV/CC**	Price
0-4	0-2000	6463A	50 mV combined		280	√	R	√	$3850
4-5.5	0-8	6384A	1 mV	1 mV	1 mV		B		250
5.8 ±20%	0-1.5	60063A	0.05%	0.05%	1 mV		R		†
5.8 ±20%	0-3	60065A	0.05%	0.05%	1 mV		R		†
5.8 ±20%	0-8	60066A	0.05%	0.05%	1 mV		R		†
0-7.5	0-3	6203B	5 mV	3 mV	0.2	√	B	√	169
0-7.5	0-5	6281A	5 mV	2 mV +0.01%	0.2	√	B	√	210
0-8	0-1000	6464A	25 mV combined		80	√	R	√	3300
0-10	0-1	6213A	4 mV	4 mV	0.2		B		95
0-10	0-1	6214A	4 mV	4 mV	0.2		B	√	120
0-10	0-2	6113A	0.1 mV +0.001%	0.001%	0.04	√	B		375
0-10	0-10	6282A	1 mV +0.01%	1 mV +0.01%	0.5	√	B	√	350
0-10	0-20	6256B	200 μV +0.01%	200 μV +0.01%	0.2	√	R	√	450
0-10	0-50	6259B	200 μV +0.01%	200 μV +0.01%	0.5	√	R	√	695
0-10	0-100	6260B	200 μV +0.01%	200 μV +0.01%	0.5	√	R	√	895
13 ±20%	0-0.5	60122B	0.05%	0.05%	1 mV		R		†
13 ±20%	0-1	60123B	0.05%	0.05%	1 mV		R		†
13 ±20%	0-2.2	60125B	0.05%	0.05%	1 mV		R		†
13 ±20%	0-6	60126B	0.05%	0.05%	1 mV		R		†
±15 ±20%	0-0.2 A	60153D	0.03%	0.03%	0.3		R		†
±15 ±20%	0-0.75	60155C	0.03%	0.01%	0.3		R		†
0-15	0-200	6453A	10 mV +0.2% combined		150	√	R	√	1375
0-16 or 0-18	0-600 or 0-500	6466A	10 mV +0.2% combined		180	√	R	√	2800
0-±20	0-0.5	6823A	5 mV +0.02%	5 mV +0.02%	2	√	B	√	225
0-20	0-0.6	6204B	4 mV +0.01%	4 mV +0.01%	0.2	√	B		144
0-20 and 0-40	0-0.6 and 0-0.3	6205B	4 mV +0.01%	4 mV +0.01%	0.2	√	B		235
0-20	0-1	6101A	100 μV +0.001%	0.001%	0.04	√	B		265
0-20	0-1	6111A	100 μV +0.001%	0.001%	0.04	√	B		375
0-20	0-1.5	6200B	4 mV +0.01%	4 mV +0.01%	0.2	√	B	√	189
0-20	0-1.5	6201B	4 mV +0.01%	4 mV +0.01%	0.2	√	B	√	169
0-20 Dual	0-3	6253A	4 mV +0.01%	2 mV +0.02%	0.2	√	R	√	445
0-20	0-3	6284A	4 mV +0.01%	2 mV +0.01%	0.2	√	B	√	210
0-20	0-5	6285A	1 mV +0.01%	1 mV +0.01%	0.5	√	B	√	350
0-20	0-10	6263B	200 μV +0.01%	200 μV +0.01%	0.2	√	R	√	435
0-20	0-10	6286A	1 mV +0.01%	1 mV +0.01%	0.5	√	B	√	395
0-20	0-15	6427B	20 mV	10 mV	40	√	R	√	395
0-20	0-20	6264B	200 μV +0.01%	200 μV +0.01%	0.2	√	R	√	525

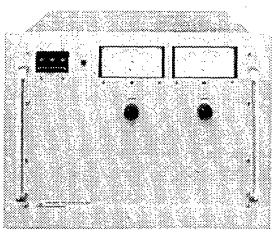
*"B" indicates bench type and "R" indicates full rack width type supplies. All bench supplies (except Model 721A) can be rack mounted using accessory rack mounting hardware.

**Automatic crossover between constant voltage (CV) and constant current (CC) operation.

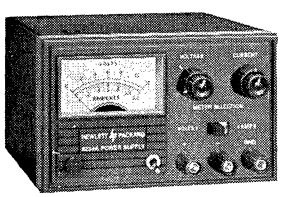
HEWLETT hp PACKARD

890A, 895A

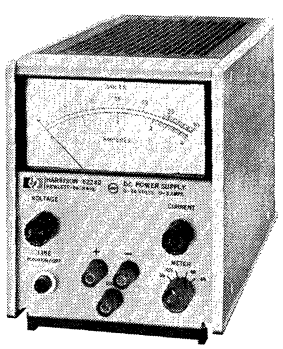
6521A-6525A



6453A-6483B



6213A-6218A



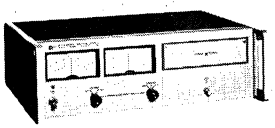
6220B-6226B

Output (volts)	Output (amperes)	Model	Load regulation	Line regulation	RMS ripple & noise (mV)	Remote programming	Bench or Rack*	CV/CC**	Price
0-20	0-45	6428B	40 mV	20 mV	40	√	R	√	$575
0-20	0-50	6261B	200 μV +0.01%	200 μV +0.01%	0.5	√	R	√	795
0-24	0-3	6224B	4 mV +.01%	2 mV +.01%	0.2	√	B	√	355
0-25	0-0.4	6215A	4 mV	4 mV	0.2		B		95
0-25	0-0.4	6216A	4 mV	4 mV	0.2		B	√	120
0-25	0-1	6220B	2 mV +.01%	2 mV +.01%	0.2	√	B	√	275
0-25 Dual	0-2	6227B	.01% +1 mV	1 mV	0.25	√	B	√	450
26 ±20%	0-0.25	60242B	0.05%	0.05%	1 mV		R		†
26 ±20%	0-0.5	60243B	0.05%	0.05%	1 mV		R		†
26 ±20%	0-1	60244B	0.05%	0.05%	1 mV		R		†
26 ±20%	0-1.5	60245B	0.05%	0.05%	1 mV		R		†
26 ±20%	0-3.5	60246B	0.05%	0.05%	1 mV		R		†
0-30	0-0.15	721A	30 mV or 0.3%	15 mV or 0.3%	0.15		B		165
0-30	0-1	6206B	4 mV +0.01%	4 mV +0.01%	0.2	√	B		169
0-36	0-10	6433B	36 mV	18 mV	36	√	R	√	370
0-36	0-100	6456B	10 mV +0.2% combined		160	√	R	√	1275
0-36	0-300	6469A	10 mV +0.2% combined		180	√	R	√	2300
0-40	0-0.3	6204B	4 mV +0.01%	4 mV +0.01%	0.2	√	B		144
0-40 and 0-20	0-0.3 and 0-0.6	6205B	4 mV +0.01%	4 mV +0.01%	0.2	√	B		235
0-40	0-0.5	6102A	100 μV +0.001%	0.001%	0.04	√	B		265
0-40	0-0.5	6112A	100 μV +0.001%	0.001%	0.04	√	B		375
0-40	0-0.75	6200B	4 mV +0.01%	4 mV +0.01%	0.2	√	B	√	189
0-40	0-0.75	6202B	4 mV +0.01%	4 mV +0.01%	0.2	√	B	√	169
0-40 Dual	0-1.5	6255A	2 mV +0.01%	2 mV +0.01%	0.2	√	R	√	445
0-40	0-1.5	6289A	2 mV +0.01%	2 mV +0.01%	0.2	√	B	√	210
0-40	0-3	6265B	200 μV +0.01%	200 μV +0.01%	0.2	√	R	√	350
0-40	0-3	6290A	1 mV +0.01%	1 mV +0.01%	0.5	√	B	√	350
0-40	0-5	6266B	200 μV +0.01%	200 μV +0.01%	0.2	√	R	√	435
0-40	0-5	6291A	1 mV +0.01%	1 mV +0.01%	0.5	√	B	√	395
0-40	0-10	6267B	200 μV +0.01%	200 μV +0.01%	0.2	√	R	√	525
0-40	0-25	6434B	40 mV	18 mV	40	√	R	√	550
0-40	0-30	6268B	200 μV +0.01%	200 μV +0.01%	1 mV	√	R	√	695
0-40	0-50	6269B	200 μV +0.01%	200 μV +0.01%	1 mV	√	R	√	875
0-±50	0-1	6824A	5 mV +0.02%	5 mV +0.02%	10	√	B	√	375
0-±50	0-1	6130B	0.5 mV	5 mV	3	√	B		1800
0-50	0-0.2	6217A	4 mV	4 mV	0.2		B		95
0-50	0-0.2	6218A	4 mV	4 mV	0.2		B	√	120
0-50	0-0.5	6177B	25ppm	25ppm	40 μA	√	B		425
0-50	0-0.5	6220B	2 mV +.01%	2 mV +.01%	0.2	√	B	√	275
0-50	0-1.5	6226B	2 mV +.01%	2 mV +.01%	0.2	√	B	√	355
0-50 Dual	0-1	6228B	1 mV +.01%	1 mV	0.25	√	B	√	450
0-60	0-0.5	6206B	4 mV +0.01%	4 mV +0.01%	0.2	√	B		169

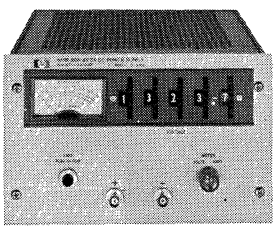
Note: Virtually all HP units can be rack mounted in accordance with standard RETMA 19″ systems. Some may require rack kits.
†Check with local HP sales offices for quantity price.

additional listing on next page

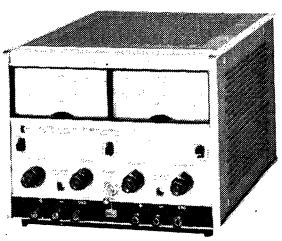
DC power supplies



6130B, 6131B



6110A, 6516A,
6111A-6116A



6227B, 6228B

DC Power Supply Selection Guide

This 36 page guide is factual and informative . . . clearly lists all the specs, features, options, prices, etc. on every HP power supply . . . makes it easy to find the right model for any application.

DC Power Supply Handbook

. . . includes power supply definitions, principles of operation, connection / operation, and performance measurements.

For your copies contact your local Hewlett Packard sales office or write Hewlett Packard Company, New Jersey Division, 101 Locust Avenue, Berkeley Heights, New Jersey 07922.

Output (volts)	Output (amperes)	Model	Load regulation	Line regulation	RMS ripple & noise (mV)	Remote programming	Bench or Rack*	CV/CC**	Price
0-60	0-1	6294A	2 mV +0.01%	2 mV +0.01%	0.2	√	B	√	$210
0-60	0-3	6296A	1 mV +0.01%	1 mV +0.01%	0.5	√	B	√	395
0-60	0-3	6271B	200 μV +0.01%	200 μV +0.01%	0.2	√	R	√	435
0-60	0-5	6438B	60 mV	30 mV	120	√	R	√	370
0-60	0-15	6439B	120 mV	60 mV	60	√	R	√	550
0-60	0-15	6274B	200 μV +0.01%	200 μV +0.01%	0.2	√	R	√	695
0-64	0-50	6459A	10 mV +0.2% combined		160	√	R	√	1275
0-64	0-150	6472A	100 mV +0.2% combined		160	√	R	√	2600
0-100	0-0.2	6106A	100 μV +0.001%	0.001%	0.04	√	B		265
0-100	0-0.2	6116A	100 μV +0.001%	0.001%	0.04	√	B		375
0-100	0-0.25	6181B	25 ppm	25 ppm	20 μA	√	B		425
0- ±100	0-0.5	6131B	5 mV	5 mV	3	√	R		1800
0-100	0-0.75	6299A	2mV +0.01%	2 mV +0.01%	0.2	√	B	√	225
0-110	0-100	6475A	100 mV +0.2% combined		220	√	R	√	2600
0-120	0-2.5	6443B	120 mV	60 mV	240	√	R	√	360
0-160	0-0.2	6207B	2 mV +0.02%	2 mV +0.02%	0.5	√	B	√	255
0-220	0-50	6477A	100 mV +0.2% combined		330	√	R	√	2600
0-300	0-35	6479A	100 mV +0.2% combined		300	√	R	√	2600
0-300	0-0.1	6186B	25 ppm	25 ppm	5 μA	√	B		475
0-320	0-0.1	6209B	2 mV +0.02%	2 mV +0.02%	1 mV	√	B	√	255
0-320	0-0.6	890A	10 mV or 0.007%	10 mV or 0.007%	1 mV	√	R		495
0-320	0-1.5	895A	10 mV or 0.007%	10 mV or 0.007%	1 mV	√	R		625
0 to +500 −300 0 to −150	0-0.2 0-0.05 0-0.005	712C	5 mV +0.01% 50 mV 50 mV	5 mV +0.01% 50 mV 50 mV	0.5 30 15	√	B	√	545
0-440 or 0-500 or 0-600	0-25 or 0-20 or 0-15	6483B	100 mV +0.5% combined		600	√	R	√	2600
1-600	0.005-1.5	6448B	600 mV	600 mV	600	√	R	√	595
0-1000	0-0.2	6521A	20 mV or 0.005%	20 mV or 0.005%	1 mV		R	√	795
0-1600	0-0.005	6515A	16 mV or 0.01%	16 mV or 0.01%	2.0		B		235
0-2000	0-0.1	6522A	20 mV or 0.005%	20 mV or 0.005%	1 mV		R	√	795
0-3000	0-0.006	6110A	100 μV +0.001%	0.001%	2		B		495
0-3000	0-0.006	6516A	16 mV or 0.01%	16 mV or 0.01%	2.0		B		315
0-4000	0-0.05	6525A	20 mV or 0.005%	20 mV or 0.005%	1 mV		R	√	795

All Supplies: Operating temperature range 0 to +55°C, storage temperature range −40 to +75°C. Three-wire input, continuously variable floating output (ground either side), low output impedance at all frequencies. All silicon semiconductor circuitry, short-circuit-proof, fully automatic overload protection. Rapid load transient recovery time, no turn-on or turn-off overshoot. Computer quality electrolytics, glass-epoxy printed circuit board construction, 1 year warranty.

HEWLETT hp PACKARD

POWER SUPPLIES

Hewlett-Packard, N.J. Division • 101 Locust Avenue
Berkeley Heights, New Jersey 07922 • (201) 464-1234
In Europe: 1217 Meyrin, Geneva

Powertron SOLID STATE AC POWER SUPPLIES

The Powertron AC Power Supplies provide stable, low distortion, AC power at frequencies within the audio frequency spectrum. These highly reliable and versatile power sources find wide application in calibration and test stations, motor drives, gyro wheel supplies, laboratory use, military component testing, and operating foreign equipment. These supplies may be used whenever it is necessary to provide AC power at a frequency not available from the power lines.

The various supplies feature all solid state construction, wide operating frequency range, low distortion, and a wide variety of output voltages and impedances. The units are designed to be used in modular form so that a single unit can provide single phase output, and two or three units may be used to provide two phase or three phase outputs respectively.

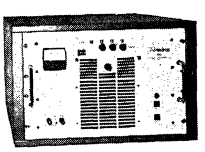
AMPLIFIER SPECIFICATIONS

(Series 250S, Illustrated)

Output Circuit:
Single phase, isolated (Ground terminal is provided for optional grounding of output.)
Output Power:
250 VA
Load Power Factor:
.7 Lead through .7 Lag for full power output. Useable to .2 at reduced power.
Output Voltage Range:
0-130 V RMS (An output connector provided at the rear of the unit may readily be reconnected to provide optimum power output at other voltages. Ranges available are 0-260 V, 0-190 V, 0-130 V, 0-90 V, 0-75 V, 0-67 V, 0-60 V, 0-38 V, 0-30 V, and 0-17 V.
Output Frequency Range:
45 Hz to 10,000 Hz for full power out. 20 Hz to 20,000 Hz at reduced power.
Output Distortion:
0.1% mid band
Load Regulation:
Factory set to ±0.5% mid band (A control is provided for zero regulation adjustment over most of frequency range.)
Line Regulation:
±0.1% for ±5% line change.
Transient Response:
50 Microseconds.
Hum Level:
80 db approx. below rated output voltage.
Thermal Overload Protection:
Output transistors protected by thermal cut-out circuit.
Short Circuit Protection:
Output may be shorted indefinitely without damage to unit.
External Amplifier Input:
An input connector is provided at the rear of the unit when it is desired to drive the amplifier from an external source. Model XA-1 plug-in Module is required for this mode of operation.
External Sync. Input:
An input connector is provided at the rear when it is desired to synchronize the plug in oscillator with an external frequency source.
Convenience Outlets:
Two convenience outlets controlled by the power switch are provided at the rear of the unit. These permit single control operation of one or two additional amplifiers when 2ø or 3ø outputs are required. When not used for this purpose, the outlets may also be used to turn on auxiliary equipment which is mounted in the same test console.
Meter:
A voltmeter with range of 0-150 V RMS is provided to monitor the output voltage.
Input Power:
115 V or 230 V, 50-60 Hz (400 Hz input available).
Ambient Temperature Range:
0° C to 55° C.
Dimensions:
5¼ x 19″ Rack Panel x 14″ Deep.
Weight:
75 Lbs. Approx.

The ordering designations listed below are for convenience of specifying the components required for various power supply configurations. To select an appropriate unit for your requirements first determine which category, 1-phase, 2-phase, or 3-phase, is most suitable to your intended load. Then use the ordering designation adjacent to the required output power within that category. For the complete ordering designation replace the asterisk with the ordering code letters of the plug-in-oscillator listed

1ø Power Supplies (For Use with Single Phase Loads)

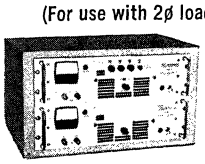


Model 1000S-1-N

Ordering Designation	Total Output Power	Output Voltage Range	Input
80S-1-*	80VA	17, 30, 38, 60, 67, 75, 90, **130**, 190, 260	1-Phase **115**, 230
250S-1-*	250VA		
500S-1-*	500VA	35, 60, 75, 120, **135**, 150, 180, 260, 380	
750S-1-*	750VA	50, 90, **115**, 180, 200, 225, 270, 390	
1000S-1-*	1KVA	65, 76, **130**, 140, 150, 260, 300	3-Phase, Line to Line 190, **208**, 225, 380, 450
1500S-1-*	1.5KVA		
2000S-1-*	2KVA	**130**, 150, 260, 280, 300	
3000S-1-*	3KVA		

2ø - 3ø (Open Delta) Power Supplies

(For use with 2ø loads and 3ø, 3 wire Delta loads.

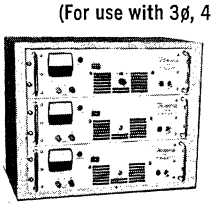


Model 500S-23-MM

Ordering Designation	Total Output Power	Output Voltage Range	Input
160S-23-*	160VA	17, 30, 38, 60, 67, 75, 90, **130**, 190, 260•	1-Phase **115**, 230
500S-23-*	500VA		
1000S-23-*	1KVA	35, 60, 75, 120, **135**, 150, 180, 260, 380	
2000S-23-*	2KVA	65, 76, **130**, 140, 150, 260, 300	3-Phase, Line to Line 190, **208**, 225, 240, 380, 450
3000S-23-*	3KVA		
4000S-23-*	4KVA	**130**, 150, 260, 280, 300	
6000S-23-*	6KVA		

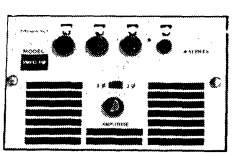
3ø Wye-Delta Power Supplies

(For use with 3ø, 4 wire wye loads or 3ø, 3 wire, Delta Loads.



Model 750S-3-AA

Ordering Designation	Total Output Power	Output Voltage Ranges (line to neutral)	Input
240S-3-*	240VA	17, 30, 38, 60, 67, 75, 90, **130**, 190, 260	1-Phase **115**, 230
750S-3-*	750VA		
1500S-3-*	1.5KVA	35, 60, 75, 120, **135**, 150, 180, 260, 380	
3000S-3-*	3KVA	65, 76, **130**, 140, 150, 260, 300	3-Phase, Line to Line 190, **208**, 225, 240, 380, 450
4500S-3-*	4.5KVA		
6000S-3-*	6KVA	**130**, 150, 260, 280, 300	
9000S-3-*	9KVA		



PLUG-IN OSCILLATORS

Single phase (1ø) and polyphase (Pø) oscillators are available for both fixed frequency and variable frequency output. A coarse and fine concentric control is included on each oscillator panel for precise amplitude adjustment. Polyphase oscillators include a switch on the front panel which provides either two-phase or three-phase output. All plug-in oscillators are provided with Sync. capability which permits locking-in their output frequency with an external source of the same nominal frequency.

CODE		FREQUENCY	ACCURACY
Single Phase	Poly Phase		
A	AA	400 Hz	0.1%
B	BB	60 Hz	0.1%
C	CC	Specify	0.1%
D	DD	Specify	0.01%
E	EE	Specify	0.001%
K	KK	10 Hz - 10 KHz	1.0%
L	LL	10 Hz - 100 Hz	1.0%
M	MM	100 Hz - 1 KHz	1.0%
N	NN	350 Hz - 450 Hz	0.25%
P	PP	300 Hz - 500 Hz	0.25%
Q	QQ	1 KHz - 10 KHz	1.0%

WRITE FOR CATALOG 969

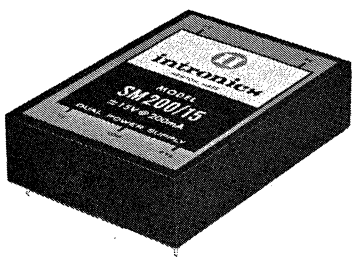
ITECO INDUSTRIAL TEST EQUIPMENT CO. 20 Beechwood Ave., Port Washington, N. Y. 11050
Phone: (516) PO 7-5253

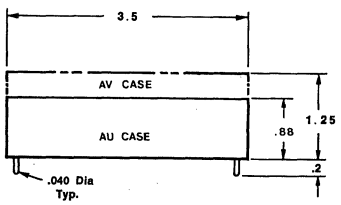
intronics

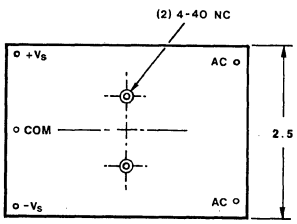
Modular Power Supplies

- **Rugged Epoxy Encapsulation**
- **Low Cost**
- **Short Circuit Protected**
- **Preset Voltages ±1%**
- **0.1% Tracking**
- **Excellent Regulation**

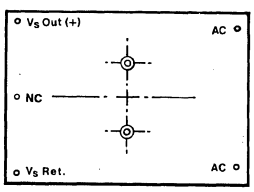
The Intronics standard line of modular power supplies provides the designer with a rugged, low cost solution to system power supply requirements. A wide range of supplies is available for fast delivery to meet the commonly used voltage and current requirements. These supplies are rugged, epoxy encapsulated units requiring no adjustments . . . just plug in and use. They feature the best possible characteristics designed-in for easy use and trouble-free operation: preset voltages to ±1%, output short circuit protection, low ripple, wide operating temperature range with no derating, 50 to 400 Hz operation, and 50 Meg isolation. These modular supplies are ideal for powering operational amplifiers and other analog function modules in addition to IC logic circuitry. They can be either soldered directly to circuit boards or plugged into a low cost mating socket. In addition, for more secure mounting, threaded 4-40 inserts are available on the bottom of the modules.







ALL DUAL SUPPLIES



SINGLE SUPPLIES

Specifications

		MODEL	V_{OUT}	I_{OUT}	REGULATION LINE	REGULATION LOAD	Z_{OUT} DC–10 kHz	CASE	PRICE
DUAL TRACKING SUPPLIES	25 mA	SM25/6	±6	25 mA	.01%	.05%	0.2 Ω	AU	$24.50
		SM25/12	±12	25 mA	.01%	.05%	0.2 Ω	AU	$24.50
		SM25/15	±15	25 mA	.01%	.05%	0.2 Ω	AU	$24.50
	50/60 mA	SM60/12	±12	60 mA	.01%	.05%	0.2 Ω	AU	$45.00
		SM60/15	±15	60 mA	.01%	.05%	0.2 Ω	AU	$39.00
		SM50/18	±18	50 mA	.01%	.05%	0.2 Ω	AU	$55.00
		SM50/24	±24	50 mA	.01%	.05%	0.2 Ω	AU	$55.00
	100 mA	SM100/12	±12	100 mA	.01%	.05%	0.2 Ω	AU	$55.00
		SM100/15	±15	100 mA	.01%	.05%	0.2 Ω	AU	$49.00
		SM100/18	±18	100 mA	.01%	.05%	0.2 Ω	AV	$75.00
		SM100/24	±24	100 mA	.01%	.05%	0.2 Ω	AV	$75.00
	200 mA	SM200/12	±12	200 mA	.01%	.05%	0.2 Ω	AV	$75.00
		SM200/15	±15	200 mA	.01%	.05%	0.2 Ω	AV	$65.00
Single Supplies		SM100/27	+27	100 mA	.01%	.05%	0.2 Ω	AV	$55.00
		SM200/27	+27	200 mA	.01%	.05%	0.2 Ω	AV	$75.00
5 Volt Logic		SM500/5	+5	500 mA	.05%	0.1%	.05 Ω	AU	$47.00
		SM1000/5*	+5	1000 mA	.05%	0.1%	.05 Ω	AV	$70.00

*Has over-voltage crowbar protection.

Other specifications common to all supplies

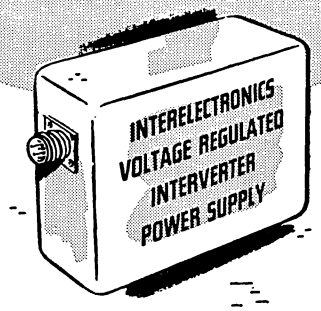
- Line Voltage 105-125 VAC
- Line Frequency 50-400 Hz
- Isolation 50 Meg.
- Output Ripple 1 mV RMS max.
- Short Circuit Protected (either output to common or each other)
- Output Voltage Tol. ± 1% max.
- Tracking Accuracy (duals) 0.1% max.
- Voltage Temp. Coeff. .015%/°C typ.
- Operating Temp. Range (no derating) -25°C to +71°C
- Intern. Temp. Rise 20°C above amb.

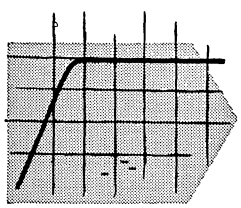
See Intronics Analog Function Modules Line in Section 1100

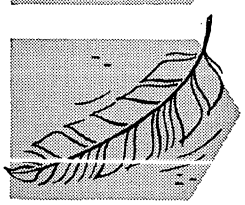
intronics

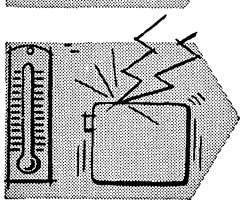
INTRONICS, INCORPORATED / 57 CHAPEL STREET / NEWTON, MASSACHUSETTS 02158 / 617-332-7350 / TWX 710-335-6835

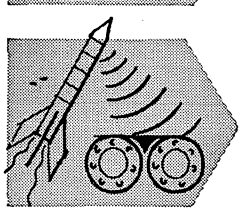
PROVEN RELIABILITY—
DC-DC, DC-AC, SOLID-STATE POWER INVERTERS
over 260,000 logged hours— voltage-regulated, frequency-controlled, for missile, telemeter, ground-support, 135°C all-silicon units available now—

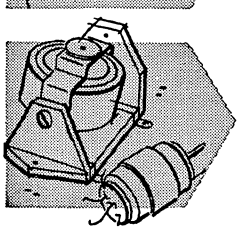












Interelectronics all-silicon thyratron-like gating elements and cubic-grain toroidal magnetic components convert DC to any desired number of AC or DC outputs from 1 to 10,000 watts.

Ultra-reliable in operation (over 260,000 logged hours), no moving parts, unharmed by shorting output or reversing input polarity. High conversion efficiency (to 92%, including voltage regulation by Interelectronics patented reflex high-efficiency magnetic amplifier circuitry).

Wide input voltage range (1 to 250 volts DC). Wide input voltage regulation (output voltage maintained with variations up to 50% in input voltage).

Light weight (to 6 watts/oz.), compact (to 8 watts/cu. in.), low ripple (to 0.01 mv. p-p), excellent voltage regulation (to 0.1%), precise frequency control (to 0.2%) with Interelectronics extreme environment magnetostrictive standards or to 0.0001% with fork or piezoelectric standards.

Complies with MIL specs. for shock (100G 11 misc.), acceleration (100G 15 min.), vibration (100G 5 to 5,000 cps.), temperature (to 150 degrees C), RF noise (I-26600).

AC single and polyphase units supply sine waveform output (to 2% harmonics), will deliver up to ten times rated line current into a short circuit to actuate MIL type magnetic circuit breakers or fuses, will start gyros and motors with starting current surges up to ten times normal operating line current.

Now in use in major missiles, powering telemeter transmitters, radar beacons, electronic equipment. Single and polyphase units now power airborne and marine missile gyros, synchros, servos, magnetic amplifiers.

Interelectronics—first and most experienced in the solid-state power supply field produces its own all-silicon solid-state gating elements, all high flux density magnetic components, high temperature ultra-reliable film capacitors and components, has complete facilities and know how—has designed and delivered more working KVA than any other firm!

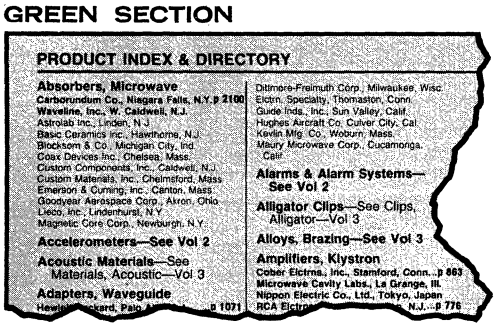
For complete engineering data, write Interelectronics today, or call (914) EL 8-8000 in Congers.

INTERELECTRONICS CORPORATION
550 U.S. Route 303, Congers, New York 10920

How to use eem

to find manufacturers of a specific product

GREEN SECTION


PRODUCT INDEX & DIRECTORY

Absorbers, Microwave
Carborundum Co., Niagara Falls, N.Y. p 2100
Waveline, Inc., W. Caldwell, N.J.
Astrolab Inc., Linden, N.J.
Basic Ceramics Inc., Hawthorne, N.J.
Blocksom & Co., Michigan City, Ind.
Coax Devices Inc., Chelsea, Mass.
Custom Components, Inc., Caldwell, N.J.
Custom Materials, Inc., Chelmsford, Mass.
Emerson & Cuming, Inc., Canton, Mass.
Goodyear Aerospace Corp., Akron, Ohio
Lieco, Inc., Lindenhurst, N.Y.
Magnetic Core Corp., Newburgh, N.Y.

Accelerometers—See Vol 2

Acoustic Materials—See Materials, Acoustic—Vol 3

Adapters, Waveguide
Hewlett-Packard, Palo Alto ... p 1071
Dittmore-Freimuth Corp., Milwaukee, Wisc.
Electro Specialty, Thomaston, Conn.
Guide Inds., Inc., Sun Valley, Calif.
Hughes Aircraft Co. Culver City, Cal.
Kevlin Mfg. Co., Woburn, Mass.
Maury Microwave Corp., Cucamonga, Calif.

Alarms & Alarm Systems—See Vol 2

Alligator Clips—See Clips, Alligator—Vol 3

Alloys, Brazing—See Vol 3

Amplifiers, Klystron
Cober Elctrns., Inc., Stamford, Conn...p 863
Microwave Cavity Labs., La Grange, Ill.
Nippon Electric Co., Ltd., Tokyo, Japan
RCA Elctrn ... N.J. ...p 776

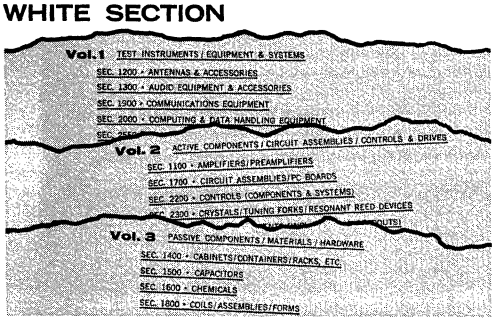
Each of the three volumes of **eem** contains a Product Index and Directory, the Green Section. This Index is a complete alphabetical listing of products. If the product you are looking for appears in the particular volume you are consulting, the green pages will provide a complete list of manufacturers who make that product. If the product is included in another volume of **eem,** the Index will provide a cross reference, directing you to the correct volume.

Boldface listings under product headings indicate that the listed manufacturer has products cataloged in **eem. Boldface** listings with page numbers indicate that this manufacturer's catalog pages include detailed data on the product indicated in the product heading.

Similar products are grouped together. For example, the many kinds of meters are listed in this manner: "Meters, Ampere," "Meters, Capacitance," "Meters, Flux" etc. To help you locate the prime product heading, there are hundreds of cross references, e.g. "Voltmeters — See Meters, Volt."

to find manufacturers' catalog information

WHITE SECTION


Vol. 1 TEST INSTRUMENTS / EQUIPMENT & SYSTEMS
SEC. 1200 • ANTENNAS & ACCESSORIES
SEC. 1300 • AUDIO EQUIPMENT & ACCESSORIES
SEC. 1900 • COMMUNICATIONS EQUIPMENT
SEC. 2000 • COMPUTING & DATA HANDLING EQUIPMENT
Vol. 2 ACTIVE COMPONENTS / CIRCUIT ASSEMBLIES / CONTROLS & DRIVES
SEC. 1100 • AMPLIFIERS/PREAMPLIFIERS
SEC. 1700 • CIRCUIT ASSEMBLIES/PC BOARDS
SEC. 2200 • CONTROLS (COMPONENTS & SYSTEMS)
SEC. 2300 • CRYSTALS/TUNING FORKS/RESONANT REED DEVICES
Vol. 3 PASSIVE COMPONENTS / MATERIALS / HARDWARE
SEC. 1400 • CABINETS/CONTAINERS/RACKS, ETC.
SEC. 1500 • CAPACITORS
SEC. 1600 • CHEMICALS
SEC. 1800 • COILS/ASSEMBLIES/FORMS

Catalog pages in **eem** are divided into three volumes based on very broad product groupings. These are:

Volume 1 — Test Instruments / Equipment and Systems

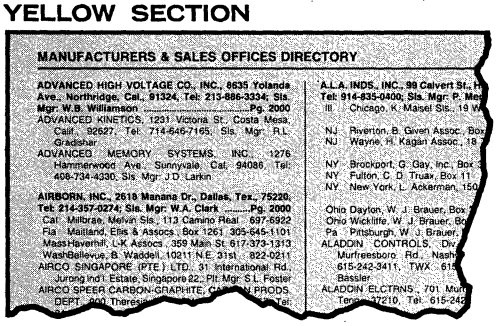
Volume 2 — Active Components / Circuit Assemblies / Controls and Drives

Volume 3 — Passive Components / Materials / Hardware

These volumes are further divided into 55 **eem** Product Sections which are assigned individually to the most appropriate volume. Within each of the 55 product sections manufacturers are arranged alphabetically, wherever possible. A complete index of all manufacturers' catalog pages is included in every volume. To locate the catalog pages of a specific manufacturer, refer to this index at the beginning of the white section in any of the three volumes. This index will provide the page numbers you require. In Volume 1, the index begins on page 302, in Volume 2 on page 1274 and in Volume 3, page 2310.

to find manufacturers' addresses, phones and sales offices

YELLOW SECTION


MANUFACTURERS & SALES OFFICES DIRECTORY

ADVANCED HIGH VOLTAGE CO., INC., 8635 Yolanda Ave., Northridge, Cal., 91324, Tel: 213-886-3334, Sls. Mgr: W.B. Williamson ..... Pg. 2000
ADVANCED KINETICS, 1231 Victoria St., Costa Mesa, Calif., 92627, Tel: 714-646-7165, Sls. Mgr: R.L. Gradshar
ADVANCED MEMORY SYSTEMS, INC., 1276 Hammerwood Ave., Sunnyvale, Cal. 94086, Tel: 408-734-4330, Sls. Mgr: J.D. Larkin

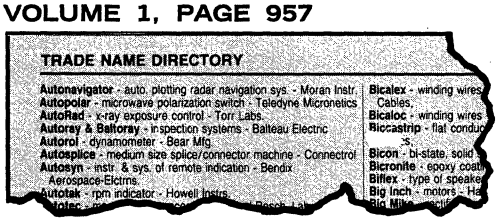
AIRBORN, INC., 2618 Manana Dr., Dallas, Tex., 75220, Tel: 214-357-0274; Sls. Mgr: W.A. Clark ..... Pg. 2000
Calif., Milforae, Melvin Sls., 113 Camino Real, 697-6922
Fla., Maitland, Ellis & Assocs., Box 1261, 305-645-1101
Mass-Haverhill, L-K Assocs., 359 Main St, 617-373-1313
Wash-Bellevue, B. Waddell, 10211 N.E. 31st, 822-0211
AIRCO SINGAPORE (PTE.) LTD., 31 International Rd., Jurong Ind'l. Estate, Singapore 22., Plt. Mgr: S.L. Foster
AIRCO SPEER CARBON-GRAPHITE, G... PRODS. DEPT., 900 Thera... Tel:

A.L.A. INDS., INC., 99 Calvert St., H... Tel: 914-835-0400, Sls. Mgr: P. Me...
Ill., Chicago, K. Maisel Sls., 19 W...
N.J., Riverton, B. Gwen Assoc., Box...
N.J., Wayne, H. Kagan Assoc., 18...
N.Y., Brockport, G. Gay, Inc., Box...
N.Y., Fulton, C. D. Truax, Box 11...
N.Y., New York, L. Ackerman, 150...
Ohio Dayton, W. J. Brauer, Box...
Ohio Wickliffe, W. J. Brauer, Bo...
Pa., Pittsburgh, W. J. Brauer, ...
ALADDIN CONTROLS, Div. ... Murfreesboro Rd., Nash... 615-242-3411, TWX: 615... Bassler
ALADDIN ELCTRNS., 701 Mur... Tenn., 37210, Tel: 615-242...

More than 6,000 manufacturers of electronic components, materials, instruments, assemblies, systems and key services are listed in the Yellow Section. An identical Yellow Section appears in each of the three volumes of **eem,** listing addresses, phone numbers and sales managers' names. TWX numbers are also included where available. **Boldface** listings indicate that detailed information on the manufacturers' products is cataloged in the White Section of **eem. Boldface** listings also indicate that local sales offices or representatives are listed for that manufacturer.

to find trade name sources

VOLUME 1, PAGE 957


TRADE NAME DIRECTORY

Autonavigator - auto. plotting radar navigation sys. - Moran Instr.
Autopolar - microwave polarization switch - Teledyne Micronetics
AutoRad - x-ray exposure control - Torr Labs.
Autoray & Baltoray - inspection systems - Balteau Electric
Autorol - dynamometer - Bear Mfg.
Autosplice - medium size splice/connector machine - Connectrol
Autosyn - instr. & sys. of remote indication - Bendix Aerospace-Elctrns.
Autotak - rpm indicator - Howell Instr.
Bicalex - winding wires Cables.
Bicaloc - winding wires ...s.
Biccastrip - flat conduc...
Bicon - bi-state, solid ...
Bicronite - epoxy coati...
Biflex - type of speake...
Big Inch - motors - He...

If you know only the trade name, brand name or trade mark of a product, you can locate it in **eem** by using the **Trade Name Directory.** This appears only in Volume 1, beginning on page 957 of the White Section. These pages can be identified by a vertical black band along the outside edge.

if you require additional assistance

contact the Editorial Department, United Technical Publications, Inc., 645 Stewart Ave., Garden City, N.Y. 11530, or phone (516) 248-9700.

all KEPCO® products are backed by a firm 5-Year Warranty

COVERING THE COST OF PARTS AND LABOR. THE WARRANTY IS HONORED AT OUR FACTORY SERVICE DEPARTMENT, FLUSHING, N. Y., AND THROUGH OUR FIELD REPRESENTATIVES.

HOW TO USE THIS CATALOG

Kepco's Power Supply catalog is organized into product groups for ready access. The groups are classified by a shared major characteristic.

Section 1: Modules ..... Page 738
Section 2: High Speed (fast programming) ..... Page 747
Section 3: High Voltage (200V and over) ..... Page 750
Section 4: General Purpose ..... Page 754
Section 5: Special Purpose (strain gauge, I-C, etc.) .. Page 757
Section 6: Programmers (interfaces, digital systems) . Page 762
Section 7: Accessories (overvoltage crowbars) ..... Page 766
Section 8: Hardware (rack adapters) ..... Page 767

Of course, a power supply might have several important classifications, so be sure to check the cross reference at the beginning of each section to find other listings which share the desired characteristic. For example: the *High Speed* Section contains data on Kepco's BOP and OPS designs and cross references data on the BHK, CC, JQE–HS and PAX–HS cataloged elsewhere.

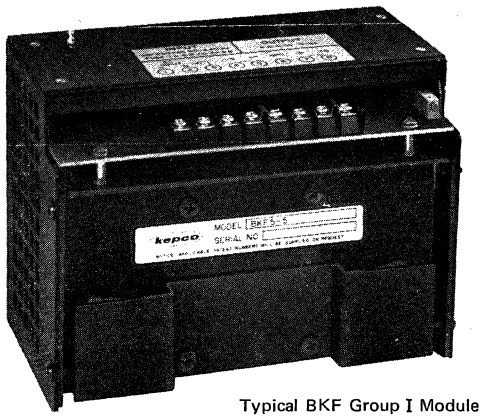
Kepco Power Supplies are manufactured in DESIGN GROUPS, identified by a letter-group prefix. All models within a group share major electrical and physcial characteristics. They are usually produced in a variety of volt/ampere combinations generally identified by the model numbers which give the maximum voltage rating and current rating in sequence. Example: Model ABC 40–0.5, a model in the ABC Design Group, rated 0–40V, 0–0.5A. Optional features may be identified by the use of suffix letters. Example: ABC 40–0.5M – metered model.

All prices in this catalog are f.o.b. factory, Flushing, New York. All prices and specifications are subject to change without notice.

Please address all communications to:
Kepco, Inc., 131-38 Sanford Avenue, Flushing, New York 11352
Telephone: 212–461–7000
TWX: 710–582–2631
Telex: 12–6055
Cable: KEPCOPOWER NEWYORK

KEPCO BKF *modular* POWER SUPPLIES

The Kepco BKF design combines an I-C driven series transistor regulator with a modified re-entrant overcurrent circuit. Voltage is controlled over a small adjustment range, protected by a built-in overvoltage crowbar. The crowbar trip point is tabulated for each model. Adjustable trip is optionally available.



Typical BKF Group I Module (Available Cased Only)

UL RECOGNIZED TO UL478 & UL114.

GROUP I

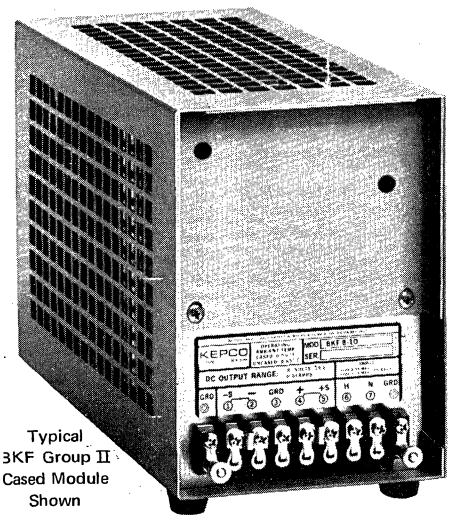
MODEL	d-c OUTPUT RANGE VOLTS	AMPS	OV TRIP POINT VOLTS (MAX.)	OUTPUT IMPEDANCE Ohms + Microhenries d-c to 100Hz	100 Hz to 1kHz	1kHz to 100kHz+μH	MAX. INPUT AMPS at 125 V a-c	PRICE	SHIP WGT. (lbs.)
BKF 1.25–7	1.25 ±10%	0–7	▲	0.001	0.02	0.1 + 1	0.7	$148.00	7
BKF 3.5–5	3.5 ±10%	0–5	▲	0.001	0.02	0.1 + 1	0.7	148.00	7
BKF 5–3	5.0 ±10%	0–3	6.5	0.003	0.02	0.1 + 1	0.6	129.00	7
BKF 5–5	5.0 ±10%	0–5	6.5	0.001	0.02	0.1 + 1	0.9	148.00	7
BKF 12–1.4	12.0 ±10%	0–1.4	15.3	0.009	0.02	0.1 + 1	0.6	129.00	7
BKF 12–2.4	12.0 ±10%	0–2.4	15.3	0.005	0.02	0.1 + 1	0.7	148.00	7
BKF 15–1.2	15.0 ±10%	0–1.2	19.5	0.013	0.02	0.1 + 1	0.6	129.00	7
BKF 15–2	15.0 ±10%	0–2	19.5	0.008	0.02	0.1 + 1	0.8	148.00	7
BKF 24–0.8	24.0 ±10%	0–0.8	30.0	0.03	0.05	0.1 + 1	0.6	129.00	7
BKF 24–1.2	24.0 ±10%	0–1.2	30.0	0.02	0.05	0.1 + 1	0.7	148.00	7
BKF 28–0.6	28.0 ±10%	0–0.6	35.3	0.05	0.05	0.1 + 1	0.5	129.00	7
BKF 28–1	28.0 ±10%	0–1	35.3	0.03	0.05	0.1 + 1	0.7	148.00	7

▲*Adjustable overvoltage trip point is standard.*

GROUP II

BKF 5–11	5.0 ±5%	0–11	6.5	0.0003	0.05	0.1 + 0.5	1.4	$213.00♦	20
BKF 8–10	8.0 ±5%	0–10	11.1	0.0004	0.05	0.1 + 0.5	1.3	213.00♦	20
BKF 12–7	12.0 ±5%	0–7	15.3	0.0009	0.05	0.1 + 0.5	2.0	213.00♦	20
BKF 15–6	15.0 ±5%	0–6	19.5	0.0013	0.05	0.1 + 0.5	2.0	213.00♦	20
BKF 24–4	24.0 ±5%	0–4	30.0	0.0030	0.05	0.1 + 0.5	2.0	213.00♦	20
BKF 28–4	28.0 ±5%	0–4	35.3	0.0045	0.05	0.1 + 0.5	2.2	213.00♦	20
BKF 36–3	36.0 ±5%	0–3	45.7	0.0060	0.05	0.1 + 0.5	2.0	213.00♦	20
BKF 48–2.5	48.0 ±5%	0–2.5	59.5	0.0100	0.05	0.1 + 0.5	2.2	213.00♦	20

♦*Uncased. To order a cased Group II model, add $12.00 to the price.*



Typical BKF Group II Cased Module Shown

This tabulation specifies the limit of change in the regulated output for defined variations in the major influences. To obtain a realistic appraisal of the behaviour in your environment, multiply each influence by its probable range of variation and sum the pertinent effects.

SPECIFICATION	OUTPUT EFFECTS VOLTAGE MODE GROUP I	GROUP II
OUTPUT RANGE:	±10% trimmer	±5% trimmer
SOURCE: 105–125/210–250V a-c	<0.05%	<0.05%
LOAD: No load – full load	<0.05% or 2.5 mV*	<0.05%
TIME: 8-hours [drift]	<0.05%	<0.05%
TEMPERATURE: Per °C	<0.05%	<0.05%
RIPPLE: [rms]	<0.5 mV	<0.5 mV

**whichever is greater, except 5 mV for Model BKF 1.25–7.*

INPUT: 105–125V a-c or 210–250V a-c [selected], 50–440 Hz, single phase.

TEMPERATURE, AMBIENT OPERATING (no derating):
Group I *Cased Only:* 0°C to +55°C.
Group II *Uncased:* 0°C to +65°C.
Cased: 0°C to +55°C.

TEMPERATURE, STORAGE: -20°C to +85°C.

COOLING: Convection.

ISOLATION: The output terminals are isolated from the grounded case. A maximum of 500 volts [d-c or peak] can be connected between either output terminal and the case.

CONTROL: Output is controlled by a built-in multiturn rheostat trimmer. There is no provision for external programming.

VOLTAGE RECOVERY (for step load current): <50 μseconds.

OVERLOAD CURRENT CUTOFF: Modified adjustable re-entrant. Cutoff point is adjustable from 10% to 110% of the maximum current rating.

REMOTE ERROR SENSING: Compensates for up to 0.5 volt drop per output lead.

OVERSHOOT (turn-on/off): None.

SERIES/PARALLEL: BKF Modules can be series-connected for additional voltage up to their rated isolation voltage. There is no provision for parallel operation.

OVERVOLTAGE PROTECTOR: All models are equipped with a built-in crowbar whose trip point is tabulated for each model [turn-off to reset]. Triggering time is <10 μseconds.

Optional Adjustable Crowbar Trip: Add suffix "–V" to the model number for an installed trimmer which will adjust the crowbar trip from -10% E_o nominal to +20% E_o nominal. Add $15.00 to the price of the model. [Models with ▲ have the adjustable trip-point control built in.]

TERMINALS: All input, output and sensing connections are made via a single multiterminal barrier-strip.

DIMENSIONS: See dimensional listings on Page 771.

FINISH & CASES: Group I: Cased only, finish is black anodizing. Group II: Specify a cased model by appending the suffix "–C" to the model number and $12.00 to the price. Case finished in royal blue epoxy.

MOUNTING: For rack mount use adapters:
Group I RA 26–1 mounts single module; RA 27–2 mounts two modules; RA 28–4 mounts four modules.
Group II RA 25–1 mounts single module; RA 8–2 mounts two modules; RA 9–3 mounts three modules.

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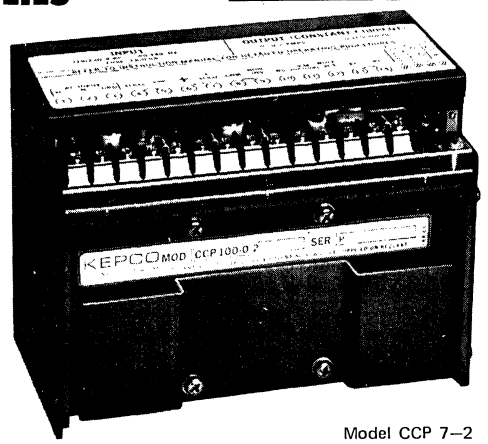
KEPCO
CCP
current stabilized modular
POWER SUPPLIES

The Kepco CCP modules are current controllers with a built-in current sensing resistor and adjustable voltage limiter. They employ a monolithic I-C amplifier driving a self-cooled NPN series transistor regulator. Capacitorless output filtering insures rapid recovery from switching or load transients. The output current ranges from true zero to 100%, linearly controlled by an external rheostat.



Model CCP 7–2

MODEL	D-C OUTPUT RANGE		OUTPUT IMPEDANCE (Ohms Min. + Shunt Capacitance in μF)	MAX. INPUT AMPS at 125 V a-c	PRICE	SHIP. WGT. (lbs.)
	AMPS	VOLTS				
CCP 7–2	0–2	0–7	34 kΩ + 0.1	0.50	$150.00	8
CCP 15–1.5	0–1.5	0–15	100 kΩ + 0.1	0.65	150.00	8
CCP 21–1	0–1	0–21	200 kΩ + 0.1	0.45	150.00	8
CCP 40–0.5	0–0.5	0–40	800 kΩ + 0.1	0.40	150.00	8
CCP 72–0.3	0–0.3	0–72	2.4MΩ + 0.1	0.45	150.00	8
CCP 100–0.2	0–0.2	0–100	10MΩ + 0.1	0.45	150.00	8

This tabulation specifies the limit of change in the regulated output for defined variations in the major influences. To obtain a realistic appraisal of the behaviour in your environment, multiply each influence by its probable range of variation and sum the pertinent effects.

SPECIFICATION	OUTPUT EFFECTS, CURRENT MODE
OUTPUT RANGE:	0–100% rated current
SOURCE: 105–125/210–250V a-c	<0.0005% or 0.2 μA
LOAD: No load – full load	<0.005% or 2 μA*
TIME: 8-hours [drift]	<0.02% or 2 μA*
TEMPERATURE: Per °C	<0.01%
RIPPLE: [rms]	<0.02% of I_o max.

**whichever is greater.*

INPUT: 105–125V a-c or 210–250V a-c [selected], 50–440 Hz, single phase.

TEMPERATURE, AMBIENT OPERATING: -20°C to +65°C.

TEMPERATURE, STORAGE: -40°C to +85°C.

ISOLATION: The output terminals are isolated from the grounded case. A maximum of 500 volts [d-c or peak] can be connected between either output terminal and the case.

CONTROLS: Voltage limit: 0.1V to 110% E_o max.
Backup current limit: 10%–110% I_o max.
Each is a multiturn trimmer with 1% resolution.

PROGRAMMING: CCP modules are fully programmable by resistance or external voltage signals. The internal current sample is 1 volt at I_o max.; the control current is [approximately] 1 milliampere. A precision external rheostat 0–1000 ohms, therefore, will control output 0–I_o max. See *Options* for the availability of a built-in current control trimmer, calibration control, and offset voltage nulling control [for precision operational programming].

MAXIMUM CAPACITIVE LOADING: 0.001 microfarads.

CURRENT RECOVERY (for step load voltage): <2 μsec./volt [except Model CCP 7–2: 4 μsec./volt], measured to the first time constant on the exponential response.

VOLTAGE LIMITING: Built-in adjustable limiter can be set anywhere in the range from 0.1 volt to 110% of the rated maximum voltage with provision for remote control.

REMOTE ERROR SENSING (provided for voltage limiter): Compensates for up to 0.5V per output lead.

SERIES/PARALLEL: Parallel operation of current sources may be made without restriction. Series operation is through the use of master/slave interconnection.

TERMINALS: All input, output and control connections are made via a multiterminal barrier-strip.

DIMENSIONS: See dimensional listings on Page 771.

FINISH: Black anodized aluminum.

MOUNTING: Rack mount with adapters RA 26–1, RA 27–1, RA 28–4.

OPTIONS: [Add suffix to the model number.]

"–R" CONTROL CURRENT ADJUSTMENT: A ±10% trimmer provides for calibration of the current programming function (sets the control current to 1 mA, exactly). Add $10.00 to price.

"–E" OFFSET VOLTAGE NULLING (for operational programming): Zeros the fixed part of the control amplifier's voltage offset. Add $10.00 to price.

"–P" OUTPUT CURRENT CONTROL: A 0–1000 ohm rheostat adjusts the output current through rated range. Add $25.00 to price.

"–VM" REMOTE VOLTAGE MONITOR: A voltage repeater provides a reproduction of the load voltage to a terminal on the barrier-strip, load 0–1 mA without affecting the load current. Add $15.00 to price.

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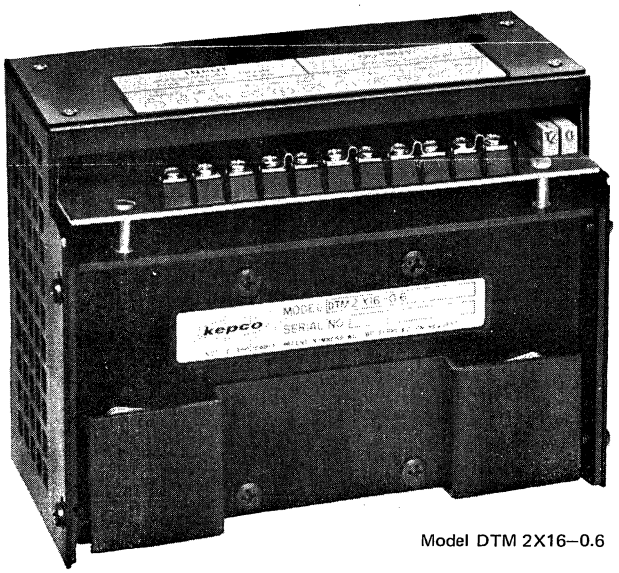
KEPCO DTM *modular* POWER SUPPLIES

The DTM models provide a tracked pair of d-c voltages for operating circuit modules, amplifiers and devices requiring matched plus and minus voltages. The circuit consists of a pair of regulators sharing a common reference and driving separate series regulators.



Model DTM 2X16–0.6

MODEL	d-c OUTPUT RANGE VOLTS	AMPS●	OUTPUT IMPEDANCE Ohms + Microhenries d-c to 100Hz	100 Hz to 1kHz	1 1kHz to 100kHz+μH	PRICE	SHIP. WGT. (lbs.)
DTM 2X16–0.6	0 to +16	0 to +0.6	0.01	0.03	0.1 + 1	$129.00	5
	0 to -16	0 to -0.6					
DTM 2X28–0.4	0 to +28	0 to +0.4	0.035	0.05	0.1 + 1	145.00	5
	0 to -28	0 to -0.4					
DTM 2X40–0.25	0 to +40	0 to +0.25	0.08	0.1	0.15 + 1	170.00	5
	0 to -40	0 to -0.25					

● *Full output current to 71°C, no derating.*

This tabulation specifies the limit of change in the regulated output for defined variations in the major influences. To obtain a realistic appraisal of the behaviour in your environment, multiply each influence by its probable range of variation and sum the pertinent effects.

SPECIFICATION	OUTPUT EFFECTS VOLTAGE No. 1	VOLTAGE No. 2
OUTPUT RANGE:	0 to + rating	0 to - rating
SOURCE: 105–125/210–250V a-c	<0.05% or 2 mV*	<0.05% or 2 mV*
LOAD: No load – full load	<0.05% or 2 mV*	<0.05% or 2 mV*
TIME: 8-hours [drift]	<0.05% or 4 mV*	<0.05% or 4 mV*
TEMPERATURE: Per °C	<0.05%	<0.05%
RIPPLE: [rms]	<0.5 mV	<0.5 mV

**whichever is greater.*

INPUT: 105–125V a-c or 210–250V a-c [selected], single phase, 0.5 amperes at 125V a-c.

TEMPERATURE, AMBIENT OPERATING: -20°C to +71°C.

TEMPERATURE, STORAGE: -40°C to +85°C.

COOLING: Convection.

ISOLATION: The output terminals are isolated from the grounded case. A maximum of 500 volts [d-c or peak] can be connected between either output terminal and the case.

CONTROL/PROGRAMMING: Output is controlled by a single built-in, multiturn rheostat trimmer which adjusts both output voltages simultaneously. The minus output tracks the plus output in any ratio. They can be set to produce identical voltages, e.g., 0 to +15 and 0 to -15 volts or unequal voltages, e.g., 0 to +12 and 0 to -6 volts. Remote control may be exercised over both voltages by means of a simple external rheostat controlling the master [+] output at ≅1000 ohms per volt, not calibrated.

TRACKING: Adjustable to ±50 mV from 1V to rated maximum.

VOLTAGE RECOVERY (for step load current): <50 μseconds.

CURRENT LIMITING: Each output individually protected by independently adjusted current limiter. Range: 10% to 110% of I_o maximum. The two outputs track with *plus out* serving as master. If the plus output goes into current limiting, the negative output will follow.

REMOTE ERROR SENSING: Compensates for up to 0.5 volts drop per output lead [3 wire].

OVERSHOOT (turn-on/off): No overshoot above a 25% voltage setting. For settings below 25% of E_o max., overshoot will be negligible when preloaded to 10% minimum.

SERIES/PARALLEL: Plus and minus outputs share a common terminal. They may be loaded individually or in series; no provision for parallel operation.

TERMINALS: Input and output and control connections are made to a barrier-strip.

DIMENSIONS: See dimensional listings on Page 771.

FINISH: Black anodized aluminum.

MOUNTING: Rack mount with adapters RA 26–1, RA 27–2 or RA 28–4.

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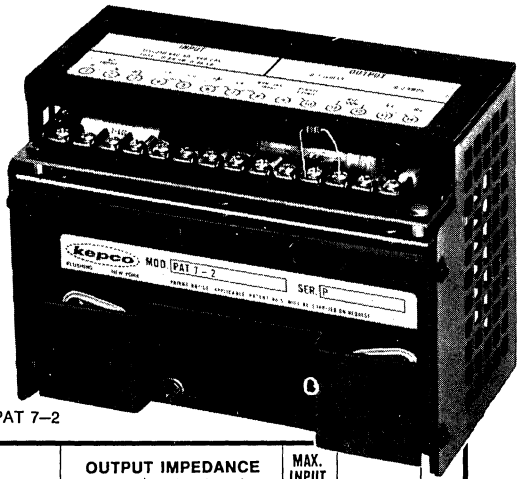
KEPCO

PAT

MODULAR

POWER SUPPLIES



Model PAT 7–2

The Kepco PAT series of voltage regulated modular power supplies features compact repairable construction of a precision programmable regulator. The output is a self-cooled series NPN transistor driven by a monolithic linear I-C amplifier and protected by adjustable current limiting. The regulator will control current when equipped with an external pair of sensing and feedback resistors.

MODEL	DC OUTPUT RANGE VOLTS	DC OUTPUT RANGE AMPS●	OUTPUT IMPEDANCE Ohms + Microhenries d-c to 100Hz	100 Hz to 1kHz	1kHz to 100kHz+μH	MAX. INPUT AMPS at 125 V a-c	PRICE	SHIP WGT. (lbs.)
PAT 7–2	0–7	0–2	0.2×10^{-3}	0.02	0.1 + 1	0.50	$130.00	6
PAT 15–1.5	0–15	0–1.5	0.5×10^{-3}	0.02	0.1 + 1	0.65	130.00	6
PAT 21–1	0–21	0–1	1×10^{-3}	0.02	0.1 + 1	0.45	130.00	6
PAT 40–0.5	0–40	0–0.5	4×10^{-3}	0.02	0.1 + 1	0.40	130.00	6
PAT 72–0.3	0–72	0–0.3	12×10^{-3}	0.02	0.1 + 1	0.45	130.00	6
PAT 100–0.2	0–100	0–0.2	25×10^{-3}	0.02	0.1 + 1	0.45	130.00	6

● Full output current to 71°C, no derating.

This tabulation specifies the limit of change in the regulated output for defined variations in the major influences. To obtain a realistic appraisal of the behaviour in your environment, multiply each influence by its probable range of variation and sum the pertinent effects.

SPECIFICATION	OUTPUT EFFECTS VOLTAGE MODE	OUTPUT EFFECTS CURRENT MODE**	VOLTAGE AMPLIFIER OFFSETS*** OFFSET VOLTAGE ΔE_{io}	OFFSET CURRENT ΔI_{io}	VOLTAGE REFERENCE (INTERNAL)***
OUTPUT RANGE:	0–100% E_o max.	1 mA–100% I_o max.	——	——	Fixed 6.2V±5%
SOURCE: 105-125/210-250V a-c	<0.0005%	<0.005%**	<10 μV	<2 nA	0.0001%
LOAD: No load — full load	<0.005% or 0.2 mV*	<0.01%**	<200 μV	<5 nA	——
TIME: 8-hours (drift)	<0.01% or 1 mV*	<0.02%**	<20 μV	<2 nA	0.005%
TEMPERATURE: Per °C	<0.01%†	<0.02%**†	<20 μV	<5 nA	0.005%
RIPPLE: (rms)	<0.1 mV	<0.02% of I_o max.	——	——	——

*whichever is greater

**External sensing, using a 1V sample. Effects are measured at rated sample voltage with 20 PPM external current feedback control.

***Offsets and the reference contribute to output change ΔE_O, by the equation $\Delta E_O = \pm\Delta E_{ref}(R_f/R_i) \pm\Delta E_{io}(1+R_f/R_i) \pm\Delta I_{io}(R_f)$ where R_f is the feedback resistor and R_i is the input resistor from the signal reference. Use the offsets to calculate output variations when external input/feedback elements are substituted for the internal reference and voltage control in special applications.

†See OPTIONS for 0.005% per °C voltage mode — 0.01% per °C current mode temperature effect coefficient.

INPUT: 105-125V a-c or 210-250V a-c (selected), 50-440 Hz, single phase.

TEMPERATURE, AMBIENT OPERATING: Cased: −20°C to +71°C.

TEMPERATURE, STORAGE: −40°C to +85°C.

COOLING: Convection.

ISOLATION: The output terminals are isolated from the grounded case. A maximum of 500 volts (d-c or peak) can be connected between either output terminal and the case.

PROGRAMMING: PAT is fully programmable by resistance or external voltage signals. Control current is 1 mA for 1000 ohms/V (option "−R" provides a calibration control). The positive terminal is common. *Note:* Programming resistance not supplied. For operational (amplifier) control, an offset voltage nulling control is available. See Option "−E".

OPEN LOOP d-c GAIN: $>0.5\times10^6$ volts per volt.

VOLTAGE RECOVERY (for step load current): <50 μseconds for recovery to within 0.005% or 2 mV of setting.

CURRENT LIMITING: Adjustable from 10% to 105% of rated full current with provision for remote control.

REMOTE ERROR SENSING: Compensates up to 0.5 volt drop per output lead.

OVERSHOOT: (Turn-on/off): None above 25% voltage setting; negligible below 25% when preloaded to 10% minimum.

SERIES/PARALLEL: Series operation to rated isolation; also master/slave capability. Current limiting design permits self-determined parallel load sharing.

TERMINALS: All input, output and control connections are made via a multi-terminal barrier strip.

DIMENSIONS: See dimensional listings on Page 771.

FINISH: Black anodized aluminum.

MOUNTING: Rack mount with adapters RA 26-1, RA 27-2 or RA 28-4.

OPTIONS: (add suffix to the model number).

"−R" CONTROL CURRENT ADJUSTMENT: ± 10% trimmer provides for programming calibration. Add $10.00 to price.

"−T" LOWER TEMPERATURE EFFECT COEFFICIENT: 0.005% per °C in voltage mode, 0.01% per °C in current mode. Add $30.00 to price.

"−E" OFFSET VOLTAGE NULLING: For operational programming. Zeros the fixed part of the control amplifier's voltage offset. Add $10.00 to price.

Data and prices subject to change without notice.

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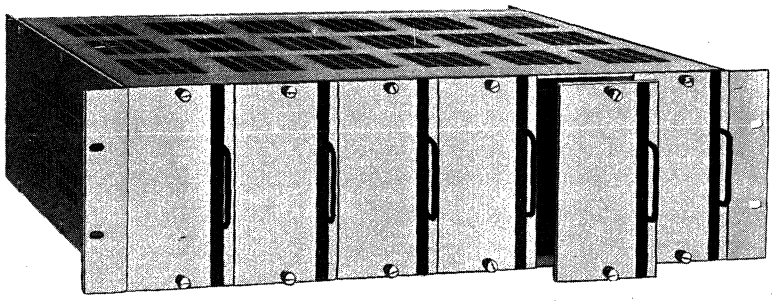
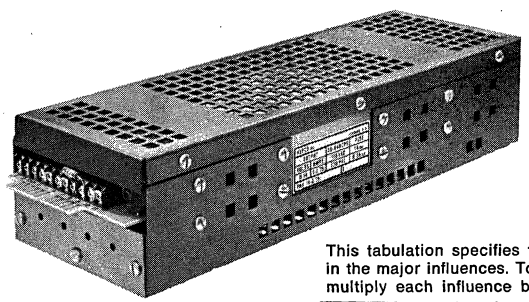
KEPCO PAX MODULAR POWER SUPPLIES



6 uncased modules mounted in RA 22-6 housing using BPA-22 slide adapters

PAX modules are low cost, single-amplifier power supplies that can be used with voltage or current feedback. The HS models (high speed) are especially recommended for current control because of their fast-recovery characteristics. In the PAX design, a convection-cooled PNP series pass transistor is used, the negative output terminal is common to the signal input. The PAX models are thus the signal-complement of the PCX and OPS designs.



Cased Module

MODEL	DC OUTPUT RANGE VOLTS	DC OUTPUT RANGE AMPS ●	OUTPUT IMPEDANCE Ohms + Microhenries d-c to 100Hz	100 Hz to 1kHz	1 1kHz to 100kHz+μH	MAX. INPUT AMPS at 125 V a-c	PRICE ♦	SHIP WGT. (lbs.)
PAX 7–1	0–7	0–1	0.004	0.02	0.1+1	0.3	$101.00	5
PAX 15–0.75	0–15	0–0.75	0.010	0.02	0.1+1	0.3	101.00	5
PAX 21–0.5	0–21	0–0.5	0.025	0.02	0.1+1	0.3	101.00	5
PAX 36–0.3	0–36	0–0.3	0.06	0.02	0.1+1	0.3	101.00	5
PAX 72–0.15	0–72	0–0.15	0.25	0.02	0.1+1	0.3	101.00	5
PAX 100–0.1	0–100	0–0.1	0.5	0.02	0.1+1	0.3	101.00	5

♦ For case, add Suffix "C" to model number and $12.00 to price.
● Full output current to 50°C, no derating.

This tabulation specifies the limit of change in the regulated output for defined variations in the major influences. To obtain a realistic appraisal of the behaviour in your environment, multiply each influence by its probable range of variation and sum the pertinent effects.

SPECIFICATION	OUTPUT EFFECTS VOLTAGE MODE	OUTPUT EFFECTS CURRENT MODE** (External Sensing)
OUTPUT RANGE:	0–100% E_O max.	1 mA to 100% I_O
SOURCE: 105-125/210-250V a-c	<0.05% or 1 mV*	<0.1% at rated sample**
LOAD: No load — full load	<0.05% or 1 mV*	<0.1% at rated sample**
TIME: 8-hours (drift)	<0.05% or 3 mV*	<0.1% or 1 mA*
TEMPERATURE: Per °C	<0.05%	<0.1% at rated sample**
RIPPLE: (rms)	<0.25 mV, rms.	<0.1% I_O max.
RIPPLE, High Speed: (rms)	<0.1% of maximun output (grounded)	<0.1% of maximum output (grounded)

*whichever is greater
**Rated sample is 1V d-c across external current sampling resistor, with external current control.

INPUT: 105-125V a-c or 210-250V a-c (selected), 50-440 Hz, single phase.

TEMPERATURE, AMBIENT OPERATING: −20°C to + 50°C

TEMPERATURE, STORAGE: −40°C to +85°C.

COOLING: Convection.

ISOLATION: The output terminals are isolated from the grounded case. A maximum of 500 volts (d-c or peak) can be connected between either output terminal and the case.

PROGRAMMING: PAX is programmable by resistance or external voltage signals. Control current is ≅ 1 mA for 1000 ohms/V (option "–R" provides a calibration control). High Speed Models provide fast response to programming commands. The negative terminal is common. *Note*: Programming resistance not supplied.

VOLTAGE RECOVERY (for step load current): <50 μseconds.

CURRENT LIMITING: Adjustable from 25% to 150% of rated full current.

REMOTE ERROR SENSING: Compensates up to 0.5V drop per output lead.

OVERSHOOT: (Turn-on/off): None above 25% voltage setting; negligible below 25% when preloaded to 10% minimum.

SERIES/PARALLEL: Series operation to rated isolation; also master/slave capability. Current limiting design permits self-determined parallel load sharing.

TERMINALS: All input, output and control connections are made via a multi-terminal barrier strip and printed circuit connector.

FINISH: Blue anodized aluminum.

DIMENSIONS: See dimensional listings on Page 771.

MOUNTING: The uncased model can be mounted to a BPA-22 slide adapter for use with the RA 22-6, CA-3, CA-4 and CA-5. *See hardware section.* The cased model can be rack-mounted on adapters RA 12-1, RA 13-4 or RA 11-6.

OPTIONS: (add suffix to the model number).

"–R" CONTROL CURRENT ADJUSTMENT: ± 10% trimmer provides for programming calibration. Add $10.00 to price.

"–C" CASED ENCLOSURE: fully encloses the power supply. Add $12.00 to price (do not use with the BPA-22).

"–HS" HIGH SPEED MODELS: Add $10.00 to price.

Slewing Rate > 50,000 volts per second measured as the chord to the first time constant on the exponential response.

Transient Response: ("–HS" models only).

Voltage Mode: (for a step load current): recovery is an exponential with a 50 μsec. time constant.

Current Mode: (for a step load voltage): recovery is at the rate of 0.05 milliseconds per volt.

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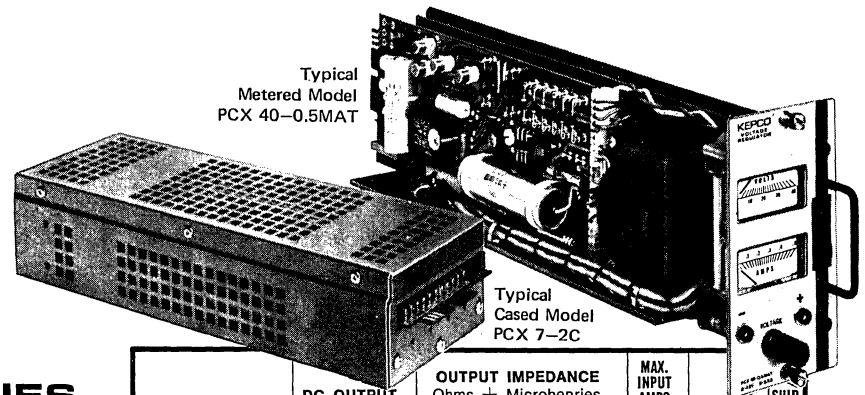
KEPCO
PCX
MODULAR
POWER SUPPLIES



Typical Metered Model PCX 40–0.5MAT

Typical Cased Model PCX 7–2C

The PCX group of voltage regulators are available in two forms—as programmable modules for OEM's or (with the suffix "MAT") as metered plug-ins with a built-in, 10-turn voltage control. The regulator is a self-cooled series NPN transistor driven by Kepco's monolithic linear I-C amplifier and protected by adjustable current limiting. The regulator will control current when equipped with an external pair of sensing and feedback resistors.

This tabulation specifies the limit of change in the regulated output for defined variations in the major influences. To obtain a realistic appraisal of the behaviour in your environment, multiply each influence by its probable range of variation and sum the pertinent effects.

MODEL	DC OUTPUT RANGE VOLTS	DC OUTPUT RANGE AMPS	OUTPUT IMPEDANCE Ohms + Microhenries d-c to 100Hz	100 Hz to 1kHz	1kHz to 100kHz+μH	MAX. INPUT AMPS at 125 V a-c	PRICE	SHIP WGT. (lbs.)
PCX 7–2	0–7	0–2	$0.2X10^{-3}$	0.02	0.1+1	0.50	$119.00♦	4
PCX 15–1.5	0–15	0–1.5	$0.5X10^{-3}$	0.02	0.1+1	0.65	119.00♦	4
PCX 21–1	0–21	0–1	$1X10^{-3}$	0.02	0.1+1	0.45	119.00♦	4
PCX 40–0.5	0–40	0–0.5	$4X10^{-3}$	0.02	0.1+1	0.40	119.00♦	4
PCX 72–0.3	0–72	0–0.3	$12X10^{-3}$	0.02	0.1+1	0.45	119.00♦	4
PCX 100–0.2	0–100	0–0.2	$25X10^{-3}$	0.02	0.1+1	0.45	119.00♦	4
PCX 7–2MAT	0–7	0–2	$0.2X10^{-3}$	0.02	0.1+1	0.50	$180.00	6
PCX 15–1.5MAT	0–15	0–1.5	$0.5X10^{-3}$	0.02	0.1+1	0.65	180.00	6
PCX 21–1MAT	0–21	0–1	$1X10^{-3}$	0.02	0.1+1	0.45	180.00	6
PCX 40–0.5MAT	0–40	0–0.5	$4X10^{-3}$	0.02	0.1+1	0.40	180.00	6
PCX 72–0.3MAT	0–72	0–0.3	$12X10^{-3}$	0.02	0.1+1	0.45	180.00	6
PCX 100–0.2MAT	0–100	0–0.2	$25X10^{-3}$	0.02	0.1+1	0.45	180.00	6

♦ For case, add Suffix "C" to model number and $12.00 to price.

SPECIFICATION	OUTPUT EFFECTS VOLTAGE MODE	OUTPUT EFFECTS CURRENT MODE**	VOLTAGE AMPLIFIER OFFSETS*** OFFSET VOLTAGE ΔE_{io}	OFFSET CURRENT ΔI_{io}	VOLTAGE REFERENCE (INTERNAL)***
OUTPUT RANGE:	0–100% E_o max.	1 mA–100% I_o max.	——	——	Fixed 6.2V±5%
SOURCE: 105-125/210-250V a-c	<0.0005%	<0.005%**	<10 μV	<2 nA	0.0001%
LOAD: No load — full load	<0.005% or 0.2 mV*	<0.01%**	<200 μV	<5 nA	——
TIME: 8-hours (drift)	<0.01% or 1 mV*	<0.02%**	<20 μV	<2 nA	0.005%
TEMPERATURE: Per °C	<0.01%†	<0.02%**†	<20 μV	<5 nA	0.005%
RIPPLE: (rms)	<0.1 mV	<0.02% of I_o max.	——	——	——

*whichever is greater †See OPTIONS for 0.005% per °C voltage mode — 0.01% per °C current mode temperature effect coefficient.

**External sensing, using a 1V sample. Effects are measured at rated sample voltage with 20 PPM external current feedback control.

***Offsets and the reference contribute to output change ΔE_o, by the equation $\Delta E_o = \pm\Delta E_{ref}(R_f/R_i) \pm\Delta E_{io}(1+R_f/R_i) \pm\Delta I_{io}(R_f)$ where R_f is the feedback resistor and R_i is the input resistor from the signal reference. Use the offsets to calculate output variations when external input/feedback elements are substituted for the internal reference and voltage control in special applications.

INPUT: 105-125V a-c or 210-250V a-c (selected) 50-440 Hz, 1Ø.

TEMPERATURE, AMBIENT OPERATING: Cased: −20°C to +65°C. Uncased: −20°C to +71°C. (no derating)

TEMPERATURE: STORAGE: −40°C to +85°C.

ISOLATION: The output terminals are isolated from the grounded case. A maximum of 500 volts (d-c or peak) can be connected between either output terminal and the case.

PROGRAMMING: PCX is fully programmable by resistance or external voltage signals. Control current is ≅1 mA for 1000 ohms/V (option "–R" provides a calibration control). The positive terminal is common. For operational (amplifier) control, an offset voltage nulling control is available, see Option "–E." Suffix "MAT" models have 10-turn voltage control built-in. Resolution: 0.05%.

OPEN LOOP d-c GAIN: $>0.5\times10^6$ volts per volt.

VOLTAGE RECOVERY (for step load current): <50 μseconds for recovery to within 0.005% or 2 mV of setting.

CURRENT LIMITING: Adjustable from 10% to 105% of the rated full current.

REMOTE ERROR SENSING: Compensates up to 0.5V drop per output lead.

OVERSHOOT: (Turn-on/off): None above 25% voltage setting; negligible below 25% when preloaded to 10% minimum.

SERIES/PARALLEL: Series operation to rated isolation; also master/slave capability. Current limiting design permits self-determined parallel load sharing.

COOLING: Convection.

TERMINALS: All input, output and control connections are made via a multi-terminal barrier strip and printed circuit connector.

DIMENSIONS: See dimensional listings on Page 771.

FINISH: Blue anodized aluminum.

CASES/MOUNTING: Model number without suffix specifies an uncased open model. Add suffix "C" and $12.00 to price for wraparound case — or order Case CA-1 separately. Cased models can be rack mounted on adapters RA 12-1, RA 13-4 or RA 11-6. Uncased models can be used with BPA-22 slide adapter for plug-in mounting. These fit interchangeably with metered "MAT" – option models in Cases CA-3, CA-4, CA-5 or RA 22-6. *See Hardware section.*

OPTIONS: (add suffix to the model number).

"–MAT" This option provides for a fully metered plug-in package with separate voltmeter and ammeter and a 10-turn output voltage control. Furnished *uncased* for mounting in single unit case CA-3, dual case CA-4 or triple case CA-5. May be rack mounted in six-unit housing Model RA-22-6, see Hardware Section. See table for specifications and prices.

"–R" CONTROL CURRENT ADJUSTMENT: ± 10% trimmer provides for programming calibration. Add $10.00 to price.

"–T" LOWER TEMPERATURE COEFFICIENT: 0.005% per °C in voltage mode, 0.01% per °C in current mode. Add $30.00 to price.

"–E" OFFSET VOLTAGE NULLING: For operational programming. Zero the fixed part of the control amplifier's voltage offset. Add $10.00 to price.

Data and prices subject to change without notice.

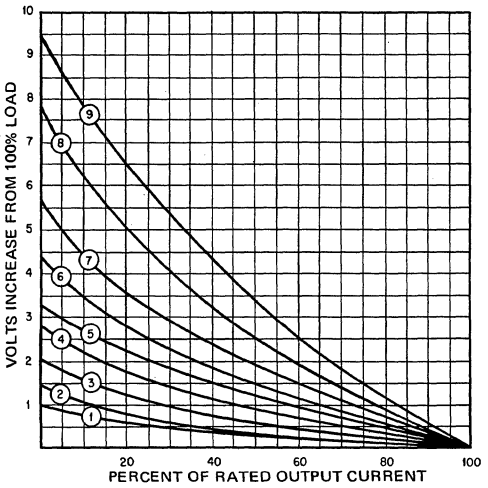
All terms used in the specifications are defined in the Kepco Glossary.

KEPCO PRM

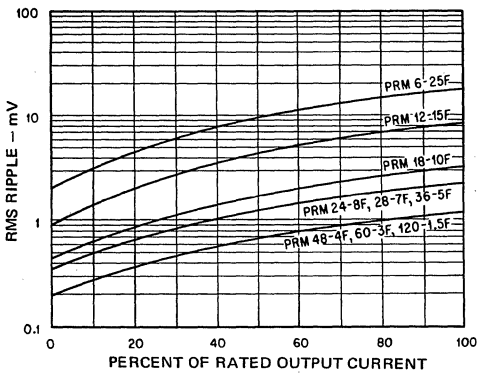
MODULAR

POWER SUPPLIES

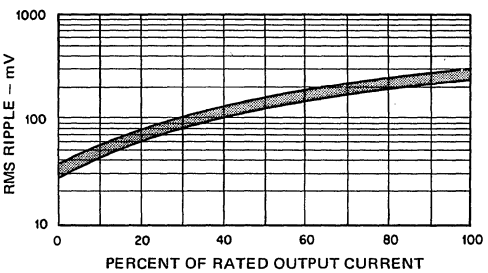
The Kepco PRM voltage regulated modules are simple, reliable, efficient, fixed output sources. The design is based on a ferroresonant power transformer called Flux-O-Tran® which provides both regulating and overload current limiting. The extra-filtered models (suffix F) have a Pi section LC filter, reducing their ripple to about a tenth that of the single section capacitor-filtered models. The *dual* output models have two independent d-c circuits that may be used in series or in parallel or separately. Size "D" models feature an adjustable output tap.



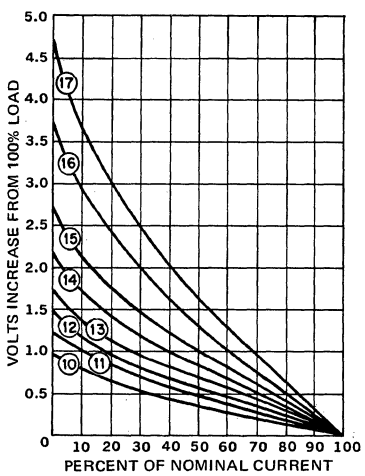
TYPICAL LOAD EFFECT CURVE FOR ALL MODELS (EXCEPT SIZE "D")



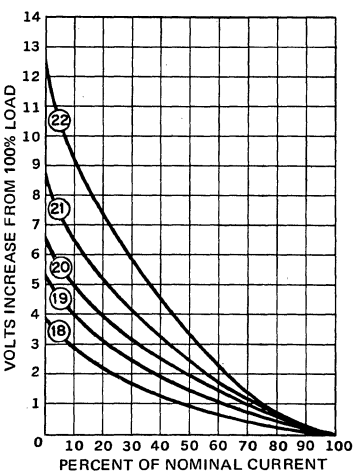
TYPICAL OUTPUT RIPPLE CURVES FOR EXTRA-FILTERED MODELS, PLOTTED AS A FUNCTION OF LOAD CURRENT



TYPICAL OUTPUT RIPPLE CURVES FOR SIZES A B and C (duals), PLOTTED AS A FUNCTION OF LOAD CURRENT



TYPICAL LOAD EFFECT CURVES FOR THE SIZE "D" PRM MODELS



This tabluation specifies the limit of change in the regulated output for defined variations in the major influences. To obtain a realistic appraisal of the behaviour in your environment, multiply each influence by its probable range of variations and sum the pertinent effects.

SPECIFICATION	OUTPUT EFFECTS				
	SIZE A 180 SERIES	SIZE B 120 SERIES	SIZE C — 180F Extra-Filter	SIZE C — 300 Dual-Output	SIZE D 60 SERIES
Accuracy: (of fixed setting)*	±2%•	±2%•	±2%†•	±2%††•	±2%•
Source: 100-130V a-c	±1%‡	±1%‡	±1%‡	±1%▼	±1%‡
Load: no load–full load	See charts for maximum value; the graphs show typical performance.				
Time: 8-hours (drift)	1% or 0.1V**	1% or 0.1V**	1% or 0.1V**	1% or 0.1V**	1% or 0.1V**
Temperature: per °C	0.05%	0.05%	0.05%	0.05%	0.05%
Ripple: (rms)	See charts for maximum value; the graphs show typical performance.				
Input Power: (at 115V a-c)	3A (280 W)	2A (190 W)	3A (280 W)	5A (465 W)	1.1A (100 W)

** At 115V a-c, full load and 30°C. The initial (cold) output is 1% higher.* *** Whichever is greater.* *• or 0.25V, whichever is greater.*

† The extra filter stage introduces an additional 2% drop. A 10% reduction in load current will compensate for this loss.

†† Interaction between sections of the dual supply produce an extra –2% change when the other section is loaded from zero to maximum.

‡ For ±15V a-c source variation with loads between 25–100%. For loads below 25% the source effect is ±1.5%.

▼For ±15V a-c source variations with loads between 50–100%. For loads below 50% the source effect is ±1.5%.

INPUT: 115V a-c ±15V a-c, 60 Hz ±5% single phase.

Overseas Models: For 50 Hz ±5%, specify suffix "–50." Inputs (selectable) are: 104 ±13.5V a-c, 115 ±15V a-c, 208 ±27V a-c or 230 ±30V a-c. Output current rating is decreased 20% in the 50 Hz version. Add $15.00 to the unit price.

NOTE: Input frequency variations produce an approximately equal percentage output voltage change.

TEMPERATURE, AMBIENT OPERATING: –20°C to +55°C.

TEMPERATURE, STORAGE: –40°C to +85°C.

COOLING: Convection.

OUTPUT IMPEDANCE: 1 kHz to 10 kHz: 0.05 ohms, 10 kHz to 100 kHz: 0.05 ohms + 0.5 microhenries. Below 1000 Hz, the impedance is a function of load current and may be derived from the slope of the load regulation curve ΔE/ΔI.

VOLTAGE RECOVERY (step load current, 50–100%): <400 ms.

OVERLOAD PROTECTION: Current limiting transformer restricts short circuit current to safe value. A thermal circuit breaker is employed in *dual* models.

ISOLATION: The output terminals are isolated from the grounded case. A maximum of 600 volts (d-c or peak) can be connected between either output terminal and the case (or between the outputs of dual models.)

SERIES/PARALLEL OPERATION: Identical models, or halves of a dual supply can be paralleled for approximately double current (allow for 10% imbalance). Series operation to rated isolation.

ACCESSORIES: Various rack adapters available, see hardware page. *Cases:* Size A uses CA-200; Size C uses CA-300. Sizes B and D have non-removable integral enclosures. To order a fully cased model in sizes A and C, add a suffix letter "C" to the model number.

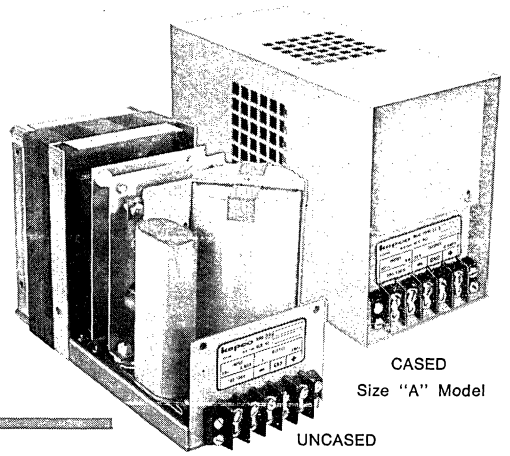
FINISH: *Cases:* royal blue.

DIMENSIONS: See dimensional listings on Page 771.

SIZE "A" — 180 SERIES

MODEL	DC OUTPUT VOLTS	DC OUTPUT AMPS	LOAD EFFECT VOLTS INCREASE * 100%-50% LOAD	LOAD EFFECT VOLTS INCREASE * 100%-25% LOAD	LOAD EFFECT CURVE	RIPPLE (max) RMS VOLTS	PRICE ♦	SHIP WGT. (lbs.)
PRM 5–25	5.2	0–25	0.5	0.8	1	0.4	$134.00	22
PRM 6–25	6.3	0–25	0.5	0.8	1	0.4	134.00	22
PRM 12–15	12	0–15	0.6	1.0	1	0.4	134.00	22
PRM 18–10	18	0–10	0.6	1.0	2	0.3	134.00	22
PRM 24–8	24	0–8	0.7	1.2	2	0.3	134.00	22
PRM 28–7	28	0–7	0.7	1.2	2	0.4	134.00	22
PRM 36–5	36	0–5	0.8	1.3	3	0.4	134.00	22
PRM 48–4	48	0–4	1.0	1.8	4	0.3	134.00	22
PRM 60–3	60	0–3	1.1	1.9	5	0.3	134.00	22
PRM 120–1.5	120	0–1.5	2.2	3.6	7	0.3	134.00	22

♦ For case, add Suffix "C" to model number and $12.00 to price.
*Measured at 115V a-c Source

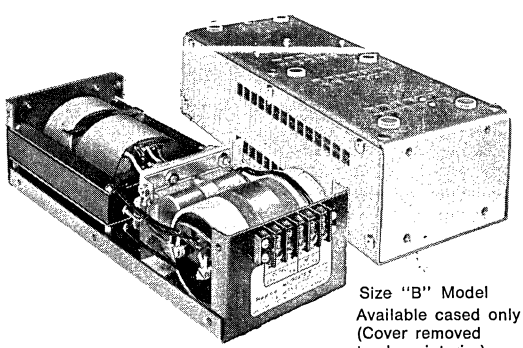


CASED
Size "A" Model
UNCASED

SIZE "B" — 120 SERIES

MODEL	DC OUTPUT VOLTS	DC OUTPUT AMPS	LOAD EFFECT VOLTS INCREASE * 100%-50% LOAD	LOAD EFFECT VOLTS INCREASE * 100%-25% LOAD	LOAD EFFECT CURVE	RIPPLE (max) RMS VOLTS	PRICE ♦	SHIP WGT. (lbs.)
PRM 5–15	5.2	0–15	0.5	0.8	1	0.4	$112.00	17
PRM 6–15	6.3	0–15	0.5	0.8	1	0.4	112.00	17
PRM 12–10	12	0–10	0.6	1.0	2	0.4	112.00	17
PRM 18–6.7	18	0–6.7	0.8	1.3	3	0.3	112.00	17
PRM 24–5	24	0–5	1.0	1.7	3	0.3	112.00	17
PRM 28–4.3	28	0–4.3	1.2	2.0	4	0.3	112.00	17
PRM 36–3.3	36	0–3.3	1.5	2.4	5	0.3	112.00	17
PRM 48–2.5	48	0–2.5	2.0	3.4	6	0.3	112.00	17
PRM 60–2	60	0–2	2.3	3.8	7	0.3	112.00	17
PRM 120–1	120	0–1	4.6	7.6	9	0.3	112.00	17

♦ Available cased only. Price includes case. *Measured at 115V a-c Source

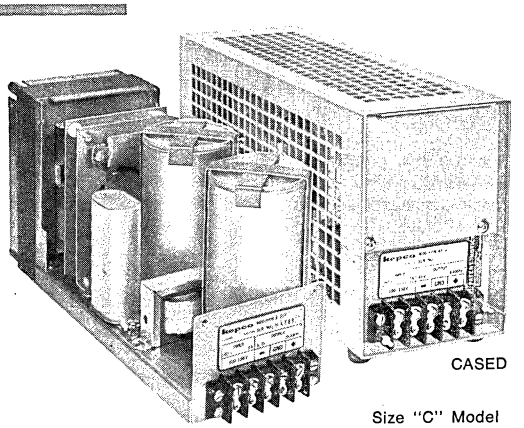


Size "B" Model
Available cased only
(Cover removed
to show interior)

SIZE "C" — 180F SERIES (Extra-Filtered)

MODEL	DC OUTPUT** VOLTS	DC OUTPUT** AMPS	LOAD EFFECT VOLTS INCREASE * 100%-50% LOAD	LOAD EFFECT VOLTS INCREASE * 100%-25% LOAD	LOAD EFFECT CURVE	RIPPLE (max) RMS VOLTS	PRICE ♦	SHIP WGT. (lbs.)
PRM 5–25F	5.2	0–25	0.7	1.2	1	0.04	$191.00	28
PRM 6–25F	6.3	0–25	0.7	1.2	1	0.04	191.00	28
PRM 12–15F	12	0–15	0.9	1.4	2	0.02	191.00	28
PRM 18–10F	18	0–10	0.9	1.5	3	0.01	191.00	28
PRM 24–8F	24	0–8	1.2	2.0	3	0.005	191.00	28
PRM 28–7F	28	0–7	1.3	2.1	3	0.005	191.00	28
PRM 36–5F	36	0–5	1.5	2.4	4	0.005	191.00	28
PRM 48–4F	48	0–4	1.7	2.9	5	0.003	191.00	28
PRM 60–3F	60	0–3	2.3	3.6	6	0.003	191.00	28
PRM 120–1.5F	120	0–1.5	3.8	6.8	8	0.003	191.00	28

♦ For case, add Suffix "C" to model number and $12.00 to price.
* Measured at 115V a-c Source/** Less 2% Filter drop (See ACCURACY)



CASED
Size "C" Model
Extra-Filtered
UNCASED

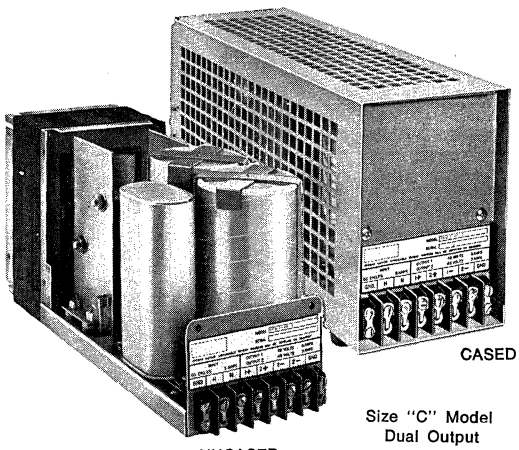
KEPCO

MODULAR POWER SUPPLIES

SIZE "C" — 300 SERIES (Dual Output)

MODEL	DC OUTPUT VOLTS	DC OUTPUT AMPS	LOAD EFFECT * VOLTS INCREASE 100%-50% LOAD	LOAD EFFECT * VOLTS INCREASE 100%-25% LOAD	LOAD EFFECT CURVE	RIPPLE (max) RMS VOLTS	PRICE ♦	SHIP WGT. (lbs.)
PRM 2X4.5–20	4.5 4.5	0–20 0–20	0.5	0.7	1	0.3	$211.00	38
PRM 2X5–20	5.2 5.2	0–20 0–20	0.5	0.7	1	0.3	211.00	38
PRM 2X6–20	6.3 6.3	0–20 0–20	0.5	0.7	1	0.3	211.00	38
PRM 2X12–12	12 12	0–12 0–12	0.5	0.7	1	0.3	211.00	38
PRM 2X15–10	15 15	0–10 0–10	0.5	1.0	1	0.3	211.00	38
PRM 2X18–8	18 18	0–8 0–8	0.6	1.6	1	0.3	211.00	38
PRM 2X24–6	24 24	0–6 0–6	0.6	1.0	2	0.3	211.00	38
PRM 2X28–5	28 28	0–5 0–5	0.7	1.2	2	0.3	211.00	38
PRM 2X36–4	36 36	0–4 0–4	0.7	1.2	3	0.3	211.00	38
PRM 2X48–3	48 48	0–3 0–3	0.8	1.4	3	0.3	211.00	38
PRM 2X60–2.5	60 60	0–2.5 0–2.5	1.0	1.7	3	0.3	211.00	38

*Measured at 115V a-c Source
♦ For case, add Suffix "C" to model number and $12.00 to price.

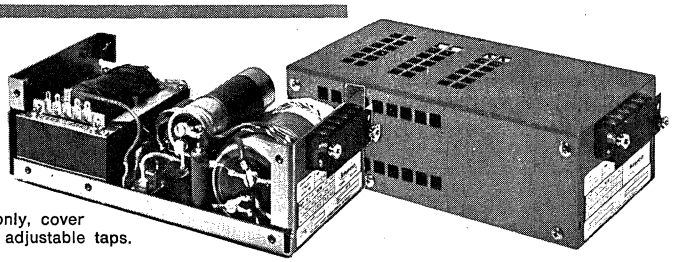


CASED

Size "C" Model
Dual Output

UNCASED

SIZE "D" — 60 SERIES

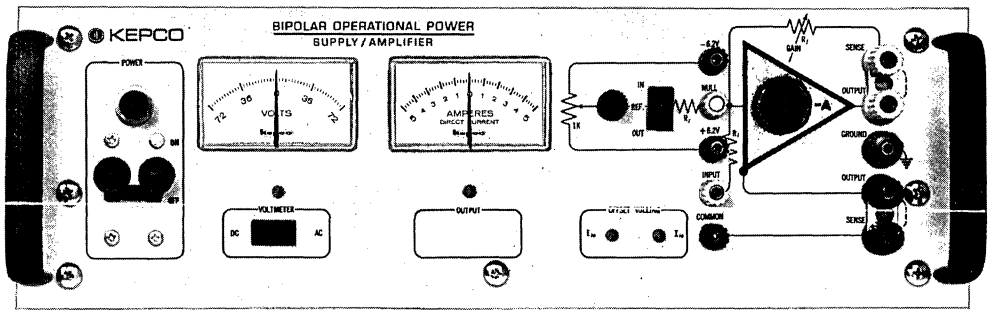


Size "D" Model
Available cased only, cover removed to show adjustable taps.

The size D, Series 60 PRM modules are equipped with an adjustable tap arrangement, selecting two increments of voltage above the nominal output and two increments of voltage below the nominal output. In the table of voltages, the nominal (center) tap is indicated by the bold face type. The table of currents has a corresponding bold face column showing the current rating at the nominal voltage. The two adjacent columns on either side correspond to the respective voltage tap increments. The specifications are computed for the nominal (center) tap.

MODEL	OUTPUT VOLTAGE VOLTS —B	—A	NOM	+A	+B	OUTPUT CURRENT AMPS —B	—A	NOM	+A	+B	LOAD EFFECT VOLTS INCREASE* 100%-50% LOAD	100%-25% LOAD	LOAD EFFECT CURVE	RIPPLE (max) RMS %	PRICE ♦	SHIP WGT. (lbs.)
PRM 5–10	4.2	4.6	**5.0**	5.4	5.8	12.0	11.0	**10.0**	9.3	8.6	0.5	0.7	10	0.50	$96.00	12
PRM 6.3–8	5.5	5.9	**6.3**	6.7	7.1	9.1	8.5	**8.0**	7.5	7.1	0.5	0.8	10	0.50	96.00	12
PRM 8–7	7.2	7.6	**8.0**	8.4	8.8	7.8	7.5	**7.0**	6.7	6.4	0.5	0.8	10	0.33	96.00	12
PRM 10–6	8.4	9.2	**10.0**	10.8	11.6	7.1	6.5	**6.0**	5.6	5.2	0.6	0.9	11	0.33	96.00	12
PRM 12–5	10.4	11.2	**12.0**	12.8	13.6	5.7	5.4	**5.0**	4.7	4.5	0.7	1.2	12	0.33	96.00	12
PRM 15–4	13.4	14.2	**15.0**	15.8	16.6	4.5	4.2	**4.0**	3.8	3.6	0.9	1.3	13	0.33	91.00	12
PRM 18–3.3	16.4	17.2	**18.0**	18.8	19.6	3.6	3.5	**3.3**	3.2	3.1	1.0	1.6	14	0.33	91.00	12
PRM 21–2.9	17.9	19.4	**21.0**	22.6	24.2	3.4	3.1	**2.9**	2.7	2.6	1.0	1.7	14	0.33	91.00	12
PRM 26–2.3	22	24	**26**	28	30	2.7	2.5	**2.3**	2.1	2.0	1.3	2.0	15	0.33	91.00	12
PRM 36–1.7	32	34	**36**	38	40	1.9	1.8	**1.7**	1.6	1.5	1.7	2.7	16	0.33	91.00	12
PRM 48–1.25	42	45	**48**	51	54	1.43	1.33	**1.25**	1.18	1.11	2.1	3.4	17	0.33	91.00	11
PRM 60–1	52	56	**60**	64	68	1.15	1.07	**1.00**	0.94	0.88	1.2	2.1	18	0.33	91.00	11
PRM 70–0.85	60	65	**70**	75	80	1.00	0.92	**0.86**	0.80	0.75	1.3	2.5	18	0.33	91.00	11
PRM 90–0.65	80	85	**90**	95	100	0.75	0.71	**0.67**	0.63	0.60	1.9	3.4	19	0.33	91.00	11
PRM 120–0.50	110	115	**120**	125	130	0.54	0.52	**0.50**	0.48	0.46	2.3	5.0	20	0.33	91.00	11
PRM 160–0.37	140	150	**160**	170	180	0.43	0.40	**0.37**	0.35	0.33	3.0	6.0	21	0.33	91.00	11
PRM 240–0.25	220	230	**240**	250	260	0.27	0.26	**0.25**	0.24	0.23	4.0	8.2	22	0.33	91.00	11

*Measured at 115V a-c Source ♦ Available cased only. Price includes case.



Model BOP 72–5M

KEPCO BOP

BIPOLAR OPERATIONAL POWER SUPPLIES

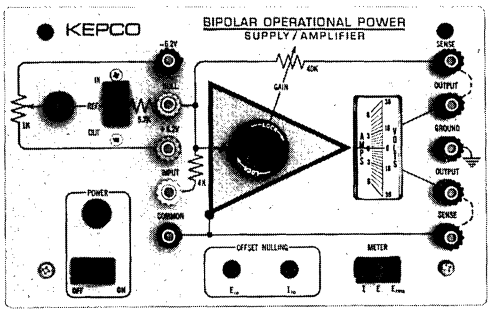
The Bipolar Operational Power Supply is a distinctly different sort of instrument, capable of responding to programming commands in either direction from zero. The BOP employs a d-c coupled NPN/PNP complementary-symmetry output stage, forced-cooled for efficient dissipation.

The standard laboratory BOP is equipped with a patch board panel containing input/output reference and feedback elements. The unmetered instrument has a blank panel for OEM's. Barrier strip access to all control points is provided on both styles.

MODEL	DC OUTPUT RANGE VOLTS	DC OUTPUT RANGE AMPS ●	CURRENT SINK	DC OUTPUT IMPEDANCE (Ohms max.)	RACK SIZE	PRICE ♦	SHIP WGT. (lbs.)
BOP 15–20M	+15 to −15	+20 to −20	±4A	$0.2X10^{-3}$	Full	$1,150.00	80
BOP 36–1.5M	+36 to −36	+1.5 to −1.5	±0.3A	$5X10^{-3}$	1/2	525.00	20
BOP 36–5M	+36 to −36	+5 to −5	±1A	$1.5X10^{-3}$	1/2	750.00	42
BOP 72–1.5M	+72 to −72	+1.5 to −1.5	±0.3A	$10X10^{-3}$	Full	1,125.00	52
BOP 72–5M	+72 to −72	+5 to −5	±1A	$3X10^{-3}$	Full	1,475.00	80

● Full output current to 65°C, no derating.

♦ Price is for laboratory style instrument with control panel, delete suffix "M" and deduct $60.00 for modular style.



Model BOP 36–5M

This tabulation specifies the limit of change in the amplifier offsets for defined variations in the major influences. To obtain a realistic appraisal of the behaviour in your environment, multiply each influence by its probable range of variation and sum the pertinent effects.

d-c SPECIFICATION	VOLTAGE AMPLIFIER OFFSETS * E_{io}	VOLTAGE AMPLIFIER OFFSETS * I_{io}	* REFERENCES 6.2V ±5%
SOURCE: 105–125/210–250V a-c	<0.1 mV	<10 nA	0.0005%
LOAD: no load — full load	<1.0 mV	<10 nA	——
TIME: 8-hours (drift)	<0.1 mV	<50 nA	0.005%
TEMP.: Per °C	<0.05 mV	<50 nA	0.005%
RIPPLE: (rms)	<0.01% of E_0 Max. or 3 mV**		——

*Offsets and the reference contribute to output change ΔE_O, by the equation $\Delta E_O = \pm\Delta E_{ref}(R_f/R_i) \pm \Delta E_{io}(1+R_f/R_i) \pm \Delta I_{io}(R_f)$ where R_f is the feedback resistor and R_i is the input resistor from the signal reference.
Use the offsets to calculate the output effects. ** whichever is greater

a-c SPECIFICATION	MODE	BOP 15–20M	BOP 36–1.5M	BOP 36–5M	BOP 72–1.5M	BOP 72–5M
SMALL SIGNAL FREQUENCY RESPONSE frequency at which the open loop gain becomes unity	FAST	300 kHz	300 kHz	300 kHz	300 kHz	300 kHz
	SLOW	10 kHz	30 kHz	30 kHz	30 kHz	30 kHz
LARGE SIGNAL FREQUENCY RESPONSE frequency at which the fully modulated, fully loaded output reaches 3% harmonic distortion	FAST	25 kHz	30 kHz	30 kHz	20 kHz	20 kHz
	SLOW	1 kHz	3 kHz	3 kHz	2 kHz	2 kHz
AMPLIFIER SLEWING RATE	FAST	2V/μsec	7V/μsec	7V/μsec.	9V/μsec.	9V/μsec.
	SLOW	0.1V/μsec.	0.7V/μsec	0.7V/μsec.	0.9V/μsec.	0.9V/μsec.
PROGRAMMING TIME CONSTANT input/feedback set for gain=10	FAST	12 μsec.	12 μsec.	12 μsec.	12 μsec.	12 μsec.
	SLOW	250 μsec.	150 μsec.	150 μsec.	150 μsec.	150 μsec.
VOLTAGE RECOVERY TIME CONSTANT for step load current	FAST	50 μsec.	50 μsec.	50 μsec.	50 μsec.	50 μsec.
	SLOW	500 μsec.	500 μsec.	500 μsec.	500 μsec.	500 μsec.
CURRENT RECOVERY TIME CONSTANT for step load voltage	FAST	50 μsec.	50 μsec.	50 μsec.	50 μsec.	50 μsec.
	SLOW	1 msec.	500 μsec.	500 μsec.	500 μsec.	500 μsec.

OPEN LOOP d-c GAIN: 35,000 V/V. Roll off −6dB per octave.

OUTPUT IMPEDANCE: Tabulated at d-c. Rises at 6 dB per octave. At high frequencies, include the effect of a 100 μH equivalent series inductance.

DISTORTION (for $2V_{pp}$ output, no load): Harmonic: < 0.5%

OFFSET NULLING: The fixed parts of the offset voltage and offset current can be nulled using recessed panel controls.

REFERENCES: Two, +6.2V ±5% and −6.2V ±5% available simultaneously; loading: 1mA.

PROGRAMMING: Control by the manipulation of input and feedback elements. The BOP is a bipolar inverting d-c amplifier that obeys the equation: $E_{OUT} = E_{IN} \frac{Z_{feedback}}{Z_{input}}$

A vernier feedback rheostat and input potentiometer is provided on the bench model, along with an operational patch panel and metering. The unmetered module requires external input and feedback elements.

INPUT: 105-125/210-250V a-c, 50-65 Hz. single phase.

TEMPERATURE, AMBIENT OPERATING: −20°C to +65°C.

TEMPERATURE, STORAGE: −40°C to +85°C.

COOLING: Forced air; built-in blower.

ISOLATION: The output terminals are isolated from the grounded case. A maximum of 500 volts (d-c or peak) may be connected between either terminal and the case.

TERMINALS: Ten-terminal front panel patch board. Ten-terminal rear mounted barrier strip duplicates functions. Unmetered model has rear barrier strip terminals only.

DIMENSIONS: See dimensional listings on Page 771.

FINISH: *Panel:* Light gray, Color 26440 per Fed. Std. 595.
Case: Charcoal gray texture.

MOUNTING: Full rack sized models have accessory flanges for direct installation in standard 19" racks. Unmetered BOP models are in modular form for chassis mounting, half-rack size models may be mounted in RA-24 by use of an adapter plate RAP 24-2B.

METERS: Half rack models use a single multi-function meter for d-c volts and amperes and a-c volts. Full rack models have separate voltmeter and ammeter. The voltmeter can be switched to read d-c or a-c volts. Unmetered models are available in all sizes with a blank front panel. These models may be used as modules with external input/feedback elements connected to the rear barrier strip. To order a modular version, delete the suffix "M" from the model number and deduct $60.00 from the price.

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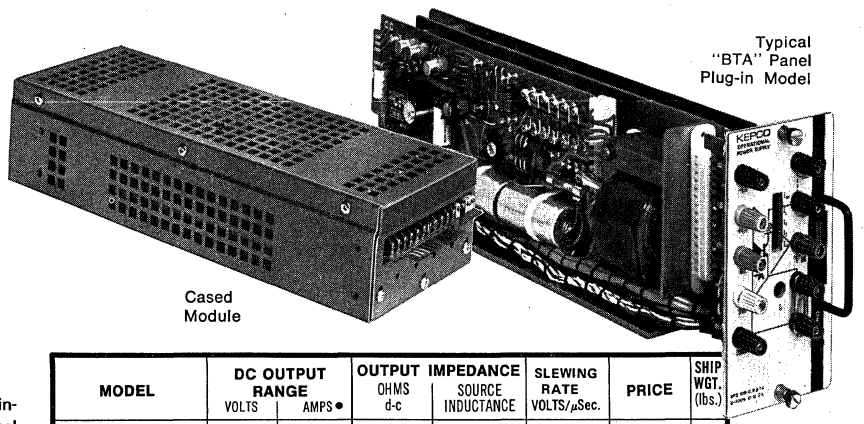
KEPCO OPS-B

PLUG-IN MODULAR

POWER SUPPLIES



Typical "BTA" Panel Plug-in Model

Cased Module

The Kepco Operational Power Supply is a unique instrument; a combination self-powered operational power amplifier and d-c power supply. The OPS group is suitable for a wide variety of signal processing chores: scaling, summing, integrating and impedance transformation. All models incorporate a linear I-C input amplifier. The "B" models are in modular form for OEM's; the "BTA versions are plug-in modules which offer a 10-terminal patch panel for bench-type operational manipulations. Their fast output slewing enables the OPS models to be fast-recovery, programmable, current controllers or audio spectrum voltage amplifiers.

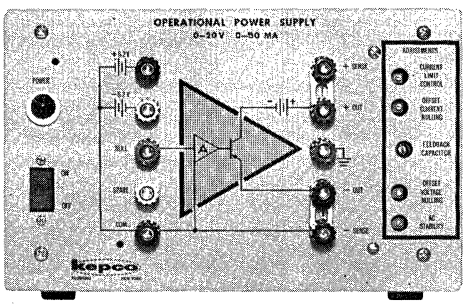
This tabulation specifies the limit of change in the amplifier offsets for defined variations in the major influences. To obtain a realistic appraisal of the behaviour in your environment, multiply each influence by its probable range of variation and sum the pertinent effects.

MODEL	DC OUTPUT RANGE VOLTS	DC OUTPUT RANGE AMPS●	OUTPUT IMPEDANCE OHMS d-c	OUTPUT IMPEDANCE SOURCE INDUCTANCE	SLEWING RATE VOLTS/μSec.	PRICE	SHIP WGT. (lbs.)
OPS 7–2B	0–7	0–2	0.0005	+15 μH	0.5	$147.00♦	4
OPS 15–1.5B	0–15	0–1.5	0.001	+15 μH	1.0	147.00♦	4
OPS 21–1B	0–21	0–1	0.0025	+15 μH	1.0	147.00♦	4
OPS 40–0.5B	0–40	0–0.5	0.008	+15 μH	1.5	147.00♦	4
OPS 72–0.3B	0–72	0–0.3	0.025	+15 μH	1.5	147.00♦	4
OPS 100–0.2B	0–100	0–0.2	0.050	+15 μH	2.0	147.00♦	4
OPS 20	0–20	0–0.05	0.04	+150 μH	1.0	199.00	7
OPS 7–2BTA	0–7	0–2	0.0005	+150 μH	0.25	$192.00	6
OPS 15–1.5BTA	0–15	0–1.5	0.001	+150 μH	0.25	192.00	6
OPS 21–1BTA	0–21	0–1	0.0025	+150 μH	0.5	192.00	6
OPS 40–0.5BTA	0–40	0–0.5	0.008	+150 μH	1.0	192.00	6
OPS 72–0.3BTA	0–72	0–0.3	0.025	+150 μH	1.0	192.00	6
OPS 100–0.2BTA	0–100	0–0.2	0.050	+150 μH	1.5	192.00	6

● Full output current to 65°C, no derating.
♦ For case, add Suffix "C" to model number and $12.00 to price.

SPECIFICATION	VOLTAGE AMPLIFIER OFFSETS* OFFSET VOLTAGE ΔE_{io}	VOLTAGE AMPLIFIER OFFSETS* OFFSET CURRENT ΔI_{io}	REFERENCES ±6.2V *
SOURCE: 105-125/210-250V a-c	<10 μV	<2 nA	<0.0001%
LOAD: No load — full load	<200 μV	<5 nA	———
TIME: 8-hours (drift)	<20 μV	<2 nA	<0.005%
TEMPERATURE: Per °C	<20 μV	<5 nA	<0.005%

**Offsets and the reference contribute to output change ΔE_O, by the equation $\Delta E_O = \pm\Delta E_{ref}(R_f/R_i) \pm\Delta E_{io}(1+R_f/R_i) \pm\Delta I_{io}(R_f)$ where R_f is the feedback resistor and R_i is the input resistor from the signal reference. Use the offsets to calculate the output effects.*



Bench Style Model OPS 20

OPEN LOOP d-c GAIN: $>0.5\times10^6$ volts per volt.

OUTPUT SLEWING RATE: See chart. (measured as the chord to the first time constant on the exponential response).

SINUSOIDAL FREQUENCY RESPONSE: $f_{max.} = \frac{\text{Slew Rate}}{\pi E_{pp}}$ (E_{pp} is the peak-to-peak voltage excursion.)

RIPPLE: <0.01% of max. output, or 3mV whichever is greater.

MAXIMUM CAPACITIVE LOADING: 0.001 microfarads. Excess capacitance slows response and causes peaking of response and instability. Adjustable lag networks provide for small range of load reactance.

TRANSIENT RESPONSE Voltage Mode (for step load current): recovery is an exponential with 50 microsecond time constant. **Current Mode (for step load voltage):** recovery is the reciprocal of the slewing rate.

OFFSET NULLING: Fixed part of input offset voltage and input offset currents can be nulled. OPS-BTA models feature front panel nulling. The "B" Modules have internal trimmers.

REFERENCES: Two at +6.2V and −6.2V; 1 mA max.

PROGRAMMING: Control by the manipulation of input and feedback elements. The OPS is a high gain inverting amplifier that obeys the equation $E_{OUT} = -E_{IN}(Z_{feedback}/Z_{input})$.

INPUT: 105-125V a-c or 210-250V a-c (selected) 50-440 Hz, 1Ø.

TEMPERATURE, AMBIENT OPERATING: −20°C to +65°C.

TEMPERATURE, STORAGE: −40°C to +85° C.

COOLING: Convection.

ISOLATION: The output terminals are isolated from the grounded case. A maximum of 500 volts (d-c or peak) can be connected between either output terminal and the case.

CURRENT LIMITING: Adjustable from 10% to 110% of rated current.

TERMINALS: Connections via a rear mounted barrier strip. Modules and OPS-BTA include a PC connector. Bench models have front panel terminal pattern.

DIMENSIONS: See dimensional listings on Page 771.
Model OPS 20 is available in a bench style case only.
OPS 7-2B to OPS 100-0.2B are available uncased, or with CA-1 case (-C), or as plug-in patch board units (-TA).

FINISH: *Modules:* Blue anodized aluminum.
Panels: Light gray, color 26440 per Fed Std. 595.
Bench style Case: Charcoal gray texture. (OPS 20 only)

MOUNTING: Cased modules may be racked with adapters RA 12-1, RA 13-4 or RA 11-16. Uncased modules with BPA-22 adapter and the (-TA) plug-in units, mount in housings CA-3, CA-4, CA-5 or RA 22-6. Model OPS 20 may be rack mounted with RA-24.

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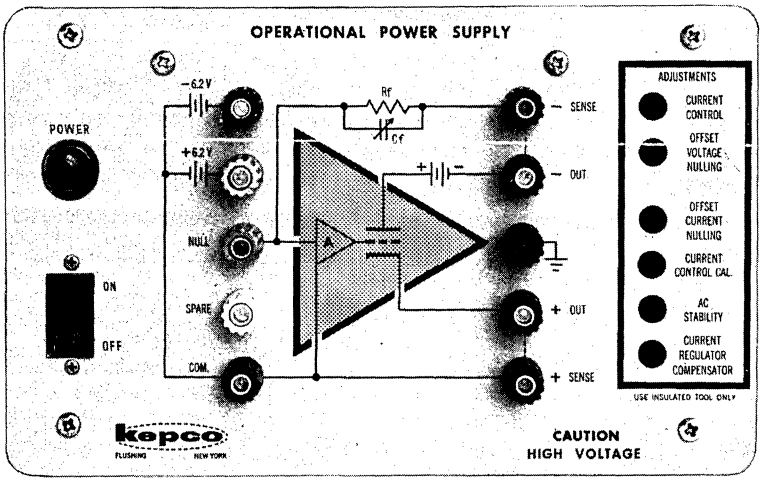
KEPCO

OPS

HYBRID

POWER SUPPLIES

The Kepco Operational Power Supply is a unique instrument; a combination self-powered operational power amplifier and d-c power supply. The OPS group is suitable for a wide variety of signal processing chores: scaling, summing, integrating and impedance transformation. The OPS Hybrids utilize a high voltage vacuum tube, together with a d-c coupled transistor amplifier. Their fast output slewing enables the OPS models to be fast-recovery, programmable, current controllers or audio spectrum voltage amplifiers.



Model OPS 1000

MODEL	DC OUTPUT RANGE VOLTS	DC OUTPUT RANGE AMPS●	OUTPUT IMPEDANCE OHMS d-c	OUTPUT IMPEDANCE SOURCE INDUCTANCE	SLEWING RATE VOLTS/μSec.	PRICE	SHIP WGT. (lbs.)
OPS 500	0–500	0–0.04	1.25	1mH	1	$394.00	20
OPS 1000	0–1000	0–0.02	5.0	1mH	1	394.00	20
OPS 2000	0–2000	0–0.01	20.0	1mH	1	394.00	20

● Full output current to 65°C, no derating.

This tabulation specifies the limit of change in the amplifier offsets—or current mode output effects—for defined variations in the major influences. To obtain a realistic appraisal of the behaviour in your environment, multiply each influence by its probable range of variation and sum the pertinent effects.

SPECIFICATION	VOLTAGE AMPLIFIER OFFSETS* OFFSET VOLTAGE ΔE_{io}	VOLTAGE AMPLIFIER OFFSETS* OFFSET CURRENT ΔI_{io}	OUTPUT EFFECTS CURRENT MODE AUTO-CROSSOVER (Internal Sensing)	REFERENCES ±6.2V *
SOURCE: 105-125/210-250V a-c	<0.1mV	<10nA	<10 μA	<0.0005%
LOAD: No load — full load	<1.0mV	<10nA	<10 μA	——
TIME: 8-hours (drift)	<0.1mV	<100nA	<0.01%	<0.005%
TEMPERATURE: Per °C	<0.5mV	<100nA	<0.01%	<0.005%

Offsets and the reference contribute to output change ΔE_O, by the equation $\Delta E_O = \pm\Delta E_{ref}(R_f/R_i) \pm\Delta E_{io}(1+R_f/R_i) \pm\Delta I_{io}(R_f)$ where R_f is the feedback resistor and R_i is the input resistor from the signal reference. Use the offsets to calculate output variations when external input/feedback elements are substituted for the internal reference and voltage control in special applications.

OPEN LOOP d-c GAIN: $>0.5X10^6$ volts per volt.

OUTPUT SLEWING RATE: See chart. (Measured as the chord to the first time constant on the exponential response.)

SINUSOIDAL FREQUENCY RESPONSE: f.max. $= \dfrac{\text{Slew Rate}}{\pi\, E_{pp}}$

(E_{pp} is the peak-to-peak voltage excursion.)

RIPPLE: <0.01% of max. output.

MAXIMUM CAPACITIVE LOADING: 0.001 microfarads. Excess capacitance slows response and causes peaking of response and ringing. Adjustable lag networks will compensate for small range of load reactance.

TRANSIENT RESPONSE Voltage Mode (for step load current): recovery is an exponential with 50 microsecond time constant. **Current Mode (for step load voltage):** Recovery is the reciprocal of the slewing rate.

OFFSET NULLING: Fixed part of input/offset voltage and input/offset currents can be nulled. OPS (Hybrid) models feature front panel nulling.

REFERENCES: Two at +6.2V and −6.2V; 1 mA maximum.

PROGRAMMING: Control by the manipulation of input and feedback elements. The OPS is a high gain inverting amplifier that obeys the equation $E_{OUT} = -E_{IN}(Z_{feedback}/Z_{input})$. The positive terminal is common.

INPUT: 105–125V a-c or 210–250V ac (selected), 50–65 Hz single phase.

TEMPERATURE, AMBIENT OPERATING: −20°C to +65°C.

TEMPERATURE, STORAGE: −40°C to +85°C.

COOLING: Convection.

ISOLATION: The output terminals are isolated from the grounded case. A maximum of 1000 volts (d-c or peak) can be connected between either output terminal and the case.

TERMINALS: Connections via a rear mounted barrier strip. Front panel terminal pattern provides for easy access in setting up operational manipulations.

DIMENSIONS: See dimensional listings on Page 771.

FINISH: *Panels:* Light gray, Color 26440 per Fed. Std. 595. *Cases:* Charcoal gray texture.

MOUNTING: Units may be rack mounted with RA–24.

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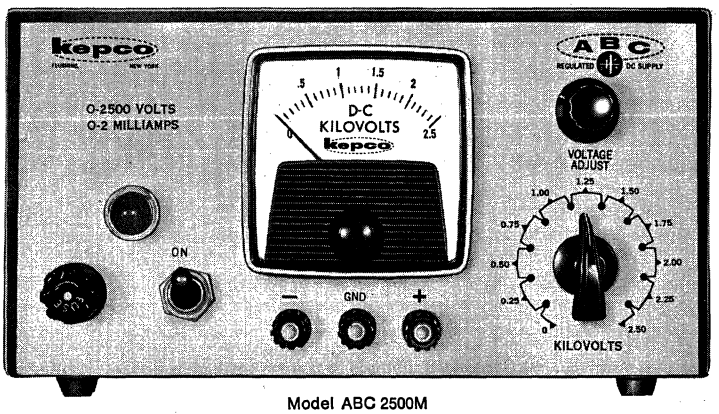
KEPCO ABC® HYBRID POWER SUPPLIES

The ABC group of bench-style programmable voltage regulators span a wide range of voltages. The transistor group covers 0–2V to 0–100V; the hybrid group 0–200V to 0–2500V. Hybrid models employ a high voltage vacuum tube series regulator, convection cooled, driven by a high gain transistor amplifier. The 0–200 and 0–425 volt models employ a continuous 10-turn wirewound, 20 PPM TC voltage control. The 0–1000 volt, 0–1500 volt and 0–2500 volt models employ a 10-step voltage selector with 10-turn vernier. They may be programmed, however, continuously from zero to their rated voltage.



Model ABC 2500M

MODEL	DC OUTPUT RANGE VOLTS	DC OUTPUT RANGE AMPS ●	RIPPLE (max) RMS mV	OUTPUT IMPEDANCE Ohms + Microhenries d-c to 100Hz	100 Hz to 1kHz	1kHz to 100kHz+μH	MAX. INPUT AMPS at 125 V a-c	PRICE ◆	SHIP WGT. (lbs.)
ABC 200M	0–200	0–0.1	0.5	1	0.5	2.0+ 2.0	0.5	$236.00	13
ABC 425M	0–425	0–0.05	0.5	4	0.5	2.0+ 2.0	0.5	236.00	14
ABC 1000M	0–1000	0–0.02	1.0	25	1.0	2.0+10.0	0.5	331.00	14
ABC 1500M	0–1500	0–0.01	1.0	75	1.0	2.0+10.0	0.3	331.00	14
ABC 2500M	0–2500	0–0.002	1.0	625	1.0	2.0+10.0	0.3	410.00	18

◆ Price includes meter, for unmetered model, delete suffix "M" and deduct $20.00 for models ABC 200 and ABC 425. Deduct $15.00 for models ABC 1000, 1500 and 2500 (any quantity order).

● Full output current to 55°C, no derating.

This tabulation specifies the limit of change in the regulated output for defined variations in the major influences. To obtain a realistic appraisal of the behaviour in your environment, multiply each influence by its probable range of variation and sum the pertinent effects.

SPECIFICATION	OUTPUT EFFECTS VOLTAGE MODE	OUTPUT EFFECTS CURRENT MODE** (External Sensing)
OUTPUT RANGE:	0–100% E_O max.	1 mA–100% I_O max.
SOURCE: 105-125/210-250V a-c	<0.05% or 5 mV*	<0.1% at rated sample**
LOAD: No load – full load	<0.05% or 5 mV*	<0.1% at rated sample**
TIME: 8-hours (drift)	<0.05% or 50 mV*	<0.1% or 10 μA*
TEMPERATURE: Per °C	<0.05%	<0.1% at rated sample**
RIPPLE: (rms)	See Table above	<0.1% I_O max.

*whichever is greater

**Rated sample is 10V d-c across external current sampling resistor, with external current control.*

INPUT: 105-125V a-c or 210-250V a-c (selected) 50-440 Hz single phase.

TEMPERATURE, AMBIENT OPERATING: –20°C to +55°C.

TEMPERATURE, STORAGE: –40°C to +85°C.

COOLING: Convection.

ISOLATION: The output terminals are isolated from the grounded case. A maximum of 1000 volts (d-c or peak) can be connected between either terminal and the case.

AC OUTPUT: 6.5V AC, 2A unregulated, available at the rear terminals of Models ABC 200M and ABC 425M.

CONTROL RESOLUTION: 0.05%, 10-turn voltage control on Models ABC 200M and ABC 425M. Resolution is 0.005% with 10-position selector and 10-turn vernier voltage control on Models ABC 1000M, ABC 1500M and ABC 2500M.

PROGRAMMING: ABC Models except Model ABC 2500 are fully programmable by resistance or external voltage signals. Model ABC 2500 can be controlled throughout its range by resistances. The control range for external voltage or current signals is restricted to the upper 2/3 of its output range. Control current is 1 mA with built-in calibrating control. (1000 ohms/V). The positive terminal is common.

VOLTAGE RECOVERY (for step load current): <50 μseconds.

CURRENT LIMITING: Single turn panel adjustment sets limit from 25% to 150% of rated full current on Models ABC 200M and ABC 425M. A fixed limit set to approximately 150% is provided on Models ABC 1000M, ABC 1500M and ABC 2500M.

OVERSHOOT: (Turn-on/off): None above 25% voltage setting; negligible below 25% when preloaded to 10% minimum.

SERIES/PARALLEL: Series operation to rated isolation; also master/slave capability. Current limiting design permits self-determined parallel load sharing.

METERS: Suffix "M" designates a single dual scale 2½", 2% volt-ammeter with selector switch, for models ABC 200M and ABC 425M. Voltmeter only for Models ABC 1000M, ABC 1500M and ABC 2500M.
Delete suffix "M" for unmetered unit.

TERMINALS: Binding posts on front panel, plus, minus and ground. Multi-terminal barrier strip at the rear contains output and control terminals.

DIMENSIONS: See dimensional listings on Page 771.

FINISH: *Panel:* Brushed aluminum. *Case:* Charcoal gray texture.

MOUNTING: Mount single unit in rack adapter RA-5, two abreast in rack adapter RA-4.

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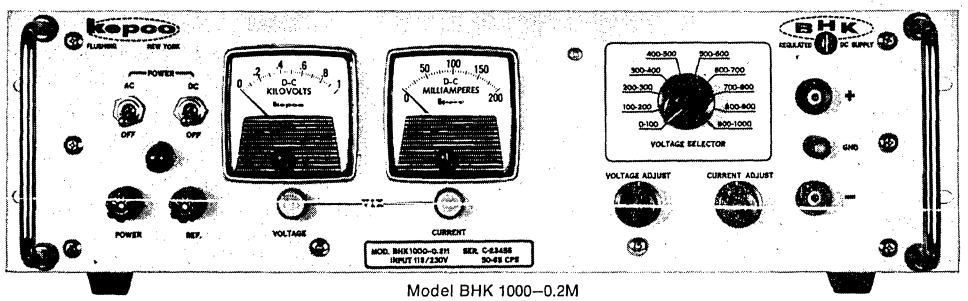
KEPCO BHK HIGH VOLTAGE POWER SUPPLIES



Model BHK 1000–0.2M

The high voltage hybrid BHK models employ twin-transistor amplifiers (one for voltage, the other for current) to drive a series pass tube regulator in either voltage or current mode, with automatic crossover and VIX® mode indicators. By restrapping for high speed, the same model is also a fast programmable voltage or quick recovery current source. Built-in offset nulling controls allow precision operational programming. Panel controls are 10-turn, 20 PPM TC wirewound, with a 10-position selector for additional voltage resolution.

MODEL	DC OUTPUT RANGE VOLTS	DC OUTPUT RANGE AMPS●	OUTPUT IMPEDANCE Ohms + Microhenries d-c–100Hz	0-1-1kHz	1-100kHz+μH	PRICE◆	SHIP WGT. (lbs.)
BHK 500–0.4M	0–500	0–0.4	0.13	0.1	0.2 + 0.5	$883.00	40
BHK 1000–0.2M	0–1000	0–0.2	0.5	0.1	0.2 + 0.5	883.00	46
BHK 2000–0.1M	0–2000	0–0.1	2.0	0.2	0.5 + 2.0	910.00	49

◆ Price includes meters, for unmetered models, delete suffix "M". In quantities of 12 or more units, deduct $30.00 from price.

● Full output current to 55°C, no derating.

This tabulation specifies the limit of change in the regulated output for defined variations in the major influences. To obtain a realistic appraisal of the behaviour in your environment, multiply each influence by its probable range of variation and sum the pertinent effects.

SPECIFICATION	OUTPUT EFFECTS VOLTAGE MODE	OUTPUT EFFECTS CURRENT MODE (Internal Sensing)	VOLTAGE AMPLIFIER OFFSETS** ΔE_{io}	ΔI_{io}	VOLTAGE REFERENCE (INTERNAL)**
OUTPUT RANGE:	0-100% E_o max.	0.2%-100% I_o max.	——	——	Fixed 6.2V±5%
SOURCE: 105-125/210-250V a-c	<0.005% or 1 mV*	<100 μA	<1 mV	<10 nA	0.0001%
LOAD: No load — full load	<0.01% or 1 mV*	<100 μA	<1 mV	<10 nA	——
TIME: 8-hours (drift)	<0.01% or 2.0 mV*	<0.01% or 20μA*	<50 μV	<50 nA	0.005%
TEMPERATURE: Per °C	<0.01%	<0.05% of I_o max.	<100 μV	<50 nA	0.005%
RIPPLE: (rms)	<1 mV	<100 μA	——	——	——

**whichever is greater.*

***Offsets and the reference contribute to output change ΔE_o, by the equation $\Delta E_o = \pm\Delta E_{ref}(R_f/R_i) \pm\Delta E_{io}(1+R_f/R_i) \pm\Delta I_{io}(R_f)$ where R_f is the feedback resistor and R_i is the input resistor from the signal reference. Use the offsets to calculate output variations when external input/feedback elements are substituted for the internal reference and voltage control in special applications.*

AUTOMATIC CROSSOVER: Selects voltage regulation or current regulation operating mode automatically.

VIX® CIRCUIT: Voltage/Current mode indicators display operating conditions; also 115V a-c control signal (0.5A max.)

TEMPERATURE, AMBIENT OPERATING: −20°C to +55°C.

TEMPERATURE, STORAGE: −40°C to +85°C.

COOLING: Convection.

INPUT: 105-125 V a-c or 210-250V a-c (selected), 50-65 Hz single phase. Approximately 4 amperes at 125V a-c.

ISOLATION: The output terminals are isolated from the grounded case. A maximum of 1000 volts (d-c or peak) can be connected between either terminal and the case.

CONTROL RESOLUTION: Voltage: 0.005% 10-turn vernier control and 10 position selector. *Current:* 0.05% 10-turn control.

OVERSHOOT: (Turn-on/off): None above 10% voltage setting; negligible below 10% when preloaded to 10% minimum.

SERIES/PARALLEL: Automatic crossover design permits self-determined parallel load sharing, or use of master/slave connection. Series operation to rated isolation.

PROGRAMMING: BHK has independently programmable voltage and current regulators. They can be controlled by resistance or external voltage signals. Control current is 1mA with built-in calibrating controls (1000 ohms/V). The positive terminal is common.

OFFSET NULLING: The initial part of the input offset voltage and input offset current can be nulled with internal controls.

REFERENCES: Two: +6.2 volts and −6.2 volts; maximum current 1 milliampere.

OPEN LOOP d-c GAIN: $>0.5 \times 10^6$ volts per volt.

OUTPUT SLEWING RATE: *(Fast slewing connection):* Greater than 500,000 volts per second, measured as the chord to the first time constant on the exponential response.

SINUSOIDAL FREQUENCY RESPONSE:

Fast Slewing Connection: $f_{max} = \frac{160}{E_{pp}}$ kHz.

(E_{pp} is the peak-to-peak excursion).

RIPPLE, Fast Slewing Connection:

Ungrounded: <0.1% E_o max.

Grounded: <0.001% E_o max.

TRANSIENT RESPONSE:

Voltage Mode, Fast Slewing: For step load current, recovery is an exponential with a 50 microsecond time constant.

Current Mode, Fast Slewing: For step load voltage, recovery is at the rate of 2 μsec. per volt.

Voltage Mode, Normal Speed: For step load current, recovery to regulation band within 50 microseconds.

OUTPUT IMPEDANCE:

Voltage Mode, Normal Speed: See table.

Voltage Mode, Fast Slewing: Above 1kHz, add the reactive impedance of 500 microhenries.

REMOTE ERROR SENSING: Compensates up to 0.5V drop per output lead.

METERS: Suffix "M" designates a pair of 2½", 2% meters. Delete suffix "M" for unmetered unit.

TERMINALS: Safety (recessed) output connections on front panel; two multi-terminal barrier strips at the rear contain output, sensing and control functions. Fast slewing/normal strapping is internal.

DIMENSIONS: See dimensional listings on Page 771.

FINISH: Light gray, color 26440, per Fed. Std. 595.

Data and prices subject to change without notice.

All terms used in the specifications are defined in the Kepco Glossary.

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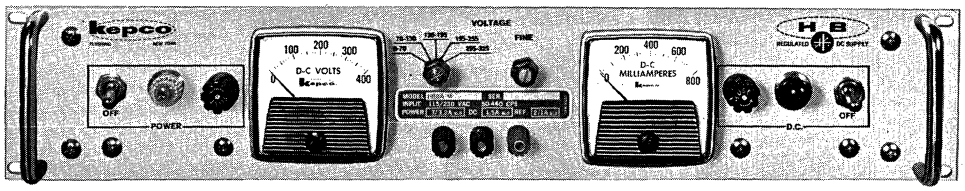


Model HB 8AM

KEPCO
HB
HYBRID
POWER SUPPLIES

The high voltage hybrid HB power supplies use a high gain transistor comparison amplifier to drive the series pass tube regulator. Voltage feedback is by means of a 5-position range switch and 10-turn, 20 PPM TC wire-wound vernier control with remote programming within the span of any one range (to zero with derating). Current may be regulated with external sensing and feedback using the rating chart to determine the allowable compliance range.

MODEL	DC OUTPUT RANGE VOLTS	DC OUTPUT RANGE AMPS ●	OUTPUT IMPEDANCE Ohms + Microhenries d-c to 100Hz	100 Hz to 1kHz	1kHz to 100kHz+μH	AUXILIARY OUTPUT 6.5V a-c Unregulated	MAX. INPUT AMPS at 125 V a-c	PRICE♦	SHIP WGT. (lbs.)
HB 2AM	0–325	0–0.2	0.2	0.08	0.2+0.5	EACH SUPPLY HAS TWO 6 AMPERE OUTPUTS	2.0	$348.00	35
HB 4AM	0–325	0–0.4	0.1	0.08	0.2+0.5		3.0	391.00	35
HB 6AM	0–325	0–0.6	0.06	0.08	0.2+0.5		5.0	423.00	43
HB 8AM	0–325	0–0.8	0.05	0.08	0.2+1.0		5.5	466.00	43
HB 525M	0–525	0–0.5	0.1	0.08	0.2+0.5		8.0	589.00	43

♦ Price includes meters, for unmetered models, delete suffix "M". In quantities of 12 or more units deduct $30.00 from price.

● Full output current to 55°C, no derating.

This tabulation specifies the limit of change in the regulated output for defined variations in the major influences. To obtain a realistic appraisal of the behaviour in your environment, multiply each influence by its probable range of variation and sum the pertinent effects.

SPECIFICATION	OUTPUT EFFECTS VOLTAGE MODE	OUTPUT EFFECTS CURRENT MODE (External Sensing)
OUTPUT RANGE:	0–100% E_O max.	10 mA–100% I_O max.
SOURCE: 105-125/210-250V a-c	<0.01%	<0.01% at rated sample**
LOAD: No load – full load	<0.01% or 2 mV*	<0.01% at rated sample**
TIME: 8-hours (drift)	<0.01% or 2 mV*	<0.05% or 0.2 mA*
TEMPERATURE: Per °C	<0.01%	<0.05% at rated sample**
RIPPLE: (rms)	<1 mV	<0.01% of I_O max.

**whichever is greater*
***Rated sample is 10V d-c across external current sampling resistor, with external current control.*

INPUT: 105-125 V or 210-250V a-c (selected), 50–440 Hz, single phase.

TEMPERATURE, AMBIENT OPERATING: –20°C to +55°C.

TEMPERATURE STORAGE: –40°C to +85°C.

COOLING: Convection.

ISOLATION: The output terminals are isolated from the grounded case. A maximum of 600 volts (d-c or peak) can be connected between either output terminal and the case.

AC OUTPUTS: Two unregulated, 6.5V a-c, 6A outputs.

CONTROL RESOLUTION: 0.02%, 5 step range selector, 10-turn vernier.

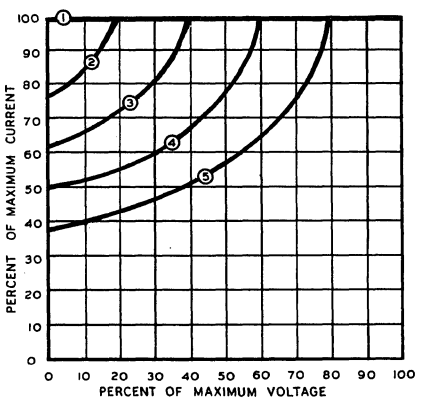
PROGRAMMING: HB is programmable by resistance or external voltage signals within the boundary of each range. By following the rating curves, programs can be executed below the range boundary. Control current is ≅ 10 mA for 100 ohms/V. The positive terminal is common.

VOLTAGE RECOVERY (for step load current): < 50 microseconds.

REMOTE ERROR SENSING: (Model HB 525M only) compensates to 0.5 volt drop per output lead.

OVERSHOOT (Turn-on/off): None above 25% voltage setting; negligible below 25% when preloaded 10% minimum.

RATING CURVES: Output is designed to deliver 100% of rated current within the span of any one range. When operating outside the selected range, either by remote programming, or as the compliance voltage in current mode, use the graph to determine the maximum current that can be drawn at reduced voltage.



RATING CURVES

Curves represent the volt-ampere rating for range switch positions 1–5. To use, determine which position covers the desired voltage. Read the maximum current for each voltage on the left scale.

METERS: Suffix "M" designates a pair of 2½", 2% meters. Delete suffix for unmetered unit.

TERMINALS: Binding posts on front panel, plus, minus and ground. Multi-terminal barrier strip at the rear contains output, sensing and control terminals.

DIMENSIONS: See dimensional listings on Page 771.

FINISH: Light gray, color 26440, per Fed. Std. 595.

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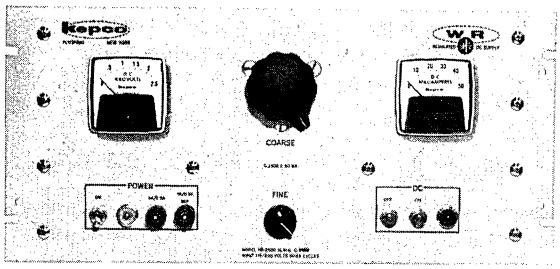
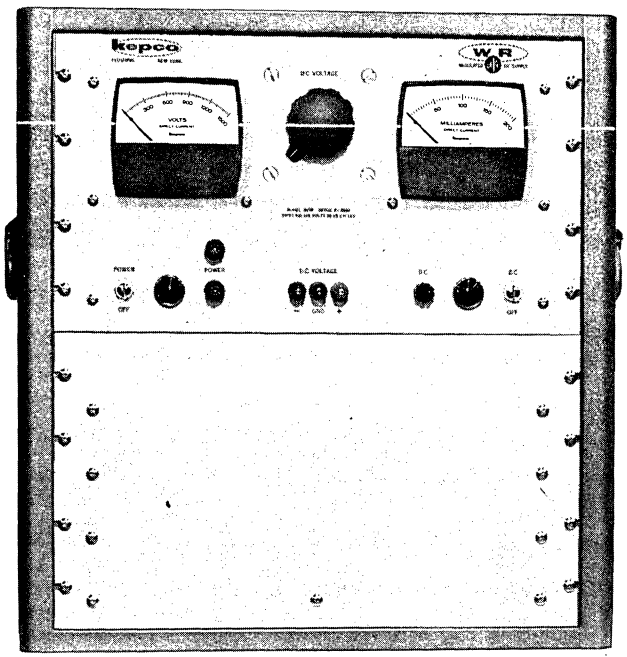
KEPCO
WR
VACUUM TUBE
POWER SUPPLIES

The Kepco WR (Wide Range) design offers well regulated, high voltage in a laboratory-equipment style. Model 605 has an added bias output and an auxiliary output for filaments.



Model HB 2500



Model 1520 B

MODEL	DC OUTPUT RANGE		OUTPUT EFFECTS LOAD 0—MAX.		OUTPUT EFFECTS SOURCE		RIPPLE RMS	OUTPUT IMPEDANCE Ohms + μH			AUXILLIARY OUTPUT 6.3V a-c Unregulated	MAX. INPUT AMPS at 125 V a-c	PRICE ♦	SHIP WGT. (lbs.)
	VOLTS	mA	%	ΔV	%	ΔV	mV	d-c to 100Hz	100Hz to 1kHz	100kHz +μH				
605	0—600	0—500	0.02	0.1	0.1	0.4	3	0.24	0.05	0.2+2	20 AMP	8.0	$ 507.00	119
	Bias 0—150	0—5	—	—	—	—	1	—	—	—	—	—	—	—
1250 B	0—1000	0—500	0.01	0.1	0.05	0.4	3	0.2	0.1	1.0+2	—	12.5	782.00	203
1520 B	0—1500	0—200	0.01	0.1	0.05	0.4	3	0.75	0.3	1.0+5	—	7.0	844.00	204
HB 2050	0—2000	0—500	0.005	0.1	0.02	0.4	3	0.2	0.5	2.0+5	—	24.0	1,855.00	312
HB 2500	0—2500	0—50	0.005	0.1	0.02	0.4	5	2.5	0.5	2.0+5	—	5.0	1,096.00	85

♦ Available metered only.

INPUT: 105-125 V a-c 50-65 Hz single phase, 400 Hz input is available on special order. Please consult the factory.

TEMPERATURE, AMBIENT OPERATING: –20°C to +55°C

TEMPERATURE, STORAGE: –40°C to +85°C

COOLING: Convection

ISOLATION: The output terminals are isolated from the grounded case. A maximum of 400 volts (d-c or peak) can be connected between either terminal or the case.

CONTROL RESOLUTION: All models except HB 2500 use a single turn control with 0.5% resolution. Model HB 2500 has coarse and fine controls. The fine control covers a 1% range with 0.005% resolution.

VOLTAGE RECOVERY STEP LOAD CURRENT: <50 micro-seconds

METERS: Each model has a separate 2% voltmeter and ammeter.

TERMINALS: Output and ground terminals are on the front panel and on the rear, except models HB 2050 and HB 2500 which have rear mounted terminals only.

FINISH: Panels light gray, color 26440 per Fed. Std. 595. Cabinets are a charcoal gray texture.

CABINETS: Models 1250B, 1520B and HB 2050 are supplied in a rack cabinet.

DIMENSIONS

MODEL	HEIGHT"	WIDTH"	DEPTH"
605	10½	19	17 7/8
1250B*	28 (26¼)	22 (19)	15½ (13⅞)
1520B*	23 (21)	22 (19)	15½ (13⅞)
HB 2050*	33½ (31½)	22 (19)	18 (17⅞)
HB 2500	8¾	19	14

*Units are supplied in a cabinet. First figure includes cabinet, second figure ( ) is the equipment dimension for mounting in separate rack.

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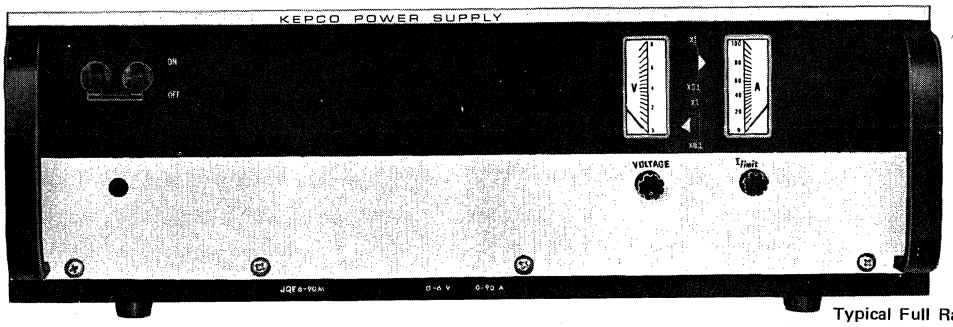
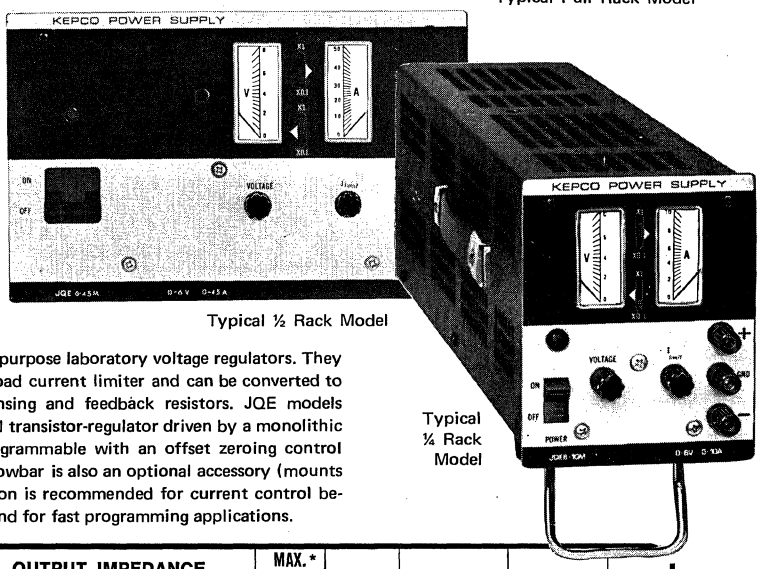


Typical Full Rack Model

KEPCO™ JQE *COMPACT* POWER SUPPLIES



Typical ½ Rack Model

Typical ¼ Rack Model

JQE power supplies are compact general-purpose laboratory voltage regulators. They are equipped with a panel-adjusted overload current limiter and can be converted to current regulation by using external sensing and feedback resistors. JQE models feature a linear full-dissipation series NPN transistor-regulator driven by a monolithic linear I-C amplifier. Output is fully programmable with an offset zeroing control available as an option. An overvoltage crowbar is also an optional accessory (mounts internally). The JQE-HS high-speed option is recommended for current control because of its fast-recovery characteristics, and for fast programming applications.

MODEL	DC OUTPUT RANGE VOLTS	DC OUTPUT RANGE AMPS ●	OUTPUT IMPEDANCE Ohms + Microhenries d-c to 100Hz	100Hz to 1kHz	1kHz to 100kHz +μH	MAX.* INPUT AMPS at 125 V a-c	RACK SIZE	PRICE	VP OPTION	SHIP WGT. (lbs.)
JQE 6–10M	0–6	0–10	30 μΩ	0.01	0.02 +1	2.0	1/4	$ 310.00	$ 81.00	21
JQE 6–22M	0–6	0–22	14 μΩ	0.005	0.01 +0.5	4.2	1/2	557.00	102.00	34
JQE 6–45M	0–6	0–45	7 μΩ	0.005	0.01 +0.5	9.0	1/2	669.00	102.00	48
JQE 6–90M	0–6	0–90	3.5 μΩ	0.001	0.005+0.5	15.7	Full	1,046.00	124.00	95
JQE 15–6M	0–15	0–6	125 μΩ	0.01	0.02 +1	2.1	1/4	310.00	81.00	21
JQE 15–12M	0–15	0–12	63 μΩ	0.005	0.01 +0.5	4.0	1/2	557.00	102.00	34
JQE 15–25M	0–15	0–25	30 μΩ	0.005	0.01 +0.5	8.4	1/2	669.00	102.00	48
JQE 15–50M	0–15	0–50	15 μΩ	0.001	0.005+0.5	16.6	Full	1,046.00	124.00	95
JQE 25–4M	0–25	0–4	300 μΩ	0.01	0.02 +1	2.2	1/4	310.00	81.00	21
JQE 25–10M	0–25	0–10	125 μΩ	0.005	0.01 +0.5	5.3	1/2	557.00	102.00	34
JQE 25–20M	0–25	0–20	63 μΩ	0.005	0.01 +0.5	10.5	1/2	669.00	102.00	48
JQE 25–40M	0–25	0–40	31 μΩ	0.001	0.005+0.5	21.0	Full	1,046.00	124.00	95
JQE 36–3M	0–36	0–3	600 μΩ	0.01	0.02 +1	2.2	1/4	310.00	81.00	21
JQE 36–8M	0–36	0–8	225 μΩ	0.005	0.01 +0.5	6.0	1/2	557.00	102.00	34
JQE 36–15M	0–36	0–15	120 μΩ	0.005	0.01 +0.5	9.5	1/2	669.00	102.00	48
JQE 36–30M	0–36	0–30	60 μΩ	0.001	0.005+0.5	19.0	Full	1,046.00	124.00	95
JQE 55–2M	0–55	0–2	1.4 mΩ	0.01	0.02 +1	2.3	1/4	321.00	81.00	21
JQE 55–5M	0–55	0–5	550 μΩ	0.01	0.02 +1	5.0	1/2	557.00	102.00	34
JQE 55–10M	0–55	0–10	275 μΩ	0.01	0.02 +1	9.0	1/2	669.00	102.00	48
JQE 55–20M	0–55	0–20	138 μΩ	0.01	0.02 +1	18.0	Full	1,046.00	124.00	95
JQE 75–1.5M	0–75	0–1.5	2.5 mΩ	0.01	0.02 +1	2.3	1/4	321.00	81.00	21
JQE 75–3M	0–75	0–3	1.25 mΩ	0.005	0.01 +1	4.0	1/2	557.00	102.00	34
JQE 75–8M	0–75	0–8	469 μΩ	0.005	0.01 +1	10.0	1/2	669.00	102.00	48
JQE 75–15M	0–75	0–15	250 μΩ	0.005	0.01 +1	18.0	Full	1,046.00	124.00	95
JQE 100–1M	0–100	0–1	5 mΩ	0.01	0.05 +2	2.1	1/4	321.00	81.00	21
JQE 100–2.5M	0–100	0–2.5	2 mΩ	0.005	0.02 +1	4.5	1/2	557.00	102.00	34
JQE 100–5M	0–100	0–5	1.25 mΩ	0.005	0.02 +1	8.4	1/2	669.00	102.00	48
JQE 100–10M	0–100	0–10	0.62 mΩ	0.005	0.02 +1	17.0	Full	1,046.00	124.00	95
JQE 150–1.5M	0–150	0–1.5	5 mΩ	0.01	0.05 +2	4.6	1/2	568.00	102.00	34
JQE 150–3.5M	0–150	0–3.5	2.2 mΩ	0.01	0.05 +2	8.7	1/2	691.00	102.00	48
JQE 150–7M	0–150	0–7	1.1 mΩ	0.01	0.05 +2	18.0	Full	1,067.00	134.00	95

● Full output current to 71°C, no derating.

*at 125V a-c, Pf. typical 0.7

This tabluation specifies the limit of change in the regulated output for defined variations in the major influences. To obtain a realistic appraisal of the behaviour in your environment, multiply each influence by its probable range of variations and sum the pertinent effects.

SPECIFICATION	VOLTAGE MODE	CURRENT MODE**	VOLTAGE AMPLIFIER OFFSETS*** OFFSET VOLTAGE ΔE_{io}	OFFSET CURRENT ΔI_{io}	VOLTAGE REFERENCE (INTERNAL)***
OUTPUT RANGE:	0—100% E_o max.	1 mA—100% I_o max.	———	———	Fixed 6.2V±5%
SOURCE: 105-125/210-250V a-c	<0.0005%	<0.005%**	<10 μV	<2 nA	0.0001%
LOAD: No load — full load	<0.005% or 0.2 mV*	<0.01%**	<200 μV	<5 nA	———
TIME: 8-hours (drift)	<0.01% or 1 mV*	<0.02% **	<20 μV	<2 nA	0.005%
TEMPERATURE: Per °C	<0.01%†	<0.02% **†	<20 μV	<5 nA	0.005%
RIPPLE: (rms)	<0.2 mV	<0.02% of I_o max.	———	———	———

*whichever is greater.

**External sensing, using a 1V sample. Effects are measured at rated sample voltage with 20 PPM external current feedback control.

***Offsets and the reference contribute to output change ΔE_O, by the equation $\Delta E_O = \pm\Delta E_{ref}(R_f/R_i) \pm\Delta E_{io}(1+R_f/R_i) \pm\Delta I_{io}(R_f)$ where R_f is the feedback resistor and R_i is the input resistor from the signal reference. Use the offsets to calculate output variations when external input/feedback elements are substituted for the internal reference and voltage control in special applications.

†See OPTIONS for 0.005% per °C voltage mode — 0.01% per °C current mode temperature effect coefficient.

INPUT: 105-125V a-c or 210-250V a-c (selected) 50-65 Hz, 1Ø

TEMPERATURE, AMBIENT OPERATING: —20°C to + 71°C

TEMPERATURE, STORAGE: —50°C to + 85°C

COOLING: Forced air, built-in blower.

ISOLATION: The output terminals are isolated from the grounded case. A maximum of 500 volts (d-c or peak) can be connected between either output terminal and the case.

CONTROLS: *Voltage:* 10-turn wirewound rheostat, Resolution: 0.05%.
Current: Multiturn vernier potentiometer.

PROGRAMMING: JQE is fully programmable by resistance or external voltage signals. Control current is 1mA with built-in calibration control (1000 ohms/V). For operational (amplifier) control, an offset voltage nulling control is available, see option "—E". High Speed models provide fast response to programming commands. (See option "—HS".) The positive terminal is common.

OPEN LOOP d-c GAIN: $>0.5\times10^6$ volts per volt.

VOLTAGE RECOVERY (for step load current): <50 μseconds for recovery to within 0.005% or 2 mV of setting.

OVERSHOOT (Turn on/off): Conventional speed models exhibit no overshoot when set above 25% of rated voltage or at any voltage setting when loaded to 10% of rated current (not applicable to HS models).

CURRENT LIMITING: Adjustable from 10% to 105% of the rated full current.

REMOTE ERROR SENSING: Compensates up to 0.5V drop per output lead.

SERIES/PARALLEL: Series operation to the rated isolation voltage. Units may be paralleled by employing their current limiters.

METERS: Two dual range, 2-inch, 2% recessed meters, monitor output voltage and current. 10:1 range switching. Unmetered versions available as modules, delete suffix "M" and deduct $30.00 from listed price (any quantity).

DIMENSIONS: See dimensional listings on Page 771.

FINISH: *Panel:* Light gray, Color 26440, per Fed. Std. 595.
Case: Charcoal gray texture.

MOUNTING: JQE ¼ rack and ½ rack size models fit the RA-24 hardware system *(see hardware section)*. Full rack sized models have accessory flanges for direct installation in standard 19" racks. Unmetered JQE models are in modular form for chassis mounting — or may be mounted in RA-24 by use of an adapter plate RAP 24-1J for ¼ rack size; RAP 24-2J for ½ rack size. Full rack units are predrilled for Jonathan slides 110 QD 20-1, 22-1, 24-1.

OPTIONS: (add suffix to the model number)

"—HS" HIGH SPEED OPTION for fast programming.

Output Slewing Rate: 100V per millisecond for models up to 20 amperes. 50V per millisecond for models over 20 amperes. Measured as the chord of the exponential to its first time constant.

Ripple: <0.01% of E_0 Max. or 3mV whichever is greater.

Output Impedance: From 1KHz to 100KHz add an inductance of 100 μH to the impedance specification in the table.

For HS option, add $50.00 to unit price. The HS option includes an offset voltage nulling control.

"—VP" OVERVOLTAGE CROWBAR: Shorts output terminals through an SCR if voltage attempts to exceed preset limit. Not available with HS option. (See table for price.)

Limit level range: 3 V d-c to 175V d-c.

Trigger time: 5-10 μsec., adjustable delay to minimize false alarms.

Threshold: 5% of output level — or 0.25 volts, whichever is greater.

"—T" LOWER TEMPERATURE EFFECT COEFFICIENT: 0.005% per °C in voltage mode, 0.01% per °C in current mode. Add $30.00 to price.

"—E" OFFSET VOLTAGE NULLING: For operational programming. Zeros the fixed part of the control amplifier's voltage offset. Add $10.00 to price.

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KEPCO

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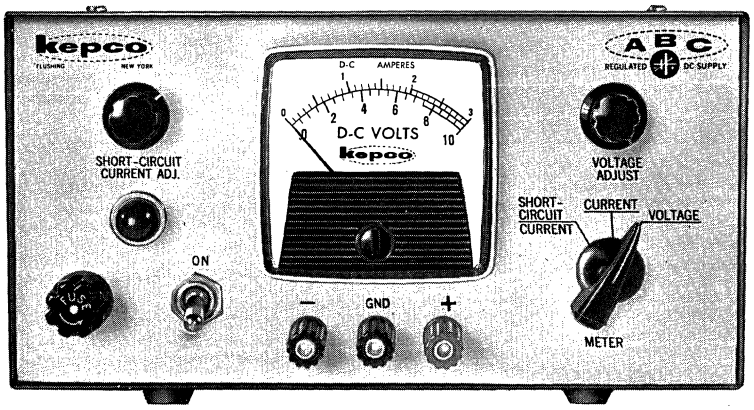
ALL-TRANSISTOR

POWER SUPPLIES



Model ABC 7.5–2M

The ABC group of bench-style programmable voltage regulators span a wide range of voltages. The transistor group covers 0–2V to 0–100V; the hybrid group 0–200V to 0–2500V. All-transistor models employ a PNP series regulator, convection cooled, driven by a high gain transistor amplifier. These models feature 10-turn wirewound, 20 PPM TC voltage controls and panel-adjustable current limiting.

MODEL	DC OUTPUT RANGE VOLTS	DC OUTPUT RANGE AMPS ●	RIPPLE (max) RMS MV.	OUTPUT IMPEDANCE Ohms + Microhenries d-c to 100Hz	100 Hz to 1kHz	1kHz to 100kHz+μH	MAX. INPUT AMPS at 125 V a-c	PRICE◆	SHIP WGT. (lbs.)
ABC 2–1M	0–2	0–1	0.25	0.001	0.01	0.1 +0.5	0.3	$141.00	10
ABC 7.5–2M	0–7.5	0–2	0.25	0.002	0.01	0.05+0.5	0.5	188.00	14
ABC 10–0.75M	0–10	0–0.75	0.25	0.007	0.02	0.1 +1	0.3	141.00	10
ABC 15–1M	0–15	0–1	0.25	0.008	0.01	0.05+0.5	0.5	188.00	13
ABC 18–0.5M	0–18	0–0.5	0.25	0.02	0.02	0.1 +1	0.3	141.00	10
ABC 30–0.3M	0–30	0–0.3	0.25	0.05	0.02	0.1 +1	0.3	141.00	10
ABC 40–0.5M	0–40	0–0.5	0.25	0.04	0.02	0.05+0.5	0.5	188.00	14
ABC 100–0.2M	0–100	0–0.2	0.25	0.25	0.05	0.05+1	0.5	211.00	14

◆ Price includes volt/ammeter, for unmetered models, delete suffix "M" and deduct $20 from price (any quantity order).
● Full output current to 50°C, no derating.

This tabulation specifies the limit of change in the regulated output for defined variations in the major influences. To obtain a realistic appraisal of the behaviour in your environment, multiply each influence by its probable range of variation and sum the pertinent effects.

SPECIFICATION	OUTPUT EFFECTS VOLTAGE MODE	OUTPUT EFFECTS CURRENT MODE** (External Sensing)
OUTPUT RANGE:	0–100 % E_O max.	1 mA to 100% I_O
SOURCE: 105-125/210-250V a-c	<0.05% or 1 mV*	<0.1% at rated sample**
LOAD: No load — full load	<0.05% or 1 mV*	<0.5% at rated sample**
TIME: 8-hours (drift)	<0.05% or 3 mV*	<0.1% or 1 mA*
TEMPERATURE: Per °C	<0.05%	<0.1% at rated sample**
RIPPLE: (rms)	<0.25 mV	<0.1% of I_O max.

**whichever is greater*
***Rated sample is 1V d-c across external current sampling resistor, with external current control.*

INPUT: 105-125V a-c or 210-250V a-c (selected), 50-440 Hz, single phase

TEMPERATURE, AMBIENT OPERATING: −20°C to +50°C.

TEMPERATURE, STORAGE: −40°C to +85°C.

COOLING: Convection.

ISOLATION: The output terminals are isolated from the grounded case. A maximum of 500 volts (d-c or peak) can be connected between either output terminal and the case.

CONTROL RESOLUTION: 0.05%, 10-turn voltage control.

PROGRAMMING: ABC is fully programmable by resistance or external voltage signals. Control current is 1 mA with built-in calibration control (1000 ohms/V) — the negative terminal is common.

VOLTAGE RECOVERY: (for step load current): <50 μsec.

CURRENT LIMITING: Single turn panel adjustment sets limit from 25% to 150% of rated full current.

REMOTE ERROR SENSING: Compensates up to 0.5V drop per output lead.

OVERSHOOT: (Turn-on/off): None above 25% voltage setting. Negligible below 25% when preloaded to 10% minimum.

SERIES/PARALLEL: Series operation to rated isolation; also master/slave capability. Current limiting design permits self-determined parallel load sharing.

METERS: The suffix "M" designates a single dual scale volt-ammeter, 2½", 2%, with selector switch. Delete suffix for unmetered unit.

TERMINALS: Binding posts on front panel, plus, minus and ground. Multi-terminal barrier strip at rear contains output, sensing and control terminals.

DIMENSIONS: See dimensional listings on Page 771.

FINISH: *Panel:* Brushed aluminum
Case: Charcoal gray texture.

MOUNTING: Mount single unit in rack adapter RA-5, two abreast in rack adapter RA-4.

Data and prices subject to change without notice. *All terms used in the specifications are defined in the Kepco Glossary.*

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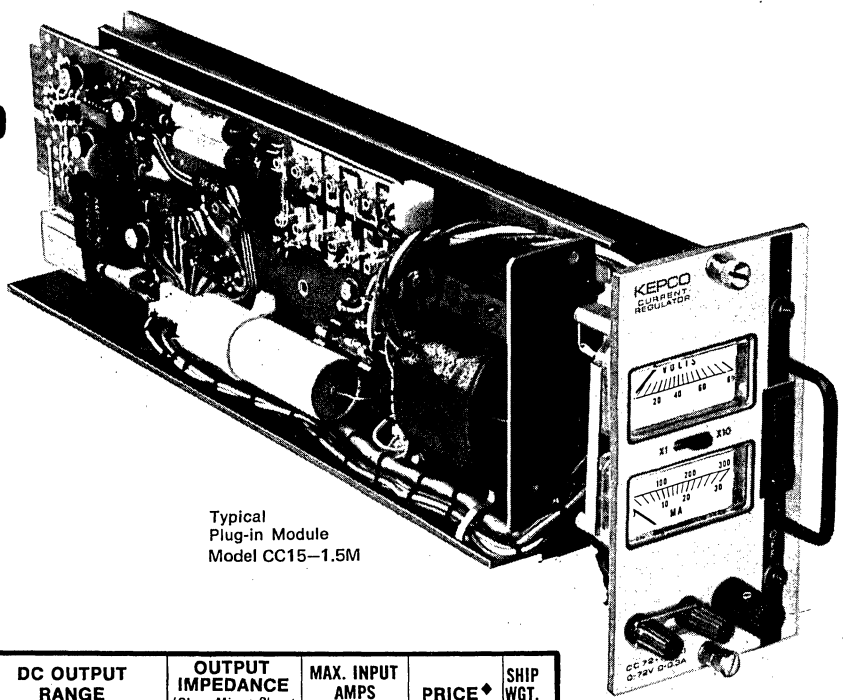
KEPCO™

CC

CONSTANT CURRENT

POWER SUPPLIES

The CC plug-in modules are current controllers with built-in dual-range, current-sensing resistors and 10-turn control. They employ Kepco's monolithic linear I-C amplifier driving a self-cooled NPN series transistor-regulator. Capacitorless output filtering ensures rapid recovery from switching or load transients. Output current ranges from true zero (no minimum) to the selected range (10% or 100% of the current rating) with 10-turn resolution. Metering is isolated by means of an I-C voltage follower.



Typical
Plug-in Module
Model CC15—1.5M

MODEL	DC OUTPUT RANGE AMPS	DC OUTPUT RANGE VOLTS	OUTPUT IMPEDANCE (Ohms Min. + Shunt Capacitance in μF)	MAX. INPUT AMPS at 125 V AC	PRICE◆	SHIP WGT. (lbs.)
CC 7—2M	**0—2A**	**0—7V**	35 kΩ + 0.1	0.50	**$209.00**	6
CC 15—1.5M	**0—1.5A**	**0—15V**	100 kΩ + 0.1	0.65	**209.00**	6
CC 21—1M	**0—1A**	**0—21V**	200 kΩ + 0.1	0.45	**209.00**	6
CC 40—0.5M	**0—0.5A**	**0—40V**	800 kΩ + 0.1	0.40	**209.00**	6
CC 72—0.3M	**0—0.3A**	**0—72V**	2.4 MΩ + 0.1	0.45	**209.00**	6
CC 100—0.2M	**0—0.2A**	**0—100V**	10 MΩ + 0.1	0.45	**209.00**	6

◆ Uncased, available metered only. See MOUNTING below.

This tabulation specifies the limit of change in the regulated output for defined variations in the major influences. To obtain a realistic appraisal of the behaviour in your environment, multiply each influence by its probable range of variation and sum the pertinent effects.

SPECIFICATION	OUTPUT EFFECTS CURRENT MODE
OUTPUT RANGE:	0—100% or 0—10%, switched
SOURCE: 105-125/210-250V a-c	<0.0005% or 0.2 μA*
LOAD: No load — full load	<0.005% or 2 μA*
TIME: 8-hours (drift)	<0.02% or 2 μA*
TEMPERATURE: Per °C	<0.01%
RIPPLE: (rms)	<0.02% of selected scale

**whichever is greater*

INPUT: 105-125V a-c or 210-250V a-c (selected) 50-440 Hz, 1Ø.

TEMPERATURE, AMBIENT OPERATING: −20°C to +65°C.

TEMPERATURE, STORAGE: −40°C to +85°C.

ISOLATION: The output terminals are isolated from the grounded case. A maximum of 500 volts (d-c or peak) can be connected between either output terminal and the case.

CONTROLS: A panel mounted output range selector switches the output either 0—100% I_o max. or 0—10% I_o max. A 10-turn precision current control operates full span through either range. Resolution: 0.05% of the full scale value. A combination on-off slide switch and pilot light provides primary power control.

PROGRAMMING: Control loop uses 0.1 milliampere, current sample is approximately 1V d-c. Supply may be programmed through either current range by a 0-10,000 ohm rheostat. (range switch is not programmable).

MAXIMUM CAPACITIVE LOADING: 0.001 microfarads.

CURRENT RECOVERY (for step load voltage): <2 μsec/volt, except Model CC 7-2M: 4 μsec/volt, measured to the first time constant on the exponential response.

VOLTAGE LIMITING: Fixed at approximately 150-200% of the rated compliance voltage.

SERIES/PARALLEL: Parallel operation of current sources may be made without restriction. Series operation through the use of master-slave interconnection.

COOLING: Convection.

METERS: Two 2% recessed meters monitor output current and compliance voltage. Current is displayed on a dual-scale meter whose range is switched with the range switch. Both meters employ an isolation amplifier to minimize the loading error.

TERMINALS: Output terminals (shorted) are located on the front panel, a-c input, output and control terminals are via a rear PC connection which mates with the connector mounted in the various housings and rack cabinets. These connectors are. in turn, wired to barrier strips for easy access.

DIMENSIONS: See dimensional listings on Page 771.

FINISH: *Panel:* Light gray, color 26440, per Fed. Std. 595.
Housings: Charcoal gray texture.

MOUNTING: Power supplies are uncased, must be plugged into one of the following available housings: CA-3; single; CA-4; dual, CA-5; triple or RA 22-66-unit.

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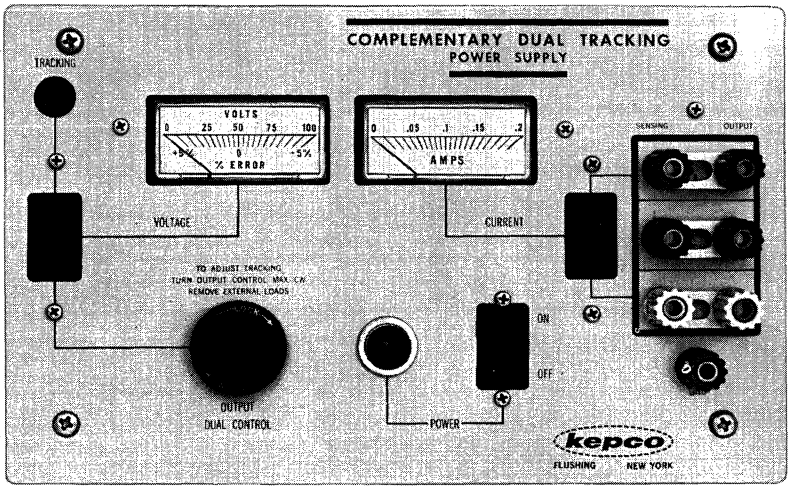
KEPCO CDT

DUAL TRACKING

POWER SUPPLIES

The complementary dual-tracking power supplies consist of two regulators coupled together in a complementary manner using a common reference and a single output voltage control. They may be used to drive independent plus (+) and minus (−) loads or may be used in series for double voltage to a single load.



Model CDT 100–0.2M

MODEL	TWIN OUTPUTS* COMPLEMENTARY VOLTS	COMPLEMENTARY AMPS●	SERIES VOLTS	SERIES AMPS●	INDIVIDUAL SUPPLIES OUTPUT IMPEDANCE Ohms + Microhenries d-c to 100Hz	100 Hz to 1kHz	1kHz to 100kHz+μH	MAX. INPUT AMPS at 125 V a-c	PRICE♦	SHIP WGT. (lbs.)
CDT 15–1.5M	0–±15	0–±1.5	0–30	0–1.5	0.001	0.02	0.1+1	1.3	$427.00	19
CDT 40–0.5M	0–±40	0–±0.5	0–80	0–0.5	0.008	0.02	0.1+1	0.8	427.00	19
CDT 100–0.2M	0–±100	0–±0.2	0–200	0–0.2	0.05	0.02	0.1+1	0.9	427.00	19

** Each Power Supply contains two sources with a common voltage control, may be used as complementary (plus and minus) supplies or in series for double voltage.*

♦ Available metered only.

● Full output current to 65°C, no derating.

This tabulation specifies the limit of change in the regulated output for defined variations in the major influences. To obtain a realistic appraisal of the behaviour in your environment, multiply each influence by its probable range of variation and sum the pertinent effects.

SPECIFICATION	OUTPUT EFFECTS VOLTAGE MODE COMPLEMENTARY**	SERIES
OUTPUT RANGE:	0 to $+E_O$ and 0 to $-E_O$	0 to twice E_O
SOURCE: 105-125/210-250V a-c	<0.005%	<0.005%
LOAD: No load — full load	<0.01% or 1mV*	<0.01% or 2mV*
TIME: 8-hours (drift)	<0.01% or 2mV*	<0.01% or 4mV*
TEMPERATURE: Per °C	<0.01%	<0.01%
RIPPLE: (rms)	<0.25mV	<0.5mV

**whichever is greater*

***Specifications are for the individual supplies, changes in the master supply (plus output) are repeated 1:1 in the slave supply.*

INPUT: 105-125V a-c or 210-250V a-c (selected) 50-440 Hz.

TEMPERATURE, AMBIENT OPERATING: −20°C to +65°C.

TEMPERATURE, STORAGE: −40°C to +85°C.

COOLING: Convection.

ISOLATION: The output terminals are isolated from the grounded case. A maximum of 500 volts (d-c or peak) can be connected between either output terminal and the case.

OUTPUT: The individual power supplies are wired in series, controlled with a single voltage control. They may be loaded in series or separately.

CONTROLS: A 10 turn voltage control adjusts the output of the positive supply, designated "master", this voltage in turn controls the negative supply or "slave" in a 1:1 ratio. The two power supplies are connected in series. Control resolution is 0.05%.

TRACKING: ±5% range of adjustment is controlled by a recessed front panel control. Units can be adjusted to within ±0.5% using panel meter. Closer adjustment with external instrumentation.

PROGRAMMING: The master supply can be controlled by resistance or external voltage signals. Control current is 1 mA with built-in calibration control (1000 ohms/V). The plus output terminal is the programming return.

VOLTAGE RECOVERY, (for step load current): <50 μseconds.

CURRENT LIMITING: Each supply is individually limited with a 10% to 105% range of adjustment.

REMOTE ERROR SENSING: Compensates for up to 0.5 volt drop per output lead.

OVERSHOOT: (Turn-on/off): None above 25% voltage setting. Negligible below 25% when preloaded to 10% minimum.

METERS: Voltmeter monitors output of MASTER, or the difference between MASTER and SLAVE, displayed as a percentage error (range ±5%). Ammeter monitors current from either supply (selectable).

TERMINALS: Binding posts on the front panel for plus, common and minus outputs, also sensing terminals and separate ground. Barrier strip at the rear has duplicate output, sensing and control terminals.

DIMENSIONS: See dimensional listings on Page 771.

FINISH: *Panel:* Light gray Color 26440 per Fed. Std. 595.
Case: Charcoal gray texture.

MOUNTING: Rack adapter RA-24.

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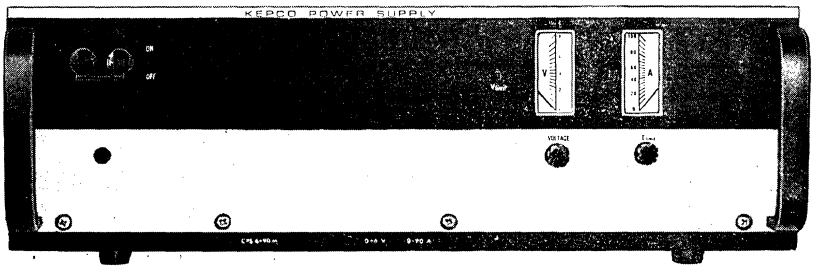
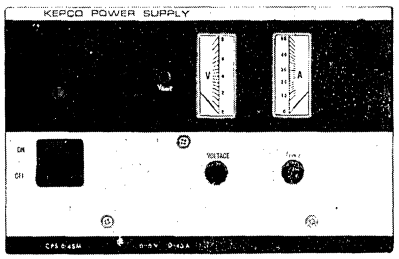
KEPCO CPS
COMPUTER I-C
POWER SUPPLIES



Typical Full Rack Model



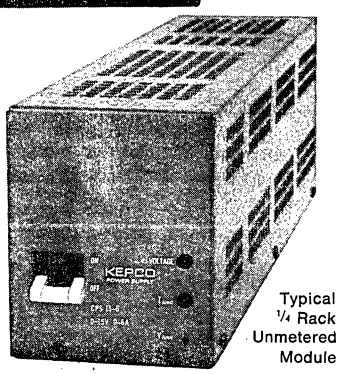
Typical ½ Rack Model

CPS Power Supplies are especially designed for driving digital I-C's. They feature an integral overvoltage crowbar and a linear full-dissipation series NPN transistor-regulator driven by a monolithic linear amplifier. On/off switching and crowbar reset is accomplished by a panel-mounted circuit breaker. The metered models feature panel-mounted, 10-turn voltage controls and dual meters. The CPS Power Supplies are also available unmetered, in modular form for OEM's with controls recessed.

This tabulation specifies the limit of change in the regulated output for defined variations in the major influences. To obtain a realistic appraisal of the behaviour in your environment, multiply each influence by its probable range of variation and sum the pertinent effects.

SPECIFICATION	OUTPUT EFFECTS VOLTAGE MODE	OUTPUT EFFECTS CURRENT MODE**	VOLTAGE AMPLIFIER OFFSETS*** OFFSET VOLTAGE ΔE_{io}	OFFSET CURRENT ΔI_{io}	VOLTAGE REFERENCE (INTERNAL)***
OUTPUT RANGE:	0–100% E_o max.	1 mA–100% I^o max.	——	——	Fixed 6.2V±5%
SOURCE: 105-125/210-250V a-c	<0.0005%	<0.005%**	<10 μV	<2 nA	0.0001%
LOAD: No load – full load	<0.005% or 0.2 mV*	<0.01%**	<200 μV	<5 nA	——
TIME: 8-hours (drift)	<0.01% or 1 mV*	<0.02%**	<20 μV	<2 nA	0.005%
TEMPERATURE: Per °C	<0.01%†	<0.02%**†	<20 μV	<5 nA	0.005%
RIPPLE: (rms)	<0.2 mV	<0.02% of I_o max.	——	——	——

*whichever is greater. †See OPTIONS for 0.005% per °C voltage mode – 0.01% per °C current mode temperature effect coefficient.
**External sensing, using a 1V sample. Effects are measured at rated sample voltage with 20 PPM external current feedback control.
***Offsets and the reference contribute to output change ΔE_o, by the equation $\Delta E_o = \pm\Delta E_{ref}(R_f/R_i) \pm\Delta E_{io}(1+R_f/R_i) \pm\Delta I_{io}(R_f)$ where R_f is the feedback resistor and R_i is the input resistor from the signal reference. Use the offsets to calculate output variations when external input/feedback elements are substituted for the internal reference and voltage control in special applications.



Typical ¼ Rack Unmetered Module

MODEL	DC OUTPUT RANGE VOLTS	DC OUTPUT RANGE AMPS●	OUTPUT IMPEDANCE Ohms + Microhenries d-c to 100Hz	100Hz to 1kHz	1kHz to 100kHz+μH	RACK SIZE	PRICE♦	SHIP WGT. (lbs.)
CPS 6–10M	0–6	0–10	$30X10^{-6}$	0.02	0.05+1	¼	$ 392.00	21
CPS 6–22M	0–6	0–22	$14X10^{-6}$	0.02	0.05+1	½	626.00	34
CPS 6–45M	0–6	0–45	$7X10^{-6}$	0.02	0.05+1	½	707.00	48
CPS 6–90M	0–6	0–90	$3.5X10^{-6}$	0.02	0.05+1	Full	1,065.00	95
CPS 15–6M	0–15	0–6	$125X10^{-6}$	0.02	0.05+1	¼	392.00	21
CPS 15–12M	0–15	0–12	$63X10^{-6}$	0.02	0.05+1	½	626.00	34
CPS 15–25M	0–15	0–25	$30X10^{-6}$	0.02	0.05+1	½	707.00	48
CPS 15–50M	0–15	0–50	$15X10^{-6}$	0.02	0.05+1	Full	1,065.00	95

♦ Price is for the metered unit, deduct $30.00 for modular style.
● Full output current to 71°C, no derating.

INPUT: 105-125V a-c or 210-250V a-c (selected) 50-65 Hz, 1Ø.

TEMPERATURE: AMBIENT OPERATING: –20°C to +71°C

TEMPERATURE, STORAGE: –50°C to + 85°C

COOLING: Forced air, built-in blower.

CONTROLS: *Voltage:* 10-turn, wirewound rheostat.
Resolution: 0.05%.
Current: Multiturn vernier potentiometer.

Unmetered models (without suffix M) are designed for chassis mounting as modules and have their voltage control and current limit control recessed.

PROGRAMMING: Control loop uses 1 milliampere. Supply may be programmed by resistance at 1000 ohms per volt, or may be operationally controlled as an amplifier (common positive) using voltage or current signals.

VOLTAGE RECOVERY (for step load current): <50 μseconds for recovery to within 2 mV of setting.

OVERSHOOT (Turn-on/off): None above 25% voltage setting; negligible below 25% when preloaded to 10% minimum.

CURRENT LIMITING: Adjustable from 10% to 105% of the rated full current.

REMOTE ERROR SENSING: Compensates up to 0.5V drop per output lead.

SERIES/PARALLEL: Series operation to the rated isolation voltage. Units may be paralleled by employing their current limiters.

ISOLATION: The output terminals are isolated from the grounded case. A maximum of 500 volts (d-c or peak) may be connected between either terminal and the case.

METERS: Two dual range, 2-inch, 2% recessed meters, monitor output voltage and current. Unmetered versions available as modules, delete suffix "M" and deduct $30.00 from listed price (any quantity).

DIMENSIONS: See dimensional listings on Page 771.

FINISH: (Metered models only have a panel).
Panel: Light gray, Color 26440 per Fed. Std. 595.
Case: Charcoal gray texture.

MOUNTING: Full rack sized models have accessory flanges for direct installation in standard 19" racks. Unmetered CPS models are in modular form for chassis mounting or may be mounted in RA-24 by use of an adapter plate RAP 24-1 (for ¼ rack size) and RAP 24-2 (for ½ rack size). Full rack units are pre-drilled for Jonathan Slides 110 QD 20-1, 22-1, 24-1.

OPTIONS: (add suffix to the model number)

"–T" LOWER TEMPERATURE EFFECT COEFFICIENT: 0.005% per °C in voltage mode, 0.01% per °C in current mode. Add $30.00 to price.

"–E" OFFSET VOLTAGE NULLING: For operational programming. Zeros the fixed part of the control amplifier's voltage offset. Add $10.00 to price.

OVERVOLTAGE PROTECTOR: (built-in) An integral overvoltage crowbar is set by means of a recessed multiturn panel control. Range is from 3V d-c to the maximum voltage rating plus 10%.

Triggering Time: 5-10 microseconds with an adjustable delay to minimize the false alarm rate.

Threshold: May be set to within 5% or 0.25 volts (whichever is greater) of the power supply's output voltage.

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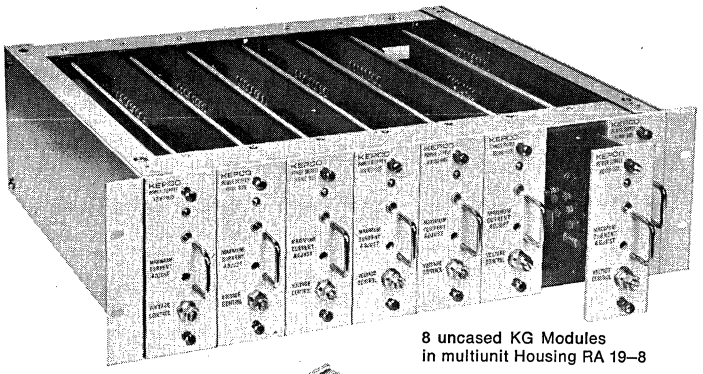
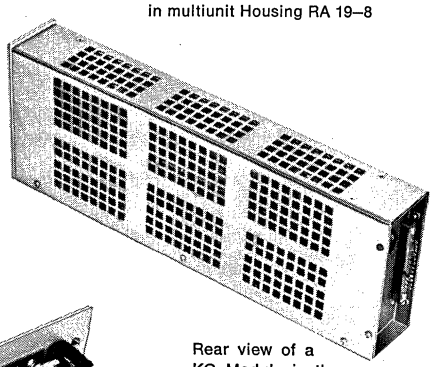
KEPCO
KG
ISOLATED
POWER SUPPLIES



8 uncased KG Modules in multiunit Housing RA 19–8

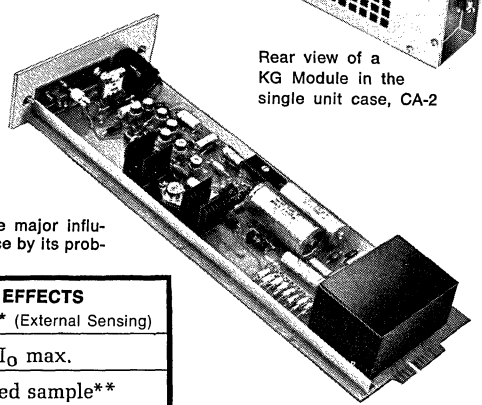
The KG isolated module is designed for driving balanced electronic circuits and bridges - often used with electromechanical transducers. The KG module offers minimal common mode line-coupled current, achieved by stringent isolation of the power transformer and line-related components, and nonmetallic, low-capacitance mounting. The modules are designed for plug-in mounting 8-abreast in a 19-inch rack or in an individual plug-in case.



Rear view of a KG Module in the single unit case, CA-2

MODEL	DC OUTPUT RANGE VOLTS	DC OUTPUT RANGE AMPS●	OUTPUT IMPEDANCE Ohms + Microhenries d-c to 100Hz	100 Hz to 1kHz	1kHz to 100kHz+μH	MAX. INPUT AMPS at 125 V a-c	PRICE ♦	SHIP WGT. (lbs.)
KG 25–0.2	0–25	0–0.2	0.006	0.01	0.1+1	0.2	$188.00	4
KG 100–0.05	0–100	0–0.05	0.1	0.01	0.1+1	0.2	188.00	4

KG Modules have been especially isolated for minimum common mode signal and least ground coupling to the power line.
♦ Uncased, see MOUNTING below.
● Full output current to 50°C, no derating.



Uncased KG Module

This tabulation specifies the limit of change in the regulated output for defined variations in the major influences. To obtain a realistic appraisal of the behaviour in your environment, multiply each influence by its probable range of variation and sum the pertinent effects.

SPECIFICATION	OUTPUT EFFECTS VOLTAGE MODE	OUTPUT EFFECTS CURRENT MODE** (External Sensing)
OUTPUT RANGE:	0–100% E_O max.	1 mA–100% I_O max.
SOURCE: 105-125/210-250V a-c	<0.001%	<0.001% at rated sample**
LOAD: No load – full load	<0.005% or 0.5 mV*	<0.01% at rated sample**
TIME: 8-hours (drift)	<0.005% or 1 mV*	<0.01% at rated sample**
TEMPERATURE: Per °C	<0.005%	<0.01% at rated sample**
RIPPLE: (rms)	<0.1 mV	<0.01% of I_O max.

**whichever is greater*
***Rated sample is 1Vd-c across external current sampling resistor, with external current control.*

INPUT: 105-125V a-c, 50-65 Hz, single phase.
Overseas Models: For 210-250V a-c input, consult factory.
TEMPERATURE, AMBIENT OPERATING: –20°C to +50°C.
TEMPERATURE, STORAGE: –40°C to +85°C.
COOLING: Convection.
ISOLATION: Volts: 500 volts to ground, maximum.
Ohms: 10 K megohms to ground, minimum.
Capacitance: 200 picofarads to ground, max.
Leakage: 50 nA to ground, maximum.
Input to output: 1 picofarad, maximum.
CONTROL RESOLUTION: 0.05%, 10-turn voltage control, screwdriver adjustment, with lock.
PROGRAMMING: KG is programmable by an external rheostat at 1000 ohms/V (option R provides a calibration control) the positive terminal is common. An offeset voltage nulling control is available, see option "E".
VOLTAGE RECOVERY (for step load current): <50 microseconds for recovery to within 0.005% or 2 mV of setting.
CURRENT LIMITING: Recessed panel adjustment from 5% to 110% of rated current.
OVERSHOOT (Turn-on/off): None above 25% voltage setting; negligible below 25% when preloaded to 10% minimum.
SERIES/PARALLEL: Current limiting design permits self-determined parallel load-sharing. Series operation to rated isolation.
TERMINALS: All connections are made through printed circuit connector in housing, a-c input, d-c output, sensing and control. A blank terminal is provided which can be wired for operational control using voltage or current signals.
FINISH: Light gray, Color 26440 per Fed Std. 595.
DIMENSIONS: See dimensional listings on Page 771.
MOUNTING: The uncased KG module must be plugged into either a single unit case, CA-2 or the 8-unit rack adapter, RA 19-8. Both housings contain integral plug-in connectors.

OPTIONS: (add suffix to the model number).
"–R" CONTROL CURRENT ADJUSTMENT: ± 10% trimmer provides for programming calibration. Add $10.00 to price.
"–E" OFFSET VOLTAGE NULLING: zeros the fixed part of the control amplifier's offset voltage. Add $10.00 to price.

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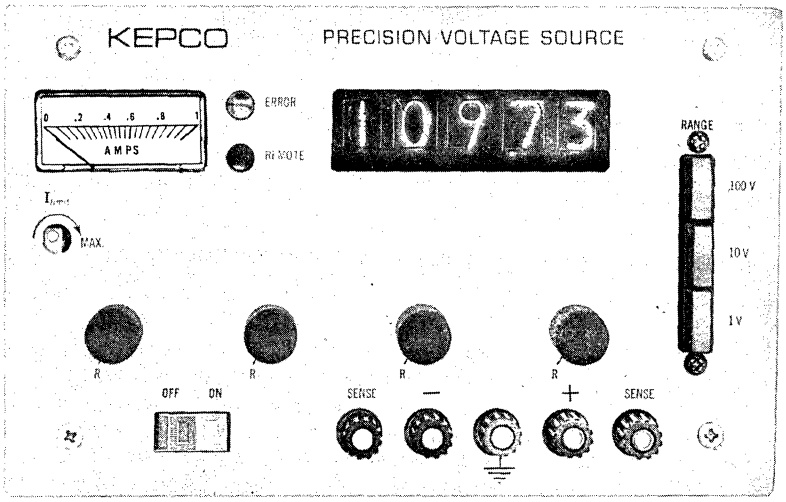
KEPCO PVS
PRECISION VOLTAGE SOURCE
POWER SUPPLIES

- *4 digit output selection*
- *3 decimal range selection*
- *BCD programming (switch closures)*
- *digital display*
- *current limiting*



Model PVS 100–1M — Price: $937.00 — Ship Wgt.: 37 lbs.
Model PVS 100–1MG — Price: 873.00 — Ship Wgt.: 37 lbs.

OUTPUT:	0.0000–100.00 volts
CURRENT:	0–1 ampere

The PVS Precision Voltage Source features an extremely low drift linear amplifier driving a self-cooled NPN power transistor stage. Voltage control is by means of digitally selected (1–2–4–8 BCD) precision –low TC, high stability feedback resistors with a 3-decade oven-controlled reference. Output is displayed on a 4½ digit readout with a built-in error-detecting system to prevent false indication. Output current is metered and the limit is adjustable. A remote digital programming connector is fitted to the voltage control (BCD switch closures). Model with suffix "G" omits the remote digital control feature. The 0.02% overall accuracy qualifies the Precision Voltage Source as an instrument calibrator.

This tabulation specifies the limit of change in the regulated output for defined variations in the major influences. To obtain a realistic appraisal of the behaviour in your environment, multiply each influence by its probable range of variation and sum the pertinent effects.

SPECIFICATION	OUTPUT EFFECTS VOLTAGE MODE
SOURCE: 105-125/210-250V a-c	<0.0005%
LOAD: No load – full load	<0.001% or 0.1 mV*
TIME: 8-hours (drift)	<0.005% or 1 mV*
TEMPERATURE: Per °C	<0.005% per °C
READOUT ACCURACY:	0.02% of full scale
RESOLUTION:	100 microvolts
RIPPLE: (rms)	<100μV rms
OUTPUT IMPEDANCE:	d-c–1kHz : $10^{-3}\Omega$ 1kHz–100kHz : $10^{-2}\Omega + 1\mu h$

**whichever is greater*

INPUT: 105-125V a-c or 210-250V a-c (selected) 50-440 Hz, 1Ø.

TEMPERATURE, AMBIENT OPERATING: –20°C to +55°C (no derating).

TEMPERATURE, STORAGE: –40°C to +85°C

COOLING: Convection.

ISOLATION: The output terminals are isolated from the grounded case. A maximum of 500 volts (d-c or peak) may be connected between either terminal and the case.

CONTROLS: Four (4) 10-position rotary switches select voltage in conjunction with three push button decimal range selectors. A recessed current limit control is accessible through the front panel.

OVERRANGE: 10% overrange on each range; *e.g.*, 1.099V, 10.999V and 109.99 volts (derate current to 0.6 amperes at 109.99 volts).

PROGRAMMING: External switch closures will program the output in a 1-2-4-8 BCD code. This connector is omitted in the model with suffix "G".

CURRENT LIMITING: Recessed multiturn trimmer adjusts the current limiting from 10% to 105% I_O max.

VOLTAGE RECOVERY (for step load current): <50 μseconds for recovery to within 0.005% or 2 mV of setting.

REMOTE ERROR SENSING: Compensates up to 0.5V drop per output lead. Error sensing terminals located on the front panel.

OVERSHOOT (Turn-on/off): None above 25% voltage setting; negligible below 25% when preloaded to 10% minimum.

METERS: Voltage is indicated on a four-digit numerical display with a fifth-digit overrange. Current on a 2-inch, 2% recessed ammeter.

TERMINALS: Binding posts on the front panel, plus/minus, ground and error sensing. Connections at the rear for output, error sensing and programming functions.

DIMENSIONS: See dimensional listings on Page 771.

FINISH: *Panel:* Light gray, Color 26440 per Fed. Std. 595.
Case: Charcoal gray texture.

MOUNTING: Fits RA-24 rack adapter.

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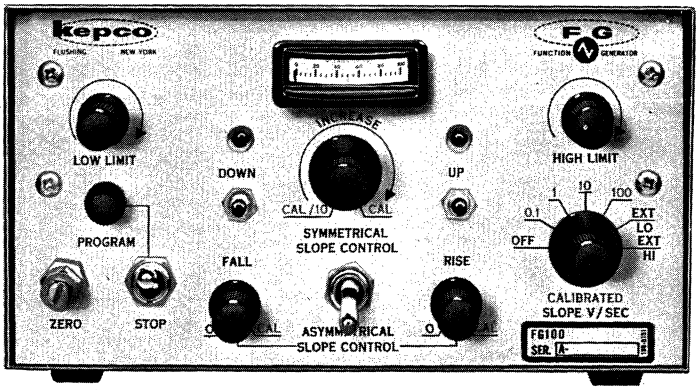
KEPCO

PROGRAMMER FUNCTION GENERATOR



Model FG 100 — Price: $616.00 — Shp. Wgt. 16 lbs.

Model FG-100 is a precision, slow speed, triangular waveform generator capable of generating any repetitive ramp function. Separately adjustable, high and low limits, are provided which periodically reverse the direction of the integration. The rising rate and falling rate are separately adjustable or can be controlled symmetrically with a single control.

OUTPUTS: All outputs available simultaneously.
#1 — 0–20V d-c, 0–20 ma.
#2 — 0–10 ma to program 100 ohm/volt power supply.
#3 — 0–1 ma to program 1000 ohm/volt power supply.

INPUT: 105–125V or 210–250V a-c, 50–440 Hz.

TIMING: 4 ranges: 0.1V/sec., 1.0V/sec., 10V/sec., 100V/sec. Rising and falling slopes continuously adjustable between ranges either separately or symmetrically. For outputs #2 and #3, divide the above timing by 2000 and 20,000 respectively to obtain milliamperes per second.

LIMITS: Separately adjustable high limit and low limit permits operation between any two pre-set voltages or currents.

REVERSING SWITCHES: Programming direction is automatically reversed at the high and low limits. In addition, a pair of push buttons are provided which permit the direction to be reversed at any point in the operating span. A pair of directional lamps are provided to show the direction of the ramp.

METER: 2½" edgewise meter monitors output in volts (0–20V a-c) and in percent of maximum output, 0–100%.

PROGRAMMING: Model FG–100 may be used by itself to generate a wide variety of very low speed triangular or sawtooth functions, or it can be used directly with any programmable d-c power supply. When connected to a programmable power supply, the Model FG-100 Function Generator programs the power supply throughout all or part of its rated voltage or current range as set by the power supply's controls and the function generator's limit settings.

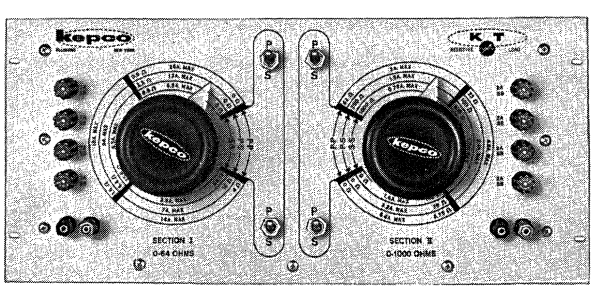
NOTE: function speed is converted to programming speed by multiplying the driving current rate (ma/sec.) by the resistance setting of the voltage control of the power supply being programmed. This gives the programming speed of the power supply's output in volts per second.

REMOTE CONTROLS: Timing and limit setting controls are brought to a multi-terminal barrier strip at the rear of the unit for remote operation. A sync output is also provided as is provision for remote directional signals.

DIMENSIONS: 4¼"H x 8$\frac{5}{32}$"W x 13⅜"D

MOUNTING: Mount single unit in rack adapter RA-5, two abreast in rack adapter RA-4. *See Hardware Section.*

KEPCO VARIABLE RESISTIVE LOAD



Model KT 6212 — Price: $619.00 — Shp. Wgt. 47 lbs.

The Model KT 6212 is a multiganged, eight-section group of dual-wound power rheostats used in the testing of regulated power supplies.

Model KT 6212 consists of two independent gangs of four rheostats apiece, 0-64 ohms and 0-1000 ohms. The rheostats can be switched for parallel, series parallel and series operation. Each rheostat has heavy and light windings so that the maximum load current changes at approximately each third rotation point around the dial.

CONTROLS:
Switches select series and parallel combinations of the four ganged rheostats with the corresponding resistance and current rating designated by concentric bands.

Each band defines the resistance range for its particular connection with zero ohms (maximum current) in the clockwise position. The bands are divided into three sections that correspond to the position of the heavy and light windings, respectively. The maximum current in each section is shown on the corresponding portion of the band.

FUSING:
Each rheostat in the 0-64 ohm gang is fused at 7 amperes. Each rheostat of the 0-1000 ohm gang is fused for 2 amperes.

TERMINALS:
A pair of 5-way binding posts is provided at each gang for connection to the power source under test. These connections are duplicated at the rear.

EXTERNAL POWER REQUIREMENTS:
None. The Model KT 6212 is a passive device.

DIMENSIONS:
8¾"H x 19"W x 13⅜"D. The Model KT 6212 resistive load is designed for mounting in standard 19" equipment racks.

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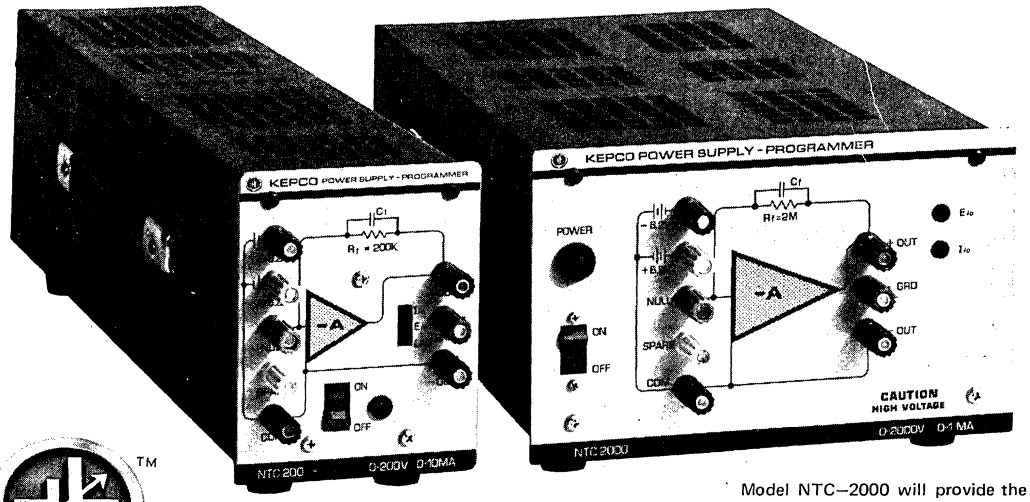

Model NTC–200 will provide the programming interface for power supplies up to 200 volts, including models in the CPS, JQE, OPS, PAT, and PCX Design Groups.

Model NTC–2000 will provide the programming interface for power supplies up to 2000 volts, including models in the ABC (Hybrid),HB,BHK,and OPS(Hybrid) Design Groups.

KEPCO NTC PROGRAMMING INTERFACE

The Kepco NTC is a power supply–to programmer interface that provides a convenient solution to the problem of mixed grounds with *common–positive* d-c power supplies. The NTC is an operational inverting amplifier which boosts a programming signal to the desired *voltage* level, then couples this signal to the noninverting voltage repeater (feedback) terminals of the power supply. By this means, the *negative* output terminal of the power supply is made electrically common to the signal source.

MODEL	d-c OUTPUT RANGE VOLTS	mA	RIPPLE rms	SLEWING RATE	MAX. INPUT AMPS at 125 V a-c	PRICE	SHIP. WGT. (lbs.)
NTC–200	0–200	0–10	0.01%*	1V/μsec.	0.25	$190.00	10
NTC–2000	0–2000	0–1	0.01%*	3V/μsec.	0.3	325.00	15

**or 5 mV, whichever is greater.*

This tabulation specifies the limit of change in the regulated output for defined variations in the major influences. To obtain a realistic appraisal of the behaviour in your environment, multiply each influence by its probable range of variation and sum the pertinent effects.

SPECIFICATION	VOLTAGE AMPLIFIER OFFSETS ΔE_{io}	ΔI_{io}	REFERENCE (±6.2V)
SOURCE: 105–125/210–250V a-c	<100 μV	<10 nA	0.0005%
LOAD: No load – full load	<1 mV	<10 nA	——
TIME: 8-hours [drift]	<20 μV	<5 nA	0.005%
TEMPERATURE: Per °C	<20 μV	<5 nA	0.005%

Offsets and the reference contribute to output change ΔE_O, by the equation $\Delta E_O = \pm \Delta E_{ref}(R_f/R_i) \pm \Delta E_{io}(1+R_f/R_i) \pm \Delta I_{io}(R_f)$ where R_f is the feedback resistor and R_i is the input resistor from the signal reference. Use the offsets to calculate output variations when external input/feedback elements are substituted for the internal reference and voltage control in special applications.

SIGNAL INPUT: 0–1 milliampere, current driven into zero ohms. A voltage signal is connected to the NTC through a coupling resistance such that the peak input current is 1 milliampere. [Example: 0–10V signal, 10 K ohm input resistance.]

SIGNAL OUTPUT: 0–100% E_o maximum at rated current. The output of the NTC may be used directly to drive loads whose current requirements are small and can be accommodated by the respective ratings. The intended application, however, is for the NTC output to drive the voltage repeater [feedback] terminals of a suitable power supply.

OPEN LOOP d-c GAIN: $>0.5 \times 10^6$ volts per volt.

SINUSOIDAL FREQUENCY RESPONSE:

$$f_{max.} = \frac{\text{Slew Rate}}{\pi E_{pp}}$$

[E_{pp} is the peak-to-peak voltage excursion.]

MAXIMUM CAPACITIVE LOADING: 0.001 microfarad. Capacitance in excess of this value will slow the response, cause peaking, and reduce the stability margin. An adjustable network is provided to compensate for a small range of reactance.

REFERENCES: Two +6.2 volts [nominal] and -6.2 volts [nominal] at 1 milliampere maximum.

POWER INPUT: 105–125V a-c or 210–250V a-c [selected], 50–65 Hz, single phase.

TEMPERATURE, AMBIENT OPERATING: -20°C to +65°C.

TEMPERATURE, STORAGE: -40°C to +85°C.

COOLING: Convection.

ISOLATION: The output terminals are isolated from the grounded case. A maximum of 500 volts for Model NTC–200, or 1000 volts for Model NTC–2000 (d-c or peak) can be connected between either output terminal and the case.

TERMINALS: Front panel binding posts and rear barrier-strip duplicate all functions.

DIMENSIONS: NTC–200: 5 7/32" x 4 5/32" x 17 3/8"
NTC–2000: 5 7/32" x 8 5/32" x 12 7/8"

FINISH: *Panel:* Light gray, Color 26440 per Fed. Std. 595.
Case: Charcoal gray texture.

MOUNTING: Units may be rack-mounted with Adapter RA–24. See *Hardware Section*

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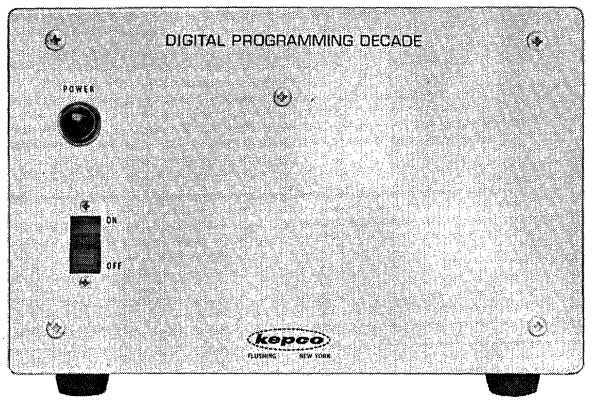
KEPCO

DIGITAL PROGRAMMING SYSTEM



DIGITAL PROGRAMMING DECADE

MODEL	DESCRIPTION		COMPANION REGISTER	CABLE TO DPR
DPD—1	4 digit	0—1000.0V	DPR—4	Cable A
DPD—2	4 digit	0—100.00V	DPR—4	Cable B
DPD—3	5 digit	0—1000.00V	DPR—5	Cable A
DPD—4	3 digit	0—1000V	DPR—3	Cable A
DPD—5	3 digit	0—100.0V	DPR—3	Cable B
DPD—6	3 digit	0—10.00V	DPR—3	Cable B
DPD—7	3 digit	Current	DPR—3	Cable B

FUNCTION:
To control the output level (voltage or current) of a d-c Power Supply by means of digitally encoded commands.

OUTPUT RANGE: Each DPD will program 10% overrange and when using the voltage control board has three selectable decimal levels. The largest is shown in the chart; e.g., Model DPD—1, a 4 digit overranging instrument will program: 0—10.999 volts, 0—109.99 volts and 0—1099.9 volts. The DPD—7, a three-digit instrument for the control of current has two selectable decimal levels. A current code board, compatible with the *current rating* of the power supply being controlled, is needed with the DPD—7. Specify the *current code board* when ordering by appending a suffix number to the model equal to the *ampere* rating of the supply being controlled. Specify Model DPD—7—22A for an instrument to control a 22 ampere power supply. The *current code board* in Model DPD—7 causes the programmed current to correspond to the numerical display of the companion DPR—3 Register.

DESCRIPTION: The DPD's use transistor-driven reed relays to actuate resistors in a 1—2—4—8 BCD code. The input is parallel (RTL) logic levels or switch closures; the output a four-wire resistance and control current command capable of programming any Kepco Operationally Programmable Power Supplies. The DPD's may be driven by the suitable companion DPR which provides serial-parallel conversion, data storage and display.

TIMING: Commands to the DPD are sequenced: hold—execute —program, requiring a 10 millisecond sequence time. This sequencing is provided by the DPR when used together.

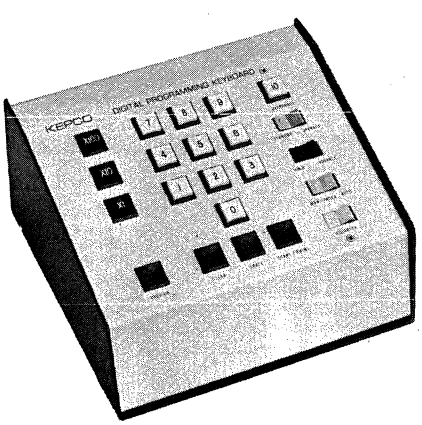
INPUT: logic "0" is 0 to 0.3V d-c
logic "1" is 1 to 3V d-c
input impedance: 3K ohms

POWER REQUIREMENTS:
115V ±10V a-c or 230V ±20V a-c, 50-440 Hz single phase

DIMENSIONS: 5 7/32"H x 8 11/32"W x 12 7/8"D
Rack adapter (Model RA-24) is available)

DIGITAL PROGRAMMING KEYBOARD

Model DPK-1



FUNCTION:
To control the output of a regulated d-c Power Supply with an adding machine keyboard, through a DPR logic and DPD analog converter. DPK-1 is a manual input — in serial form — for the DPR registers.

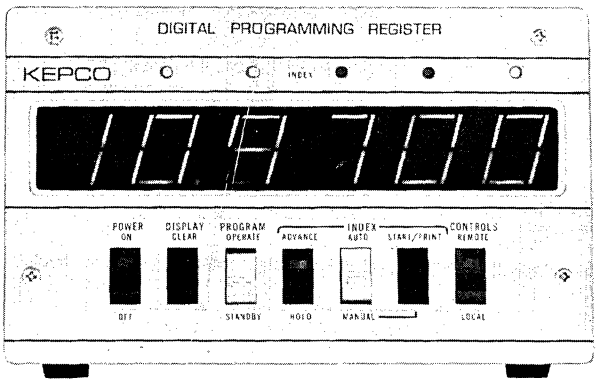
DESCRIPTION:
The DPK-1 uses SPDT keys to generate decimal code and register control signals, which are shaped and processed for delivery to the DPR storage register. Model DPK-1 will program registers DPR-3, DPR-4 and DPR-5

COMMANDS:
10 digit decimal signals, 3 ranges, Space, Clear, Start/Print, Index, Hold/Advance, Standby/Operate, Preview, Polarity.

POWER: Supplied from DPR.

DIMENSIONS: 4 5/16"H x 8 11/32"W x 7 5/8"D
Rack adapter (Model RA 29-1) available.

DIGITAL PROGRAMMING REGISTER



Model DPR-5

MODEL	NUMBER OF DISPLAY REGISTERS
DPR-3	3 + Overrange
DPR-4	4 + Overrange
DPR-5	5 + Overrange

FUNCTION: The registers accept inputs of binary coded decimal programming signals, display and store them; and provide a parallel output signal to a DPD decade for the purpose of controlling a power supply. The models DPR are used for the storage and display of digital input information within a complete Digital Programming System.

INPUTS: Inputs may be provided by a Model DPK-1 Keyboard or other inputs, such as magnetic or punched tape or code generators.

OUTPUTS: The DPR's provide parallel output data on 21 lines for presentation to a programming decade DPD-1 — DPD-7. Simultaneously, a separate output is provided at the front panel consisting of a segmented numeric display, decimal point and index indicator. The index indentifies the register digit next in line to receive a command.

The DPR provides the logical sequencing of its companion DPD for each command change. At the instant of switching, timing signals from the DPR instruct the DPD to "hold" while new command levels are established. This sequenced action prevents discontinuities in the output.

POWER REQUIREMENTS: 115V a-c ±10V a-c or 230V a-c ±20V a-c, 50-440 Hz single phase.

DIMENSIONS: 5 7/32"H x 8 11/32"W x 17 3/8"D. Rack mount with adapter RA-24.

FINISH: Panel: Light gray, Color 26440 per Fed. Std. 595.
Cover: Charcoal gray texture.

INPUT LINES: (Serial data) Input Impedance: 1.5 k ohms

Decimal format:	10 lines
BCD format:	5 lines, incl. data pulse
Range selection (decimal point):	3 lines
Function commands:	5 lines
Logic level "0"	0 to 0.3V
Logic level "1":	1 to 3V

OUTPUT LINES: (Parallel data) Output impedance: 640 ohms

DATA LINES	TO DPD	TO PRINTER
DPR-3	12 + 1 common	12 + 1 common
DPR-4	16 + 1 common	16 + 1 common
DPR-5	20 + 1 common	20 + 1 common
Range selection (decimal point):	3 lines	2 lines
Overrange	—	1 line
Polarity	1 line	—
Print signal	—	1 line (150 ohms)
Print complete signal	—	1 line (1000 ohms)
Hold signal	1 line	—

CABLES: There are two types of cabling used to interconnect Register, Decade and Keyboard. Types A and B are available in 3 feet and 10 feet lengths. The Type A Cable is used to connect a Model DPK-1 to any of the three Registers DPR-3, 4 and 5. Between the Registers and the various Decades, use the cable type listed in table. Use a 4-wire shielded cable (not supplied) between Decade (DPD) and the power supply it is to program.

INTERCONNECTING CABLE ASSEMBLIES

TYPE	10' length	3' length	CONNECTS DPR–3–4–5 TO
A	A–10	A–3	DPK–1, DPD–1–3–4
B	B–10	B–3	DPD–2–5–6–7
PC-3	Unwired plug for custom cabling		Mates with all connectors

DIGITAL PROGRAMMING SYSTEM

MODEL	DESCRIPTION	PRICE	SHIP WGT. (LBS.)
DPK–1	Keyboard	$ 247.00	7
DPR–3	3-Digit Register	980.00	24
DPR–4	4-Digit Register	1,090.00	24
DPR–5	5-Digit Register	1,200.00	24
DPD–1	0–1000.0V Decade	846.00	17
DPD–2	0–100.00V Decade	787.00	17
DPD–3	0–1000.00V Decade	899.00	17
DPD–4	0–1000V Decade	760.00	17
DPD–5	0–100.0 Decade	707.00	17
DPD–6	0–10.00 Decade	707.00	17
DPD–7	Current Decade	675.00	17
A–3	Cable, 3'	33.00	2
A–10	Cable, 10'	38.00	4
B–3	Cable, 3'	33.00	2
B–10	Cable, 10'	38.00	4
PC-3	Unwired plug	7.00	½

SYSTEM OPTIONS and ACCESSORIES

PROGRAM BOARDS		SUPPLIED IN DPD MODELS:						
MODEL	PRICE	–1	–2	–3	–4	–5	–6	–7
PB–10K	$107.00	*		*	*			
PB–1K	81.00	*	*	*	*	*		
PB–100	54.00	*	*	*	*	*	*	*
PB–10	54.00	*	*	*		*	*	*
PB–1	54.00		*	*			*	*

OPTIONAL OFFSET CONTROL: Add suffix "E" to model number, e.g.: DPD–2E for an optional E_{IO} (voltage offset) zeroing control. Used to control power supplies that lack zeroing facilities.

PRICE: $50.00

CURRENT CODE BOARDS: Plug into DPD–7 to control current. Board of choice is supplied with DPD–7, specified by appending suffix equal to current rating of supply being programmed, e.g.: DPD–7–15 for 15 amp code board. Additional code boards.

PRICE: $50.00 each

PRIMARY LISTING
VIP
VP-PX

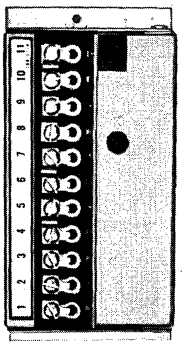
CROSS REFERENCE
CPS
JQE

KEPCO
ACCESSORY EQUIPMENT
OVERVOLTAGE CROWBARS

MODEL	VOLTS	AMPS	TRIP TIME μSEC	FOR USE WITH	PRICE	SHIP. WGT. (lbs.)
VIP–1	5–200*	30	50	Stand alone, Overvoltage/Current	$142.00	21
VIP–3	5–200*	30	50	Stand alone, Over and Undervoltage/Current	254.00	21
VIP–4	5–50	200	50	Stand alone, Overvoltage/ Current	332.00	21
VP–PX	3–110	3	5–10**	PAX, PCX Model, bolt onto RA 22–6	86.00	3

* Ranges: 5–50V, 50–100V, 100–150V, 150–200V.

** This model incorporates an adjustable trigger delay which allows a closer setting without an excess false alarm rate.



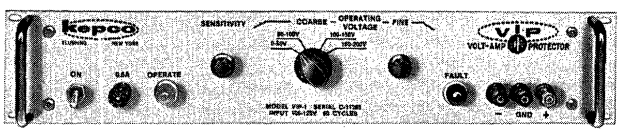
Model VP–PX

The Kepco VIP (stand alone, rack mounted) and VP (bolt-on) protectors are independent voltage monitors complete with their own power supply, reference, comparator and SCR crowbar. A voltage excursion above the static trigger level (or below, in the case of VIP-3, the undervoltage protector) initiates crowbar conduction to clamp the supply terminals. Simultaneously, a power interlock relay (or connection to the power supply's circuit breaker) trips to remove the primary a-c power. Re-set is automatically accomplished when the a-c power is restored.

SENSITIVITY: **VIP Models:** 1% of the operating voltage or 0.1V
VP Model: 5% of the operating voltage or 0.25 volts, whichever is greater.
VIP-1 &-3 Current Sensitivity: 5% of the operating current producing a 1 volt drop across an external sensing resistor.

TEMPERATURE COEFFICIENT: 0.1% or 0.1V (whichever is greater) per °C.

REMOTE ERROR SENSING: Compensates for up to 1V per output lead.

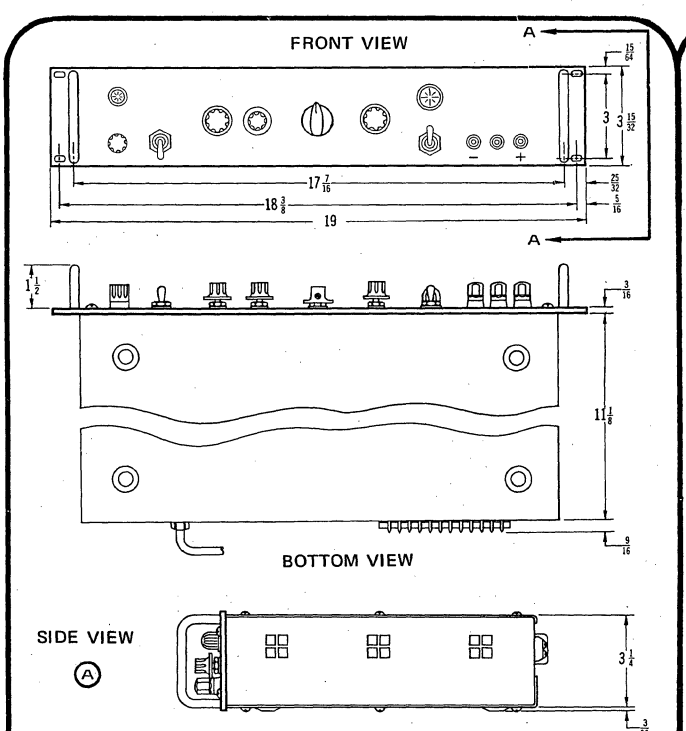


Model VIP–1

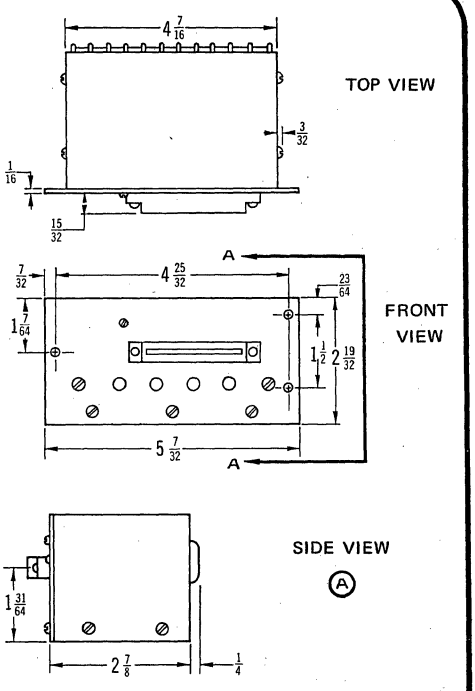
DIMENSIONS: See outline drawings, this section.

FINISH: VIP Panels, light gray, color 26440, per Fed. Std. 595.

OPTIONS (Tracking Mode, VIP Models): The VIP may be interconnected with the voltage control of the power supply that it monitors to sense a voltage differential between the output of the supply and the programmed voltage. For details, please consult the factory.



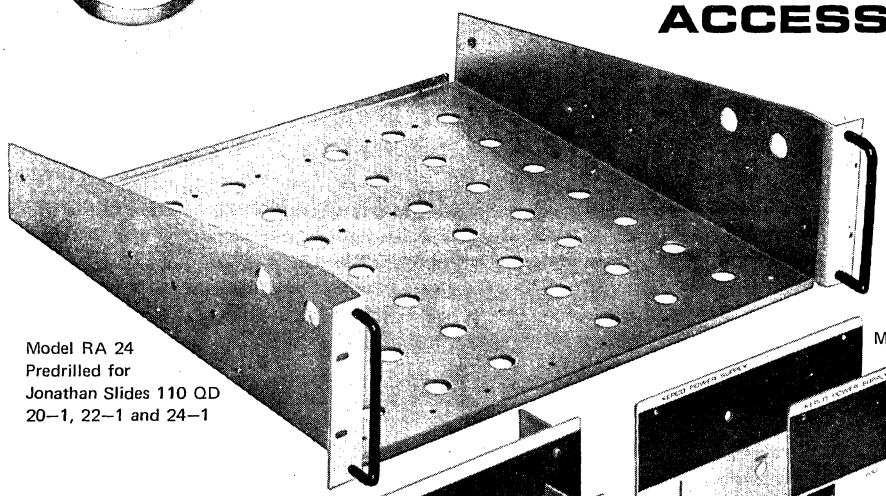
VIP DESIGN GROUP



VP–PX DESIGN GROUP

OUTLINE DIMENSIONAL DRAWINGS

KEPCO™
HARDWARE AND MOUNTING ACCESSORIES



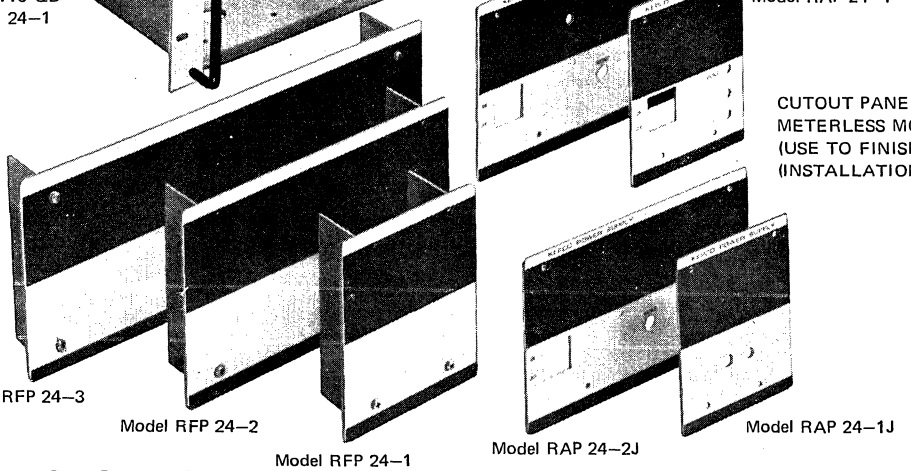
Model RA 24
Predrilled for
Jonathan Slides 110 QD
20–1, 22–1 and 24–1

Model RAP 24–2

Model RAP 24–1

CUTOUT PANELS FOR METERLESS MODULES (USE TO FINISH RA–24 (INSTALLATION).

BLANK FILLER PANELS are finished with a matching stripe on one side and solid gray on the other. Color 26440 per Fed. Std. 595.



Model RFP 24–3

Model RFP 24–2

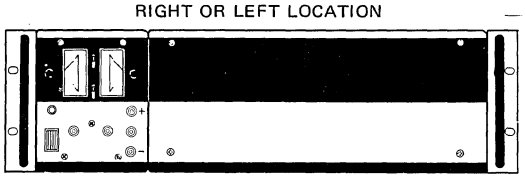
Model RFP 24–1

Model RAP 24–2J

Model RAP 24–1J

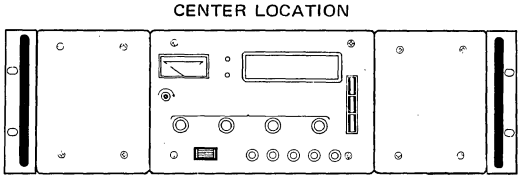
RA 24 RACK SYSTEM

RIGHT OR LEFT LOCATION



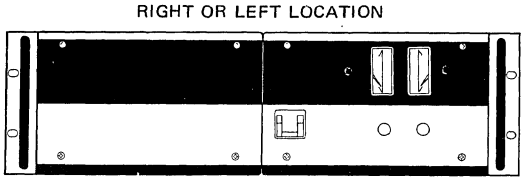
JQE 6–10M RFP 24–3

CENTER LOCATION



RFP 24–1 PVS 100–1M RFP 24–1

RIGHT OR LEFT LOCATION



RFP 24–2 CPS 6–22M

THE RA 24 WILL HOUSE ¼ & ½ RACK SIZED MODELS IN THE FOLLOWING GROUPS:

ABC*, BOP, CDT, CPS, DPD, DPR, FG*, JQE, NTC, OPS 20, OPS (Hybrid) & PVS

MODEL	DESCRIPTION	DIMENSIONS H	W	D	PRICE	SHIP. WGT. (LBS.)
RA–24	Rack Adapter for (2) ½ or (4) ¼ Rack Models	5 7/32"	19"	17 7/8"	$23.00	10
RAP 24–1	Adapter for unmetered ¼ Rack CPS Models	5 7/32"	4 5/32"	—	7.00	½
RAP 24–2	Adapter for unmetered ½ Rack CPS Models	5 7/32"	8 11/32"	—	7.00	½
RAP 24–1J	Adapter for unmetered ¼ Rack JQE Models	5 7/32"	4 5/32"	—	7.00	½
RAP 24–2B	Adapter for unmetered ½ Rack BOP Models	5 7/32"	8 11/32"		7.00	½
RAP 24–2J	Adapter for unmetered ½ Rack JQE Models	5 7/32"	8 11/32"	—	7.00	½
*RAP 24–45	Rack Adapter for ABC, FG	—	—	—	12.00	½
RFP 24–1	¼ Filler Panel for RA–24	5 7/32"	4 5/32"	1 5/8	7.00	½
RFP 24–2	½ Filler Panel for RA–24	5 7/32"	8 11/32"	1 5/8	7.00	½
RFP 24–3	¾ Filler Panel for RA–24	5 7/32"	11 3/16"	1 5/8	7.00	½

½ & ¼ RACK POWER SUPPLIES AND PROGRAMMERS CAN BE MOUNTED TOGETHER OR WITH FILLER PANELS IN RA–24.

Data and prices subject to change without notice. *All terms used in the specifications are defined in the Kepco Glossary.*

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KEPCO
HARDWARE AND MOUNTING EQUIPMENT

6-in-a-RACK MOUNTING SYSTEM

The Kepco 6-in-a-rack concept is designed to solve the problem of multiple output, multiple function power supplies. There are eighteen different models available in three styles (PCX—voltage regulators, CC—current regulators and OPS—operational power supplies). Each style is available in the same six volt/ampere combinations: 0—7V @ 2A, 0—15V @ 1.5A, 0—21V @ 1A, 0—40V @ 0.5A, 0—72V @ 0.3A and 0—100V @ 0.2A. Additionally, the PCX models (voltage regulators) and the OPS models (operational power supplies) are made in two mechanical formats. They are available as modules with or without cases or can be ordered in a "laboratory format" with operating panels complete with controls, terminals and (for the PCX) meters. The CC models (current controllers) are available only in the laboratory format with a 10-turn current control, two meters, on-off switch, pilot light, etc. If you want a modular current controller, you would use the OPS module—with current feedback.

The models in laboratory format are identified by a special suffix. For the voltage regulators, the suffix is "MAT," and the model number would read (for example) PCX 21-1MAT. For the operational power supplies, the suffix is "TA," and the model number would read OPS 21—1BTA. The letter "B" in that suffix is part of the regular (module-style) model number, OPS 21—1B.

Four different mounting assemblies are offered for the three laboratory-style groups. Case CA—3 mounts a single unit with built-in printed circuit-to-barrier strip interface, line cord, handle and feet for bench mounting.

Case CA—4 mounts any two units, identical or dissimilar with built-in printed circuit-to-barrier strip interfaces for both models. It contains a single line cord, handle and bench mounting feet.

Case CA—5 mounts any three units, mixed or matched. It contains three printed circuit-to-barrier strip interfaces, line cord, handle and feet.

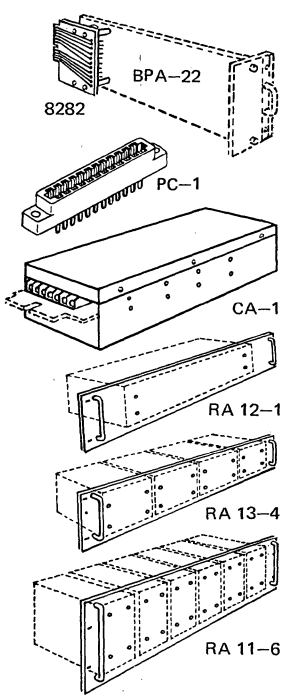
RA 22—6 is a 19" wide housing which fits in 5¼" of standard rack space and accepts any six units. RA 22—6 does not include any PC-to-barrier strip interfaces. Order these separately as Model PC—2. You'll want one Model PC—2 for each unit mounted in the RA 22—6. A line cord is supplied which must be bussed to each active PC—2.

In all of these housings, the power supplies mount on rails so that they will slide in and out freely. A set of coding pins are provided so that you may uniquely encode each slot for a particular supply.

The modular style of the PCX and the OPS models as well as Kepco's PAX model can be plugged into the various housings by mounting an uncased module onto a Model BPA—22 slide adapter.

Various filler panels are available to close off unused slots in any of the housings.

A simpler rack mounting adapter is available for the cased modules: PCX, OPS and the Kepco PAX models. These are Models RA 12—1 (single), RA 13—4 (4 units) and RA 11—6 (6 units). Mount the cased model by machine screws to these adapters and make input-output connection by means of a PC connector Model PC—1.



HARDWARE FOR PLUG-IN MODELS OPS-BTA, PCX-MAT AND CC POWER SUPPLIES.
OPS-B, PAX and PCX models can also be mounted using BPA—22 Adapter.

MODEL	DESCRIPTION	SIZE	PRICE	SHIP. WGT. (LBS.)
RA 22—6	Six-slot rack housing w/o plug boards*	5 7/32" H x 19" W x 16 3/8" D	$35.00	11
BPA—22	Blank panel assembly w/slide plate	5 7/32" H x 2 25/32" W x 14 3/8" D	12.00	2
RFP 22—1	Single filler panel	5 7/32" H x 2 25/32" W — —	7.00	1/2
RFP 22—2	Double filler panel	5 7/32" H x 5 5/16" W — —	7.00	1/2
RFP 22—3	Triple filler panel	5 7/32" H x 8 3/8" W — —	7.00	1/2
CA—3	Single-slot housing w/plug board	5 7/32" H x 2 25/32" W x 16" D	22.00	6
CA—4	Double-slot housing w/plug board	5 7/32" H x 5 5/16" W x 16" D	33.00	7
CA—5	Triple-slot housing w/plug board	5 7/32" H x 8 3/8" W x 16" D	43.00	8
PC—2	Plug-in adapter*	5 7/32" H x 2 21/32" W — —	10.00	1
8282	Plug-in Kit for BPA—22	— — — —	7.00	1/2

*For plug-in convenience in the RA 22—6, use (1) PC—2 per slot.

CHASSIS MOUNTING TYPES OPS-B, PAX, PCX MODELS CAN BE ENCASED WITH CASE CA—1, FITTED WITH PLUG PC—1 FOR QUICK-DISCONNECT AND RACK MOUNTED IF DESIRED.

CA—1	Chassis mounting case (single)	2 11/16" H x 4 1/8" W x 13 3/16" D	$12.00	2
PC—1	Connector	— — — —	7.00	1/2
RA 12—1	1 cased unit Rack Adapter	3 15/32" H x 19" W — —	12.00	3
RA 13—4	4 cased unit Rack Adapter	3 15/32" H x 19" W — —	12.00	3
RA 11—6	6 cased unit Rack Adapter	5 7/32" H x 19" W — —	12.00	3

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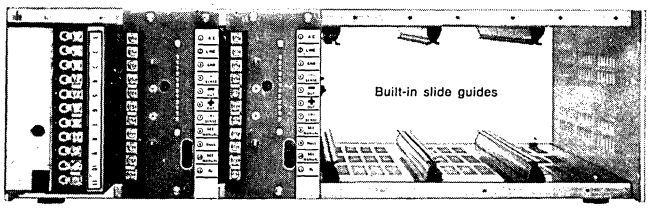
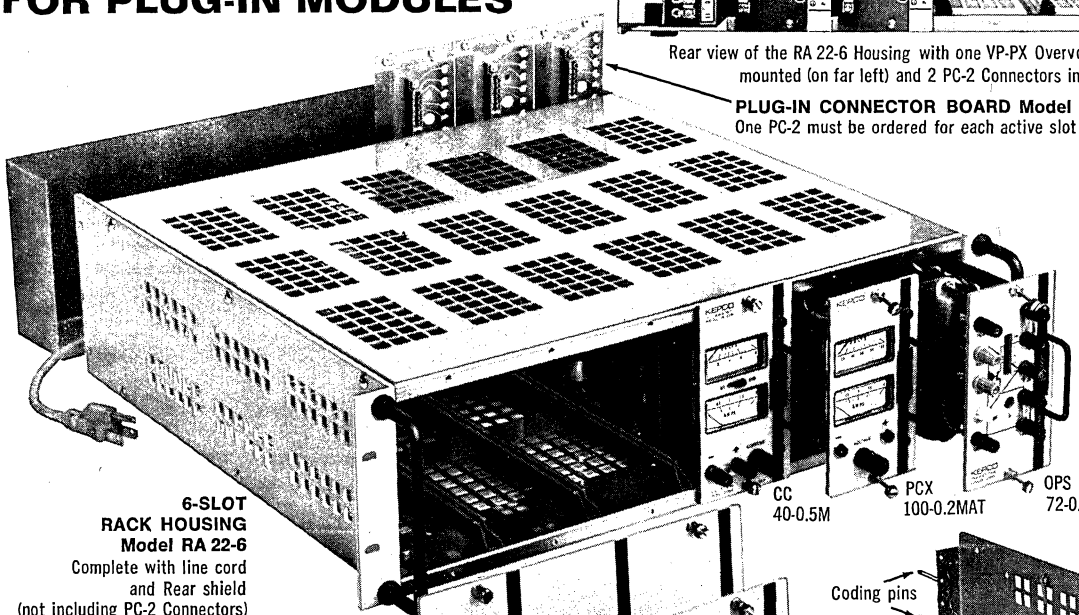
KEPCO
ENCLOSURES AND HARDWARE SYSTEMS FOR PLUG-IN MODULES



Rear view of the RA 22-6 Housing with one VP-PX Overvoltage Protector mounted (on far left) and 2 PC-2 Connectors installed

PLUG-IN CONNECTOR BOARD Model PC-2
One PC-2 must be ordered for each active slot in the RA 22-6.

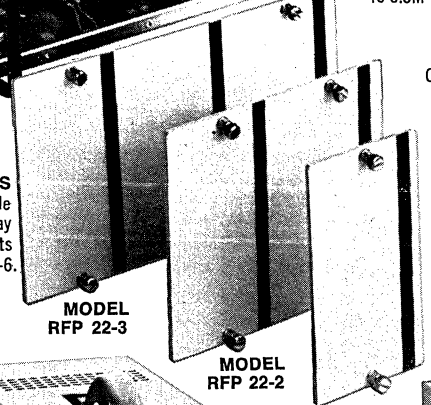


6-SLOT RACK HOUSING Model RA 22-6
Complete with line cord and Rear shield (not including PC-2 Connectors)

CC 40-0.5M

PCX 100-0.2MAT

OPS 72-0.3BTA

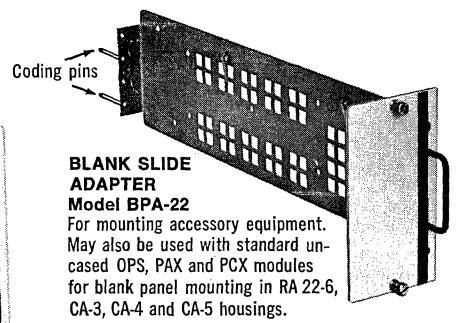


FILLER PANELS
(supplied without slide assembly and handle), may be used to fill unused slots in CA-3, CA-4, CA-5 and RA 22-6.

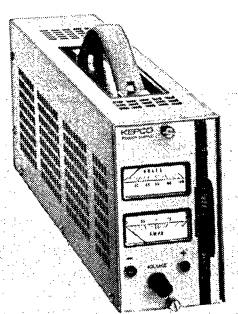
MODEL RFP 22-3

MODEL RFP 22-2

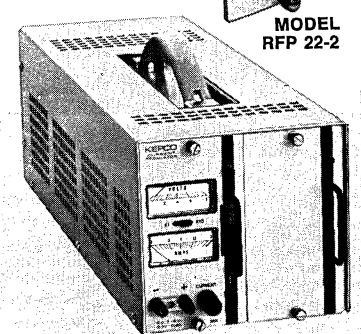
MODEL RFP 22-1



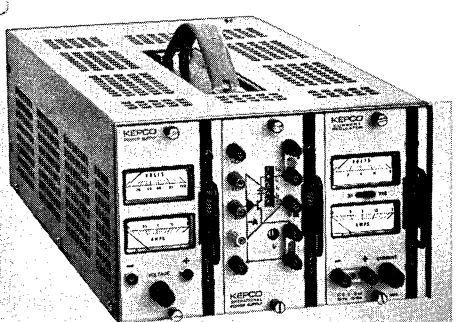
BLANK SLIDE ADAPTER Model BPA-22
For mounting accessory equipment. May also be used with standard uncased OPS, PAX and PCX modules for blank panel mounting in RA 22-6, CA-3, CA-4 and CA-5 housings.



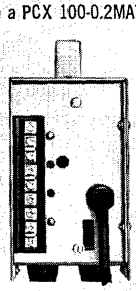
SINGLE UNIT HOUSING Model CA-3
Supplied complete with a built-in PC-2 connector. (shown with a PCX 100-0.2MAT plugged-in)



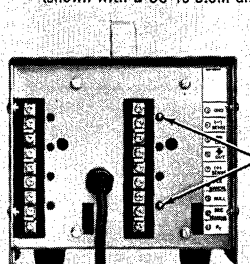
DOUBLE UNIT HOUSING Model CA-4
Supplied complete with a built-in dual PC-2 connector. (shown with a CC 40-0.5M and a BPA-22 plugged-in)



TRIPLE UNIT HOUSING Model CA-5
Supplied complete with a triple PC-2 connector.



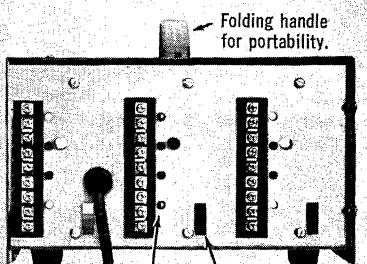
Typical rear view of CA-3, showing access terminals and connector.



Typical rear view of CA-4, showing integral connector (Double PC-2) supplied.

All plug-in models and the BPA-22 are supplied with two coding pins that can be arranged in 6 different patterns to key the housing slots.

Folding handle for portability.



Typical rear view of CA-5, showing coding pins, connectors and line cord.

Slot provides access to internal adjustments in mounted supplies.

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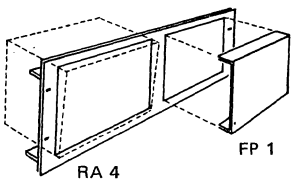
KEPCO

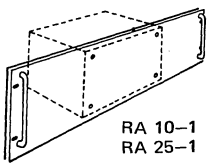
RACK ADAPTERS

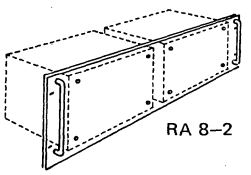
Adapt bench style, modular and half-rack Power Supplies to the standard 19" wide equipment rack or cabinet. Panels and Rack Adapters are finished light gray Color 26440 per Fed. Std. 595.

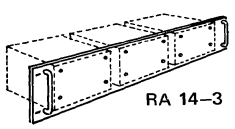


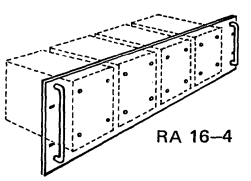
RACK ADAPTERS for ABC and FG–100

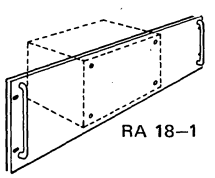
MODEL	FOR USE WITH	DIMENSIONS H	W	D	PRICE	SHIP. WGT. (LBS.)
RA 4	Above Listed Models	5 7/32"	19"	—	$18.00	4
RA 5	Above Listed Models	5 7/32"	19"	—	18.00	4
FP 1	Filler Panel for RA 4	4 1/4"	8 5/32"	—	6.00	1/2
RA 29–1	Rack Adapter for DPK-1	5 7/32"	19"	—	12.00	3

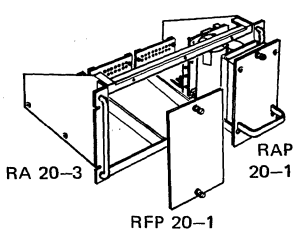


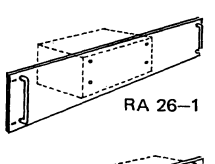


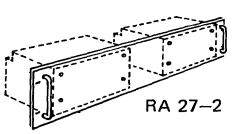












BKF II and PRM Size "A" — 180 Series

CA–200	Case	6 15/16"	5"	10 7/16"	12.00	4
RA 8–2	2 Unit Rack Adapter	5 7/32"	19"	—	12.00	4
RA 9–3	3 Unit Rack Adapter	6 31/32"	19"	—	12.00	4
RA 10–1	1 PRM Unit Adapter	5 7/32"	19"	—	12.00	4
RA 25–1	1 BKF II Unit Adapter	5 7/32"	19"	—	12.00	4

PRM Size "B" — 120 Series and Size "D" — 60 Series

RA 14–3	3 Unit Rack Adapter	3 15/32"	19"	—	12.00	3
RA 15–1	1 Size"B"Unit Adapter	3 15/32"	19"	—	12.00	3
RA 16–4	4 Unit Rack Adapter	5 7/32"	19"	—	12.00	3
RA 17–5	5 Unit Rack Adapter	5 7/32"	19"	—	12.00	3
RA 30–1	1 Size"D"Unit Adapter	3 15/32"	19"	—	12.00	3

PRM Size "C" — Dual Output and Extra-Filtered

CA–300	Case	6 15/16"	5"	14 7/16"	12.00	4
RA 8–2	2 Unit Rack Adapter	5 7/32"	19"	—	12.00	3
RA 9–3	3 Unit Rack Adapter	6 31/32"	19"	—	12.00	3
RA 18–1	1 Unit Rack Adapter for Extra-Filtered	5 7/32"	19"	—	12.00	3
RA 31–1	1 Unit Rack Adapter for Dual Output	5 7/32"	19"	—	12.00	3

PLUG-IN CABINETS for PRM Size "A" & "C"

RA 20–3	3 Unit Housing	8 23/32"	19"	18"	107.00	12
RAP 20–1	1 Unit Panel Adapter	8 23/32"	5 1/2"	—	7.00	1/2
RFP 20–1	Rack Filler Panel	8 23/32"	5 1/2"	—	7.00	1/2

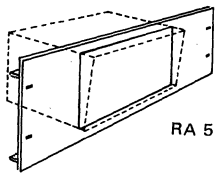
KG GROUP

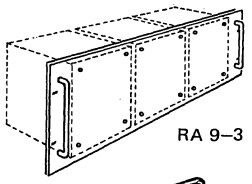
CA–2	Single Unit Housing	5 1/2"	2 3/16"	14"	18.00	2
RA 19–8	Multi Unit Housing (8)	5 1/4"	19"	14"	85.00	11
RFP 19–1	Single filler panel	5 7/32"	2 3/16"	—	7.00	1/2
RFP 19–2	Double filler panel	5 7/32"	4 3/16"	—	7.00	1/2
RFP 19–3	Triple filler panel	5 7/32"	6 5/16"	—	7.00	1/2

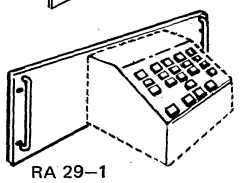
BKF I, CCP, DTM and PAT GROUPS

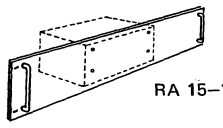
RA 26–1	1 Unit Rack Adapter	3 15/32"	19"	—	12.00	3
RA 27–2	2 Unit Rack Adapter	3 15/32"	19"	—	12.00	3
RA 28–4	4 Unit Rack Adapter	6 31/32"	19"	—	12.00	3

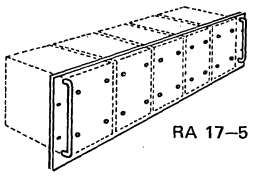
PANEL MOUNTING HOLES ARE PRE-DRILLED IN STANDARD E.I.A. PATTERN

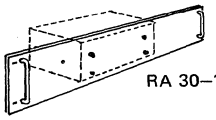


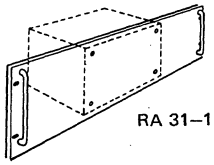


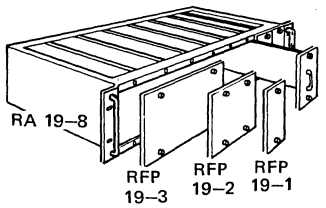


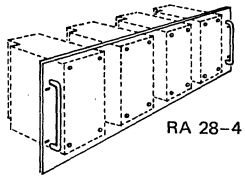












Data and prices subject to change without notice. *All terms used in the specifications are defined in the Kepco Glossary.*

KEPCO, INC. • 131-38 SANFORD AVENUE • FLUSHING, N.Y. 11352 • (212) 461-7000 • TWX #710-582-2631 • Telex: 12-6055 • Cable: KEPCOPOWER NEWYORK

KEPCO POWER SUPPLY DIMENSIONS

DIMENSIONS FOR EACH KEPCO POWER SUPPLY GROUP

The dimensions listed on this page are overall outline dimensions, except depth, which is given as the measurement behind panel, ie: clearance required. Dimensions do not include allowance for cables or connections. Outline drawings for each group of power supplies are available upon request.

ABC (Transistor) Group **Page 756**

4¼"H x 8$\frac{5}{32}$"W x 9⅝"D for Models ABC 7.5-2M, ABC 15-1M, ABC 40-0.5M and ABC 100-0.2M; 4¼"H x 8$\frac{5}{32}$"W x 5⅝"D for Models ABC 2-1M, ABC 10-0.75M, ABC 18-0.5M and ABC 30-0.3M.

ABC (Hybrid) Group **Page 750**

4¼"H x 8$\frac{5}{32}$"W x 9⅝"D for all models except 13⅜"D for Model ABC 2500M.

BHK Group **Page 751**

5$\frac{7}{32}$"H x 19"W x 16⅜"D (behind panel)

BKF Group I **Page 738**

3$\frac{15}{32}$"H x 6⅜"W x 4$\frac{15}{16}$"D

BKF Group II **Page 738**

Cased: 6$\frac{15}{16}$"H x 5"W x 11$\frac{3}{16}$"D
Uncased: 6¾"H x 4¾"W x 10$\frac{15}{16}$"D

BOP Group **Page 747**

Metered Models:
Half-Rack:
5$\frac{7}{32}$"H x 8$\frac{11}{32}$"W x 13⅛"D. (Model BOP 36–1.5M)
5$\frac{7}{32}$"H x 8$\frac{11}{32}$"W x 17⅞"D. (Model BOP 36–5M)
Full-Rack:
5$\frac{7}{32}$"H x 19"W x 18"D. (behind panel)
Unmetered (Modular) models:
Half-Rack:
Model BOP 36–1.5M: 5"H x 8$\frac{3}{32}$"W x 13$\frac{11}{16}$"D
Model BOP 36–5M: 5"H x 8$\frac{3}{32}$"W x 18$\frac{3}{16}$"D
Full-Rack:
5"H x 16½"W x 18"D

CC Group **Page 757**

5$\frac{7}{32}$" H x 2$\frac{25}{32}$" W x 15" D (behind panel)

CCP Group **Page 739**

3$\frac{15}{32}$"H x 6⅜"W x 4$\frac{15}{16}$"D

CDT Group **Page 758**

5$\frac{7}{32}$"H x 8$\frac{11}{32}$"W x 17⅜"D (behind panel)

CPS Group **Page 759**

Metered models:
¼ Rack:
5$\frac{7}{32}$" H x 4$\frac{5}{32}$" W x 17⅜" D. (behind panel).
½ Rack:
5$\frac{7}{32}$" H x 8$\frac{11}{32}$ W x 17⅜" D. (behind panel).
Full Rack:
5$\frac{7}{32}$" H x 16½" W x 18⅜" D. (behind panel).
Unmetered (modular) models:
¼ Rack: 5" H x 4$\frac{1}{32}$" W x 17⅜"D.
½ Rack: 5" H x 8$\frac{3}{32}$" W x 17⅜"D.
Full Rack: 5" H x 16½" W x 18½" D.

DTM Group **Page 740**

3$\frac{15}{32}$"H x 6⅜"W x 4$\frac{15}{16}$"D

HB Group **Page 752**

3$\frac{15}{32}$"H x 19"W x 14⅜"D (behind panel).

JQE Group **Page 754**

Metered models:
¼ Rack:
5$\frac{7}{32}$" H x 4$\frac{5}{32}$" W x 17⅜"D. (behind panel).
½ Rack:
5$\frac{7}{32}$" H x 8$\frac{11}{32}$ W x 17⅜"D. (behind panel).
Full Rack:
5$\frac{7}{32}$" H x 16½" W x 18½" D. (behind panel).
Unmetered (modular) models:
¼ Rack: 5" H x 4$\frac{1}{32}$" W x 17⅜"D.
½ Rack: 5" H x 8$\frac{3}{32}$" W x 17⅜" D.
Full Rack: 5" H x 16½" W x 18⅜" D.

KG Group **Page 760**

Panel: 2$\frac{3}{32}$" x 5$\frac{7}{32}$";
PC connector 13$\frac{19}{32}$" behind panel.

OPS-B Group **Page 748**

Uncased: 2½" H x 3$\frac{13}{16}$" W x 12$\frac{13}{16}$" D.
Cased: (Suffix C) 2$\frac{11}{16}$" H x 4⅛" W x 13$\frac{3}{16}$" D.
OPS-20: 5$\frac{7}{32}$"H x 8$\frac{11}{32}$"W x 3⅞"D. (behind panel)
OPS-BTA: 5$\frac{7}{32}$" H x 2$\frac{25}{32}$" W x 15" D.

OPS (Hybrid) Group **Page 749**

5$\frac{7}{32}$" Hx 8$\frac{11}{32}$"Wx 13⅞"D (behind panel)

PAT Group **Page 741**

3$\frac{15}{32}$"H x 6⅜"W x 4$\frac{15}{16}$"D

PAX (HS) Group **Page 742**

Uncased: 2½"H x 3$\frac{13}{16}$"W x 12$\frac{13}{16}$"D.
Cased: (Suffix C) 2$\frac{11}{16}$"H x 4⅛"W x 13$\frac{3}{16}$"D.

PCX Group **Page 743**

Uncased: 2½"H x 3$\frac{13}{16}$"W x 12$\frac{13}{16}$"D.
Cased: (Suffix C) 2$\frac{11}{16}$"H x 4⅛"W x 13$\frac{3}{16}$"D.
PCX-MAT: 5$\frac{7}{32}$"H x 2$\frac{25}{32}$" W x 15" D

PRM Group **Page 744**

Size "A": *(Cased):* 6$\frac{15}{16}$"H x 5"W x 11$\frac{3}{16}$"D
(Uncased): 6¾"H x 4¾"W x 10$\frac{15}{16}$"D
Size "B": 3$\frac{13}{32}$"H x 5"W x 13⅞"D
Size "C": *(Cased):* 6$\frac{15}{16}$"H x 5"W x 15⅜"D
(Uncased): 6¾"H x 4¾"W x 15¼"D
Size "D": 3$\frac{13}{32}$"H x 5"W x 10⅞"D

PVS Group **Page 761**

5$\frac{7}{32}$" H x 8$\frac{11}{32}$" W x 17⅞" D (behind panel).

KILOVOLT CORPORATION

HIGH VOLTAGE

POWER SUPPLIES • INSULATION TESTERS ACCESSORIES • POWER PACKS

A pioneer in high voltage techniques, KILOVOLT CORPORATION designs and manufactures a wide variety of power supplies and insulation testers and power packs ranging from 1,000 to 1,000,000 volts. These units are soundly engineered, ruggedly constructed and conservatively rated. Units are custom designed for all types of industrial processing as well as experimental laboratory work.

In addition, KILOVOLT CORPORATION can furnish anti-corona hardware devices, isolating resistors, high voltage voltmeters and high voltage spark gaps. Why not check us for all your high voltage requirements.

HIGH VOLTAGE D.C. POWER SUPPLIES FOR INDUSTRY

FEATURES

- **Reversible Polarity Output (most models)**
- **Continuously Variable Output Control**
- **Adjustable Over-Current Shut-Off**
- **Adjustable Over-Voltage Shut-off**
- **Safety Interlock on H.V. Cabinet Door**
- **Zero-Start Interlock**
- **Dual Range Voltage and Current Meter**
- **Fail-Safe Output Shorting Mechanism**
- **Circuit-Breaker Operation**
- **Functional Pilot Lamps**
- **Surge Limiting Resistor**
- **External Interlock**

OUTPUT KV	OUTPUT MA	MODEL NUMBER	OUTPUT KV	OUTPUT MA	MODEL NUMBER	OUTPUT KV	OUTPUT MA	MODEL NUMBER	OUTPUT KV	OUTPUT MA	MODEL NUMBER
0-1	500	KV1-500	0-10	30	KV10-30	0-30	500	KV30-500	0-150	500	KV150-500
0-1	1,000	KV1-1,000	0-10	50	KV10-50	0-30	1,000	KV30-1,000	0-200	5	KV200-5
0-1	3,000	KV1-3,000	0-10	100	KV10-100	0-50	50	KV50-50	0-200	10	KV200-10
0-1	5,000	KV1-5,000	0-10	250	KV10-250	0-50	100	KV50-100	0-250	2	KV250-2
0-1	15,000	KV1-15,000	0-10	500	KV10-500	0-50	300	KV50-300	0-250	5	KV250-5
0-3	200	KV3-200	0-10	1,500	KV10-1,500	0-50	1,000	KV50-1,000	0-250	10	KV250-10
0-3	1,000	KV3-1,000	0-20	10	KV20-10	0-60	10	KV60-10	0-250	25	KV250-25
0-3	2,000	KV3-2,000	0-20	50	KV20-50	0-120	5	KV120-5	0-350	2	KV350-2
0-3	5,000	KV3-5,000	0-20	150	KV20-150	0-120	10	KV120-10	0-350	5	KV350-5
0-3	10,000	KV3-10,000	0-20	300	KV20-300	0-120	30	KV120-30	0-500	2	KV500-2
0-5	100	KV5-100	0-20	800	KV20-800	0-120	100	KV120-100	0-500	20	KV500-20
0-5	500	KV5-500	0-30	20	KV30-20	0-150	5	KV150-5	0-600	2	KV600-2
0-5	1,000	KV5-1,000	0-30	50	KV30-50	0-150	10	KV150-10	0-600	5	KV600-5
0-5	2,000	KV5-2,000	0-30	100	KV30-100	0-150	30	KV150-30	0-600	20	KV600-20
0-5	3,000	KV5-3,000	0-30	200	KV30-200	0-150	100	KV150-100	0-1,000	5	KV1,000-5

ELECTRO-MECHANICAL REGULATION. The above models may be ordered with either voltage regulation, current regulation, or both by means of a servo regulating system.

SATURABLE REACTOR CONSTANT CURRENT. By use of a saturable reactor in conjunction with any of the standard models above, the output current can be held constant to within approximately 10% of the preset level for load variations from short circuit to full load and to within 3% for a half-load to full load change.

REGULATED HIGH VOLTAGE D.C. POWER SUPPLIES

Highly regulated against input line variations or changes in load, these power supplies employ fast response electronic regulation.

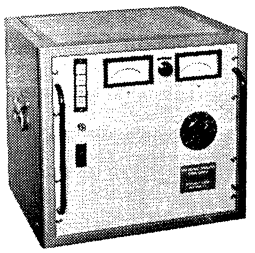
FEATURES

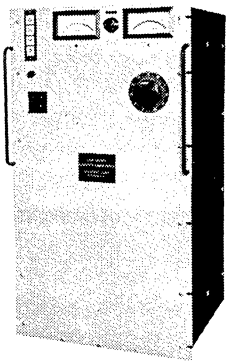
- **Continuously Variable Output**
- **Overload Protection**
- **Zero-Start Interlock**
- **Cabinet Interlock**
- **Provisions for External Interlock**
- **Reversible Polarity Output (most models)**
- **Circuit Breaker Operation**
- **Monitoring Pilot Lamps**
- **Electronically Protected 4½" Meters**

OUTPUT (MAX.) KV	OUTPUT (MAX.) MA	MODEL NUMBER	OUTPUT (MAX.) KV	OUTPUT (MAX.) MA	MODEL NUMBER
1.5	100	KVR1.5-100	10	250	KVR10-250
1.5	200	KVR1.5-200	10	500	KVR10-500
1.5	500	KVR1.5-500	10	1000	KVR10-1000
1.5	1000	KVR1.5-1000	15	7	KVR15-7
3	100	KVR3-100	15	45	KVR15-45
3	200	KVR3-200	15	150	KVR15-150
3	500	KVR3-500	15	250	KVR15-250
3	1000	KVR3-1000	15	750	KVR15-750
7	100	KVR7-100	20	10	KVR20-10
7	250	KVR7-250	20	50	KVR20-50
7	500	KVR7-500	20	150	KVR20-150
7.5	1000	KVR7.5-1000	20	500	KVR20-500
10	50	KVR10-50	20	750	KVR20-750
10	100	KVR10-100	24	10	KVR24-10

REGULATED HIGH VOLTAGE D.C. POWER SUPPLIES (cont'd.)

OUTPUT (MAX.) KV	MA	MODEL NUMBER	OUTPUT (MAX.) KV	MA	MODEL NUMBER
24	45	KVR24-45	50	100	KVR50-100
24	200	KVR24-200	75	5	KVR75-5
24	500	KVR24-500	75	10	KVR75-10
24	1000	KVR24-1000	75	50	KVR75-50
30	1	KVR30-1	75	100	KVR75-100
30	10	KVR30-10	100	5	KVR100-5
30	45	KVR30-45	100	25	KVR100-25
30	100	KVR30-100	150	5	KVR150-5
30	200	KVR30-200	150	15	KVR150-15
30	400	KVR30-400	200	5	KVR200-5
30	800	KVR30-800	200	12	KVR200-12
50	5	KVR50-5	250	5	KVR250-5
50	15	KVR50-15	250	10	KVR250-10
50	50	KVR50-50			





CURRENT REGULATION. Voltage regulated power supplies can be provided with current regulation capability on special order.

HIGH-VOLTAGE D.C. INSULATION TESTERS

FEATURES

- Reversible Polarity Output (most models)
- Continuously Variable Output Control with Vernier Adjust
- Adjustable Overcurrent and Overvoltage Shutoffs
- Safety Interlock
- Provision for External Interlock
- Zero-Start Interlock
- Triple Range Current Meters
- Triple Range Voltage Meters
- Fail-Safe Output Shorting Mechanism
- Meters Electronically Protected
- Functional Pilot Lamps
- Selenium Rectifiers
- Surge Limiting Resistor
- Circuit Breaker Operation

OUTPUT KV	MA	MODEL NO.	OUTPUT KV	MA	MODEL NO.
0-30	5	DC 30-5	0-250	5	DC 250-5
0-60	5	DC 60-5	0-350	5	DC 350-5
0-120	5	DC 120-5	0-600	5	DC 600-5
0-150	5	DC 150-5	0-1,000	5	DC 1,000-5

HIGH VOLTAGE A.C. INSULATION TESTERS

for Dielectric Testing under ASTM, MIL and Federal Specs.

FEATURES

• Motor-Driven output control with adjustable speeds permits selection of proper rate-of-rise for various specification testing. • Plexiglas, Safety-Interlocked Access Door • 4½" Memory-type Voltage Meter • Functional Pilot Lamps • Dual Range Circuit Breaker Operation • Plug-in Test Jigs available, most models.

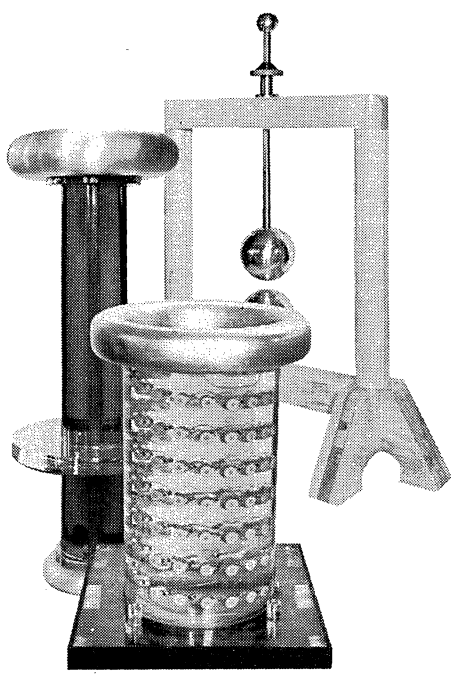
OUTPUT KV	KVA	MODEL NO.
0-15	5	AC 15-5
0-25	2.5	AC 25-2.5
0-25	5	AC 25-5
0-60	2.5	AC 60-2.5
0-100	5	AC 100-5

HIGH VOLTAGE A.C./D.C. INSULATION TESTERS

FEATURES

• Reversible Polarity D.C. Output (most models) • Continuously Variable Voltage Output Control • Adjustable D.C. Over-Current Shut-Off • Zero-Start Interlock • Safety Interlock on High Voltage Cabinet Door • Provision for External Interlock • Electronically-Protected Meters • Fail-Safe Output Shorting Mechanism • Functional Pilot Lamps • Circuit-Breaker Operation • Surge-Limiting Resistor.

OUTPUT KV Peak AC	KV Peak DC	MA AC	MA DC	MODEL NO.
15	30	20	5	DAC 15/30-20-5
30	60	20	5	DAC 30/60-20/5
75	150	20	5	DAC 75/150-20/5
125	250	20	5	DAC125/250-20/5



HIGH VOLTAGE D.C. POWER PACKS

These units are high voltage sections of standard power supplies minus meters and controls and contain the basic components described for standard power supplies — filter system, fail-safe mechanism, surge resistor, meter multiplier, primary gaps, etc.

HIGH VOLTAGE HARDWARE AND ACCESSORIES

MULTIPLIERS AND DIVIDERS. High voltage resistance strings, accurate to 0.15% or better with division ratios which may be specified. Stability is 25 PPM/°C; current drain 1 ma. Accuracy traceable to NBS standards as an option.

ELECTRONIC CROWBAR designed to protect Klystron or other sensitive loads from damage by discharge of power supply energy can be manufactured into your custom-built power supply or provided as separate devices. A typical unit has a response time of 3-5 microseconds and is capable of discharging five microfarads in approximately one millisecond at 20 KV.

CALIBRATED SPARK GAPS provided with micrometer calibration and may be used for determining crest voltage.

HIGH VOLTAGE OUTPUT BUSHING. Oil filled and terminated with anti-corona toroids, these devices are designed for oil-to-air outlet of very high voltages; available in two ratings, 300 and 600 KV D.C.

Call or write for a copy of our latest catalog.

KILOVOLT CORPORATION

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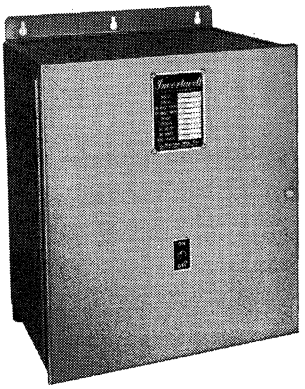
LA MARCHE

INVERTERS POWER SUPPLIES



DC to AC Power Source with Regulated Sine Wave Output

DESCRIPTION

The La Marche MODEL A-51 is a completely solid state SCR inverter which provides a regulated, sine wave output for such applications as:

- Boiler Controls
- Telephone and Microwave Communications
- Burglar Alarms
- Supervisory Control Equipment
- Data Processing and Telemetering Equipment
- Nuclear and Missile Installations
- P.A. Systems
- Fire Alarms

SPECIFICATIONS

AC OUTPUT VOLTAGE .....120 Volts Nominal
LINE REGULATION .....±1% for ±15% DC Change
LOAD REGULATION .....±2% No Load to Full Load
FREQUENCY .....60 Cycle Nominal
FREQUENCY STABILITY .....±1% for Load, Input Voltage and Temperature Variations
WAVE SHAPE .....Sine Wave
DISTORTION .....Approximately 7%
OVERALL EFFICIENCY .....Approximately 65%
AMBIENT TEMPERATURE .....−20° to 60°C (0° to 140°F)

MODEL A-51-120 VOLT A.C. — 60 HZ SINE WAVE OUTPUT

Model No.	D.C. Input Voltage volts	D.C. Current Full Load amps	D.C. Current No Load amps	Continuous A.C. Current Load Rating V.A.	Continuous A.C. Current Load Rating Continuous amps	Price
A51-250-24V	24V	20.0	5.0	250	2.1	$ 990.
A51-250-48V	48V	9.0	3.0	250	2.1	1040.
A51-250-120V	120V	4.0	1.5	250	2.1	1100.
A51-500-24V	24V	40.0	10.5	500	4.2	1240.
A51-500-48V	48V	18.0	6.0	500	4.2	1450.
A51-500-120V	120V	8.0	3.0	500	4.2	1725.
A51-1K-24V	24V	80.0	18.0	1K	8.3	1850.
A51-1K-48V	48V	36.0	10.0	1K	8.3	1950.
A51-1K-120V	120V	15.0	5.5	1K	8.3	2100.
A51-2K-48V	48V	70.0	11.0	2K	16.6	2490.
A51-2K-120V	120V	28.0	6.0	2K	16.6	2740.
A51-3K-120V	120V	45.0	6.5	3K	24.9	3090.
A51-5K-120V	120V	75.0	7.0	5K	41.9	4400.

INVERTER ACCESSORIES

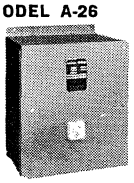
1. A.C. or D.C. Voltmeter $25.
2. A.C. or D.C. Ammeter $25.
3. Frequency meter $95.
4. A.C. Power Failure Relay $25.
5. Low D.C. Voltage Alarm Relay $38.
6. D.C. Circuit Breaker $35.
7. A.C. Circuit Breaker $25.
8. Ground Detection Relay $50.
9. Automatic Demand Panel $95.

ORDERING SPECIFICATIONS

1. La Marche model number.
2. Number and type of battery cells.
3. Ampere hour capacity of batteries.
4. AC loads.
5. Application.
6. Type and capacity of charging equipment.
7. Type of mounting, wall or rack mount.
8. Optional accessories.

FILTERED D.C. POWER SUPPLIES

MODEL A-26



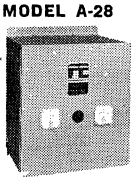
DESIGN FEATURES

1. Automatic in operation and self-regulating.
2. No moving parts. Nothing to arc or wear out.
3. No external controls. Cannot be tampered with.

The La Marche A-26 power supply features automatic load regulation and semi-automatic current limiting. The model A-26 is filtered to 10% ripple. There are no controls to be set for different applications because the amount of loading determines the current output.

The La Marche model A-26, like all La Marche units, is a solid state device employing a balanced isolation power transformer, a magnetic amplifier and sealed silicon diode rectifiers. These power supplies have no contacts, relays, switches, fans, tubes, time clocks or other moving parts.

MODEL A-28



DESIGN FEATURES

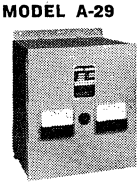
- Silicon diode rectifiers.
- Current limiting circuit.
- Automatic A.C. voltage compensation.
- D.C. voltage regulation.
- Output ammeter and voltmeter.

The model (A-28) is a solid state, fully automatic, constant voltage D.C. power supply designed for all regulated applications.

Standard features include automatic A.C. line compensation, D.C. voltage regulation and current limiting. The La Marche transistor controlled magnetic amplifier circuit is designed to automatically provide a D.C. output regulation of ±5" from no load to full rated output. Accurate output regulation is maintained with A.C. line variations of ±10%. The A-28 is offered in a wide range of sizes and voltages.

The reliability of the La Marche circuit has led to its selection for critical communication and control systems, nuclear powered ships, missile firing stations, and utility power standby systems.

MODEL A-29



ORDER SPECIFICATIONS

1. La Marche model number
2. A.C. input voltage, cycles, phase
3. Intermittent D.C. loads and duration
4. Continuous D.C. load
5. Amount of filtering — measured how?

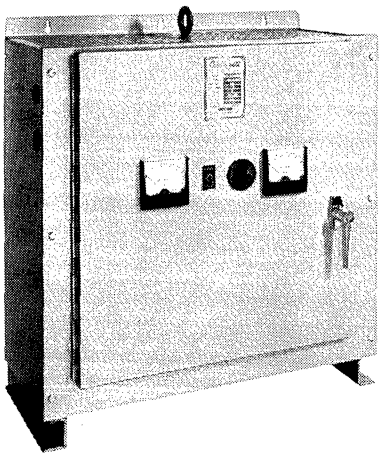
The model (A-29) is a solid state, fully automatic, constant voltage D.C. power supply designed for all regulated applications.

Standard features include automatic A.C. line compensation, D.C. voltage regulation and current limiting. The La Marche transistor controlled magnetic amplifier circuit is designed to automatically provide a D.C. output regulation of ±1% from no load to full rated output. Accurate outputs regulation is maintained with A.C. line variations of ±10%. The A-29 is offered in a wide range of sizes and voltages.

The reliability of the La Marche circuit has led to its selection for critical communication and control systems, nuclear powered ships, missile firing stations, and utility power standby systems.

D.C. AMPS	12 VOLT A-26	12 VOLT A-28	12 VOLT A-29	24 VOLT A-26	24 VOLT A-28	24 VOLT A-29	32-36 VOLT A-26	32-36 VOLT A-28	32-36 VOLT A-29	48 VOLT A-26	48 VOLT A-28	48 VOLT A-29	130 VOLT A-26	130 VOLT A-28	130 VOLT A-29	260 VOLT A-26	260 VOLT A-28	260 VOLT A-29
3	$ 85.	$130.	$260.	$ 92.	$140.	$260.	—	—	—	—	$145.	$295.	—	—	$475.	$480.	$550.	$685.
6	94.	145.	290.	105.	156.	290.	—	—	—	$247.	350.	450.	$325.	425.	640.	655.	740.	840.
10	114.	177.	350.	150.	232.	430.	$160.	$246.	$490.	305.	425.	510.	395.	564.	850.	790.	850.	970.
15	130.	197.	425.	172.	265.	490.	—	—	—	235.	485.	720.	520.	650.	980.	970.	1175.	1580.
20	153.	226.	510.	193.	298.	510.	250.	318.	640.	350.	590.	815.	655.	780.	1185.	1180.	1490.	1870.
25	—	—	—	—	—	—	—	—	—	—	—	—	760.	895.	1250.	1390.	1690.	2040.
30	182.	265.	530.	224.	347.	530.	280.	354.	715.	420.	612.	930.	820.	1146.	1565.	1660.	1950.	2250.
35	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1910.	2200.	2590.
40	205.	298.	745.	250.	384.	745.	340.	450.	990.	545.	781.	1020.	1120.	1330.	1750.	2100.	2450.	2860.
50	263.	375.	890.	295.	460.	890.	460.	612.	1360.	570.	820.	1260.	1260.	1550.	1970.	2350.	2950.	3340.
60	295.	425.	1050.	360.	510.	910.	540.	672.	1500.	710.	948.	1425.	1360.	2052.	2580.	2650.	3564.	3850.
75	326.	468.	1140.	455.	568.	1140.	655.	900.	2000.	765.	996.	1550.	1670.	2220.	3160.	—	—	—
85	—	—	—	—	—	—	—	—	—	—	—	—	1800.	2340.	3475.	—	—	—
100	394.	568.	1330.	582.	858.	1330.	—	—	—	860.	1140.	1750.	1990.	2460.	3840.	—	—	—
125	510.	702.	—	650.	995.	1540.	—	—	—	950.	1360.	2080.	—	—	—	—	—	—
130	626.	860.	—	695.	1080.	1660.	750.	960.	2150.	—	—	—	2400.	2868.	4550.	—	—	—
150	685.	950.	—	780.	1140.	1750.	820.	1194.	2650.	1050.	1420.	2180.	—	—	—	—	—	—
160	784.	1096.	—	860.	1252.	1790.	—	—	—	1110.	1548.	2250.	—	—	—	—	—	—
175	—	—	—	—	—	—	—	—	—	1190.	1620.	2490.	—	—	—	—	—	—
200	—	—	—	935.	1374.	1860.	1130.	1612.	3580.	1275.	1780.	2750.	—	—	—	—	—	—
250	—	—	—	—	1660.	2250.	—	—	—	1750.	2250.	3450.	—	—	—	—	—	—
300	—	—	—	—	2010.	2840.	—	—	—	2090.	2580.	3990.	—	—	—	—	—	—
400	—	—	—	—	2800.	3800.	—	—	—	2850.	3350.	5200.	—	—	—	—	—	—

102 BRADROCK DRIVE • DES PLAINES, ILLINOIS 60018 • PHONE (312) 299-1193



FLOAT BATTERY CHARGERS

LA MARCHE

GENERAL DESCRIPTION

The model A-11 Float Battery Charger is a completely automatic, solid state, constant voltage device having:

A.C. VOLTAGE COMPENSATION — D.C. VOLTAGE REGULATION — CURRENT LIMITING

The model (A-11) charger is designed and built to carry continuous and intermittent loads up to its maximum rated output. The A-11 is current limited at 140% of rated output. Each unit is designed and built to charge a specific type of battery containing a specific number of cells.

The La Marche Transistor Controlled magnetic-amplifier circuits provide continuous taper charging. Maintains rated output voltage within ±1% from no load to full load with A.C. input variations of ±10%. Silicon diodes are used for rectification.

The model A-11 charger floats lead-acid batteries at 2.17 volts per cell and by means of a front panel switch equalizes at 2.33 volts per cell. Both float and equalize voltages are adjustable to meet battery manufacturers recommendations. This type of charging imparts the longest battery life and is the accepted method for charging batteries used in standby service.

DESIGN FEATURES

1. Quality parts throughout. Silicon diode rectifiers and transistor magnetic amplifiers used exclusively.
2. A.C. power loss relay, output voltmeter/ammeter and fused input-output are standard on all models.
3. Eighty sizes available in five input voltages.
4. Adjustable equalize and float levels; float/equalize controls located on face panel for easy operation.
5. Design and operation tested and approved by battery manufacturers, utilities, railroads and military.

SPECIFICATIONS

STANDARD ACCESSORIES SUPPLIED:

1. Potentiometer for desired float and equalize charge voltage adjustments.
2. Quality D.C. ammeter and voltmeter with 50 millivolt movement, 2% accuracy.
3. Power failure relay with terminals for connections to a remote alarm system.
4. Fused A.C. input and D.C. output for complete protection.
5. Convenient switch to transfer from float charge to high rate equalize charge.
6. Internal terminal board for easy connection of A.C. input, D.C. output and power failure equipment.

OPTIONAL ACCESSORIES:

1. A.C. circuit breaker replacing fuse.
2. 0-24 hour equalizing timer.
3. Ground detection switch.
4. Low D.C. voltage alarm relay.
5. High D.C. voltage alarm relay.
6. Special paint.
7. Export packing add 5%.
8. Individual float/equalize adjustments, specify model A-11B.
9. Filtered units available, see model A-12.
10. Dual fusing for A.C. input and D.C. output replacing single input and output fusing.
11. Dual voltage A.C. input.
12. 1% taut band meters replacing 2% meters.
13. Relay rack mounting.

L Marche Model No. and Amperage Output	6 and 12 Volt Systems†	24 Volt Systems†	32 and 36 Volt Systems†	48 Volt Systems†	130 Volt Systems†	260 Volt Systems†
	Price	Price	Price	Price	Price	Price
A-11- 3-	$230.§	$240.§	$250.§	$290.§	$395.§	$497.§
A-11- 6-	240.§	290.§	310.§	410.§	496.§	620.§
A-11- 10-	275.§	395.§	390.§	414.§	620.§	890.§
A-11- 15-	300.§	405.§	460.§	580.§	740.§	1190.§
A-11- 20-	398.§	460.§	595.§	645.§	845.§	1540.*
A-11- 25-	—	—	—	695.§	970.§	1715.§*
A-11- 30-	480.§	525.§	730.§	780.§	1190.§	1910.§*
A-11- 35-	—	—	—	—	1300.§	2080.§*
A-11- 40-	560.§	660.§	795.§	890.§	1449.§*	2140.§*
A-11- 50-	698.§	740.§	980.§	1190.§*	1750.§*	2745.§*
A-11- 60-	890.§	910.§	1175.§	1310.§*	1950.*	3080.*
A-11- 75-	980.§	995.§	1250.§*	1495.§*	2175.§*	3290.*
A-11-100-	1100.*	1160.*	1350.§*	1655.§*	2900.§*	4175.*
A-11-125-	—	1340.*	1550.*	1890.*	3150.§*	4970.*
A-11-150-	—	1550.*	1870.*	2140.*	3440.*	5250.*
A-11-175-	—	—	—	—	4275.*	—
A-11-200-	—	1650.*	1980.*	2615.*	4410.*	6540.*
A-11-250-	—	1980.*	2685.*	3160.*	5280.*	8450.*
A-11-300-	—	2495.*	—	3675.*	5445.*	9700.*
A-11-350-	—	—	—	—	6226.*	—
A-11-400-	—	2625.*	3750.*	3850.*	6590.*	—

NOTES:

*** A.C. INPUT**

Standard models are available in nominal A.C. line voltage of 120, 208, 240, 480 and 550, single phase, 50/60 cycle. Models marked * are available in three phase only.

§ Underwriters Listed.

† BATTERY TYPES

The model A-11 chargers are available in the listed ampere capacities and **nominal D.C. voltages** for lead-acid, nickel-cadmium, nickel-iron alkaline and other types of batteries. **Specify number and type of battery cells.**

CALL FOR COMPLETE INFORMATION ON OUR VOLTAGE SENSING RELAYS & D.C. TO D.C. CONVERTERS

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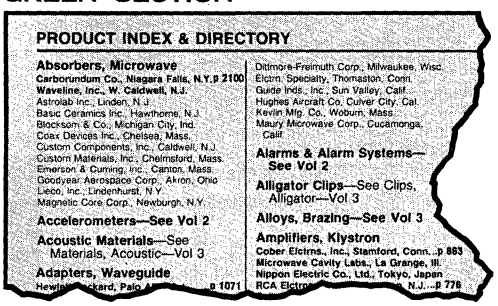
How to use eem

to find manufacturers of a specific product

GREEN SECTION


PRODUCT INDEX & DIRECTORY

Absorbers, Microwave
Carborundum Co., Niagara Falls, N.Y.p 2100
Waveline, Inc., W. Caldwell, N.J.
Astrolab Inc., Linden, N.J.
Basic Ceramics Inc., Hawthorne, N.J.
Blocksom & Co., Michigan City, Ind.
Coax Devices Inc., Chelsea, Mass.
Custom Components, Inc., Caldwell, N.J.
Custom Materials, Inc., Chelmsford, Mass.
Emerson & Cuming, Inc., Canton, Mass.
Goodyear Aerospace Corp., Akron, Ohio
Lieco, Inc., Lindenhurst, N.Y.
Magnetic Core Corp., Newburgh, N.Y.

Accelerometers—See Vol 2

Acoustic Materials—See Materials, Acoustic—Vol 3

Adapters, Waveguide
Hewlett-Packard, Palo A... p 1071
Ditmore-Freimuth Corp., Milwaukee, Wisc.
Electro Specialty, Thomaston, Conn.
Guide Inds., Inc., Sun Valley, Calif.
Hughes Aircraft Co, Culver City, Cal.
Kevlin Mfg. Co., Woburn, Mass.
Maury Microwave Corp., Cucamonga, Calif.

Alarms & Alarm Systems—See Vol 2

Alligator Clips—See Clips, Alligator—Vol 3

Alloys, Brazing—See Vol 3

Amplifiers, Klystron
Cober Elctrns., Inc., Stamford, Conn...p 863
Microwave Cavity Labs., La Grange, Ill.
Nippon Electric Co., Ltd., Tokyo, Japan
RCA Electron... N.J....p 778

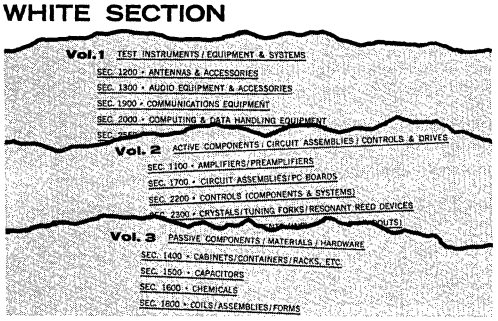
Each of the three volumes of **eem** contains a Product Index and Directory, the Green Section. This Index is a complete alphabetical listing of products. If the product you are looking for appears in the particular volume you are consulting, the green pages will provide a complete list of manufacturers who make that product. If the product is included in another volume of **eem**, the Index will provide a cross reference, directing you to the correct volume.

Boldface listings under product headings indicate that the listed manufacturer has products cataloged in **eem. Boldface** listings with page numbers indicate that this manufacturer's catalog pages include detailed data on the product indicated in the product heading.

Similar products are grouped together. For example, the many kinds of meters are listed in this manner: "Meters, Ampere," "Meters, Capacitance," "Meters, Flux" etc. To help you locate the prime product heading, there are hundreds of cross references, e.g. "Voltmeters — See Meters, Volt."

to find manufacturers' catalog information

WHITE SECTION


Vol. 1 TEST INSTRUMENTS / EQUIPMENT & SYSTEMS
SEC. 1200 • ANTENNAS & ACCESSORIES
SEC. 1300 • AUDIO EQUIPMENT & ACCESSORIES
SEC. 1900 • COMMUNICATIONS EQUIPMENT
SEC. 2000 • COMPUTING & DATA HANDLING EQUIPMENT
Vol. 2 ACTIVE COMPONENTS / CIRCUIT ASSEMBLIES / CONTROLS & DRIVES
SEC. 1100 • AMPLIFIERS/PREAMPLIFIERS
SEC. 1700 • CIRCUIT ASSEMBLIES/PC BOARDS
SEC. 2200 • CONTROLS (COMPONENTS & SYSTEMS)
SEC. 2300 • CRYSTALS/TUNING FORKS/RESONANT REED DEVICES
Vol. 3 PASSIVE COMPONENTS / MATERIALS / HARDWARE
SEC. 1400 • CABINETS/CONTAINERS/RACKS, ETC.
SEC. 1500 • CAPACITORS
SEC. 1600 • CHEMICALS
SEC. 1800 • COILS/ASSEMBLIES/FORMS

Catalog pages in **eem** are divided into three volumes based on very broad product groupings. These are:

Volume 1 — Test Instruments / Equipment and Systems

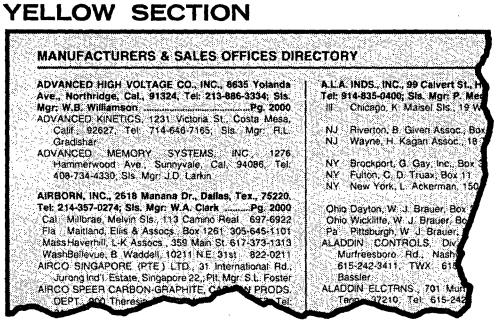
Volume 2 — Active Components / Circuit Assemblies / Controls and Drives

Volume 3 — Passive Components / Materials / Hardware

These volumes are further divided into 55 **eem** Product Sections which are assigned individually to the most appropriate volume. Within each of the 55 product sections manufacturers are arranged alphabetically, wherever possible. A complete index of all manufacturers' catalog pages is included in every volume. To locate the catalog pages of a specific manufacturer, refer to this index at the beginning of the white section in any of the three volumes. This index will provide the page numbers you require. In Volume 1, the index begins on page 302, in Volume 2 on page 1274 and in Volume 3, page 2310.

to find manufacturers' addresses, phones and sales offices

YELLOW SECTION

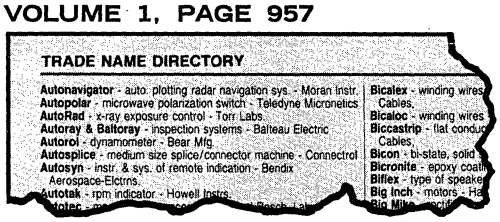

MANUFACTURERS & SALES OFFICES DIRECTORY

ADVANCED HIGH VOLTAGE CO., INC., 8635 Yolanda Ave., Northridge, Cal., 91324; Tel: 213-886-3334; Sls. Mgr: W.B. Williamson ..... Pg. 2000
ADVANCED KINETICS, 1231 Victoria St., Costa Mesa, Calif., 92627, Tel: 714-646-7165; Sls. Mgr: R.L. Gradshar
ADVANCED MEMORY SYSTEMS, INC., 1276 Hammerwood Ave., Sunnyvale, Cal. 94086, Tel: 408-734-4330, Sls. Mgr: J.D. Larkin
AIRBORN, INC., 2618 Manana Dr., Dallas, Tex., 75220, Tel: 214-357-0274; Sls. Mgr: W.A. Clark ..... Pg. 2000
Cal: Millbrae, Melvin Sls., 113 Camino Real 697-6922
Fla: Maitland, Ellis & Assocs., Box 1261 305-645-1101
Mass: Haverhill, L.K. Assocs., 359 Main St. 617-373-1313
Wash: Bellevue, B. Waddell, 10211 N.E. 31st 822-0211
AIRCO SINGAPORE (PTE) LTD., 31 International Rd., Jurong Ind'l. Estate, Singapore 22,; Plt. Mgr: S.L. Foster
AIRCO SPEER CARBON-GRAPHITE, C... PRODS. DEPT., ... Theres... Tel:
A.L.A. INDS., INC., 99 Calvert St., H... Tel: 914-835-0400; Sls. Mgr: P. Me...
Ill: Chicago, K. Maisel Sls., 19 W...
NJ: Riverton, B. Given Assoc., Box ...
NJ: Wayne, H. Kagan Assoc., 18 ...
NY: Brockport, G. Gay, Inc., Box ...
NY: Fulton, C. D. Truax, Box 11 ...
NY: New York, L. Ackerman, 150...
Ohio: Dayton, W. J. Brauer, Box ...
Ohio: Wickliffe, W. J. Brauer, Bo...
Pa: Pittsburgh, W. J. Brauer, ...
ALADDIN CONTROLS, Div. ... Murfreesboro, Rd., Nash... 615-242-3411, TWX: 615... Bassler
ALADDIN ELCTRNS., 701 Mur... Tenn. 37210, Tel: 615-24...

More than 6,000 manufacturers of electronic components, materials, instruments, assemblies, systems and key services are listed in the Yellow Section. An identical Yellow Section appears in each of the three volumes of **eem**, listing addresses, phone numbers and sales managers' names. TWX numbers are also included where available. **Boldface** listings indicate that detailed information on the manufacturers' products is cataloged in the White Section of **eem. Boldface** listings also indicate that local sales offices or representatives are listed for that manufacturer.

to find trade name sources

VOLUME 1, PAGE 957


TRADE NAME DIRECTORY

Autonavigator - auto. plotting radar navigation sys. - Moran Instr.
Autopolar - microwave polarization switch - Teledyne Micronetics
AutoRad - x-ray exposure control - Torr Labs.
Autoray & Baltoray - inspection systems - Balteau Electric
Autorol - dynamometer - Bear Mfg.
Autosplice - medium size splice/connector machine - Connectrol
Autosyn - instr. & sys. of remote indication - Bendix Aerospace-Elctrns.
Autotak - rpm indicator - Howell Instrs.
Bicalex - winding wires, Cables,
Bicaloc - winding wires
Biccastrip - flat conduc... Cables,
Bicon - bi-state, solid...
Bicronite - epoxy coati...
Biflex - type of speake...
Big Inch - motors - Ha...

If you know only the trade name, brand name or trade mark of a product, you can locate it in **eem** by using the **Trade Name Directory.** This appears only in Volume 1, beginning on page 957 of the White Section. These pages can be identified by a vertical black band along the outside edge.

if you require additional assistance

contact the Editorial Department, United Technical Publications, Inc., 645 Stewart Ave., Garden City, N.Y. 11530, or phone (516) 248-9700.

$35 Lambda-Pak™

FIELD REPAIRABLE, ADJUSTABLE VOLTAGE AC TO DC SINGLE AND DUAL OUTPUT POWER SUPPLIES

"Unencapsulated" regulated supplies designed to power operational amplifiers, linear and digital integrated circuits and transistor circuitry. Ideal for equipment where low power, small size, PC board mounting and low costs are essential.

Voltage and current ratings

LZ-10 SERIES SINGLE OUTPUT MODELS 2½" x 3½" x ⅞"

Model	Voltage(1) VDC	Current mA	Price(2)
LZS-10	5	450	$35
LZS-11	12	195	35
LZS-11	15	150	35

LZ-20 SERIES SINGLE OUTPUT MODELS 2½" x 3½" x 1¼"

Model	Voltage(1) VDC	Current mA	Price(2)
LZS-20	12	268	$55
LZS-20	15	300	55
*LZD-22	24	73	40
*LZD-23	24	129	55
*LZD-22	28	84	40
*LZD-23	28	143	55

*Single output ratings for dual output models connected in series

LZ-30 SERIES SINGLE OUTPUT MODELS 2½" x 3½" x 1⅞"

Model	Voltage(1) VDC	Current mA	Price(2)
LZS-30	5	900	$65
LZS-33	12	336	65
LZS-33	15	400	65
*LZD-32	24	186	65
*LZD-32	28	208	65

*Single output ratings for dual output models connected in series

LZ-20 SERIES DUAL TRACKING OUTPUT MODELS 2½" x 3½" x 1¼"

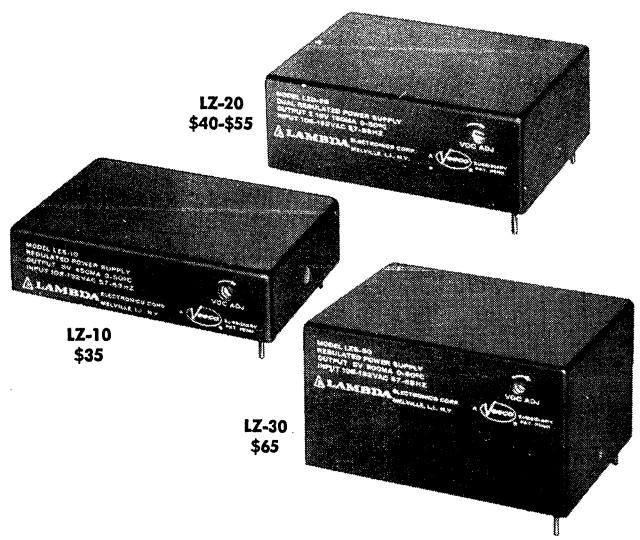
Model	Voltage(1) VDC	Current mA	Price(2)
LZD-21	± 5	300	$55
LZD-22	±12	73	40
LZD-23	±12	129	55
LZD-22	±15	90	40
LZD-23	±15	150	55

LZ-30 SERIES DUAL TRACKING OUTPUT MODELS 2½" x 3½" x 1⅞"

Model	Voltage(1) VDC	Current mA	Price(2)
LZD-31	± 5	500	$65
LZD-32	±12	186	65
LZD-32	±15	220	65

NOTES: (1) LZ Models are adjustable between the following limits: LZS 10 2 to 6V; LZS 11 8 to 15V; LZS 20 8 to 15V; LZD 21 ±2 to ±6V; LZD 22 ±8 to ±15V; LZD 23 ±8 to ±15V; LZS 30 2 to 6V; LZD 31 ±2 to ± 6V; LZD 32 ±8 to ±15V; LZS 33 8 to 15V

Consult factory for current ratings or voltages not listed above. (2) Prices are U.S.A. list prices only, F.O.B. Melville, N.Y.; North Hollywood, California; Montreal, Canada. All prices and specifications are subject to change without notice.



FEATURES

Outputs
Single and dual (tracking) outputs

Regulation
0.15%—line or load

Ripple and Noise
1.5 mV RMS, 5 mV, pk-pk

Temp. coefficient
0.03%/°C

Tracking accuracy
2% absolute voltage difference (dual output models only) 0.2% change for all conditions of line, load and temperature

Ambient operating temperature
continuous duty from 0°C to +50°C

Wide AC input voltage range
105 to 132 Vac, 57-63 Hz

Storage temperature
—25°C to +85°C

60-day guarantee

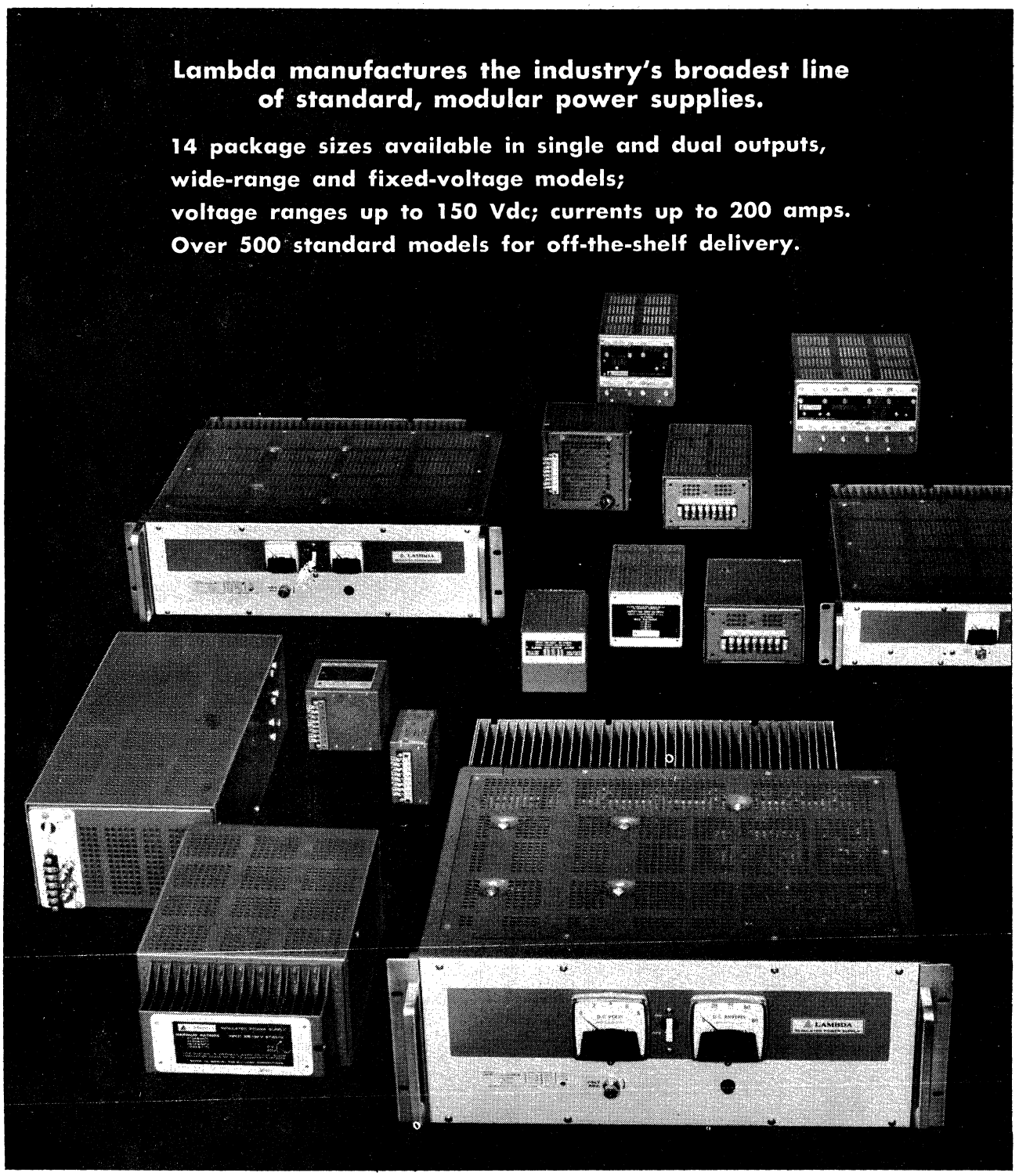
LAMBDA ELECTRONICS CORP.
A (Veeco) Company

Lambda's Distributor Division maintains a total inventory of over 10,000 power supply units located in Los Angeles, Montreal and New York for 1-day delivery.

POWER COMPONENTS
INDUSTRIAL MODULAR POWER SUPPLIES

MODULAR POWER SUPPLIES

for O.E.M., systems, test instrumentation and general-purpose use



Lambda Electronics Corp. • 515 Broad Hollow Road, Melville, L.I., New York 11746 • Tel. (516) 694-4200

Modular power supplies* single output wide range models

voltage and current ratings

LCS-1 SINGLE OUTPUT MODELS

$3\frac{5}{32}$" x $3\frac{9}{32}$" x $1\frac{21}{32}$"
REGULATION: 0.01% + 1 mV
RIPPLE: 250 μV RMS

MODEL	ADJ. VOLT. RANGE VDC	MAX. MA. AT AMBIENT OF: [1] 40°C	50°C	60°C	71°C	PRICE[2]
LCS-1-01A	0-7	275 (250)	220 (180)	165 (120)	110 (75)	$70
LCS-1-02A	0-18	130 (115)	130 (115)	100 (80)	85 (40)	70
LCS-1-03A	0-32	90 (80)	90 (80)	90 (50)	50 (25)	70
LCS-1-04A	0-60	50 (45)	50 (45)	50 (35)	30 (15)	90
LCS-1-05A	0-120	18 (15)	18 (15)	18 (15)	18 (10)	85

*Bracketed ratings are for 47-53 Hz operation.

LCS-2 SINGLE OUTPUT MODELS

$3\frac{5}{32}$" x $3\frac{9}{32}$" x $3\frac{9}{32}$"
REGULATION: 0.01% + 1 mV
RIPPLE: 250 μV RMS

MODEL	ADJ. VOLT. RANGE VDC	MAX. MA. AT AMBIENT OF: [1] 40°C	50°C	60°C	71°C	PRICE[2]
LCS-2-01	0-7	550	455	350	240	$80
LCS-2-02	0-18	330	275	210	140	80
LCS-2-03	0-32	240	205	155	95	80
LCS-2-04	0-60	145	115	87	57	90
LCS-2-05	0-120	50	50	45	30	90

LCS-3 SINGLE OUTPUT MODELS

$3\frac{3}{16}$" x $3\frac{5}{16}$" x 5"
REGULATION: 0.01% + 1 mV
RIPPLE: 250 μV RMS

MODEL	ADJ. VOLT. RANGE VDC	MAX. MA. AT AMBIENT OF: [1] 40°C	50°C	60°C	71°C	PRICE[2]
LCS-3-01	0-7	1200	1000	750	500	$90
LCS-3-02	0-18	750	620	480	320	90
LCS-3-03	0-32	400	350	265	170	90
LCS-3-04	0-60	240	190	140	85	99

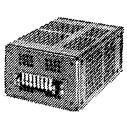
LCS-A SINGLE OUTPUT MODELS

$3\frac{3}{16}$" x $3\frac{3}{4}$" x $6\frac{1}{2}$"
REGULATION: 0.01% + 1 mV
RIPPLE: 250 μV RMS

MODEL	ADJ. VOLT. RANGE VDC	MAX. AMPS AT AMBIENT OF: [1] 40°C	50°C	60°C	71°C	PRICE[2]
LCS-A-01	0-7	2.0	1.9	1.6	1.1	$99
LCS-A-02	0-18	1.1	1.0	0.9	0.7	99
LCS-A-03	0-32	0.69	0.64	0.60	0.45	99
LCS-A-04	0-60	0.37	0.34	0.31	0.25	99
LCS-A-05	0-120	0.10	0.10	0.10	0.10	109

LCS-B SINGLE OUTPUT MODELS

$3\frac{3}{16}$" x $4\frac{15}{16}$" x $6\frac{1}{2}$"
REGULATION: 0.01% + 1 mV
RIPPLE: 250 μV RMS



MODEL	ADJ. VOLT. RANGE VDC	MAX. AMPS AT AMBIENT OF: [1] 40°C	50°C	60°C	71°C	PRICE[2]
LCS-B-01	0-7	3.7	3.3	2.7	1.7	$130
LCS-B-02	0-18	2.0	1.8	1.6	1.2	130
LCS-B-03	0-32	1.1	1.0	0.8	0.5	130
LCS-B-04	0-60	0.6	0.55	0.45	0.3	140
LCS-B-05	0-120	0.25	0.25	0.22	0.16	140

***Note: Additional voltage and current ratings available at slight surcharge. Consult factory.**

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Modular power supplies* single output wide range models

voltage and current ratings

LM-B SINGLE OUTPUT MODELS

3 3/16" x 4 15/16" x 6 1/2"

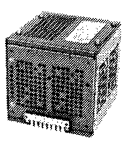
REGULATION:
0.05% + 4 mV — line
0.03% + 3 mV — load
RIPPLE: 1 mV RMS

MODEL	ADJ. VOLT. RANGE VDC	MAX. AMPS AT AMBIENT OF: (1) 40°C	50°C	60°C	71°C	PRICE(2)
LM-B-0-7	0-7	2.8	2.6	2.3	1.5	$119
LM-B-0-14	0-14	1.6	1.5	1.3	1.2	119
LM-B-0-32	0-32	0.8	0.7	0.6	0.5	119
LM-B-0-60	0-60	0.45	0.4	0.35	0.3	119
LM-217	8.5-14	2.1	1.9	1.7	1.3	129
LM-218	13-23	1.5	1.3	1.2	1.0	129
LM-219	22-32	1.2	1.1	1.0	0.8	129
LM-220	30-60	0.70	0.65	0.60	0.45	139

LCS-4 SINGLE OUTPUT MODELS

4 29/32" x 4 29/32" x 5"

REGULATION: 0.01% + 1 mV
RIPPLE: 250 μV RMS



MODEL	ADJ. VOLT. RANGE VDC	MAX. AMPS AT AMBIENT OF: (1) 40°C	50°C	60°C	71°C	PRICE(2)
LCS-4-01	0-7	3.3	3.0	2.3	1.5	$130
LCS-4-02	0-18	1.8	1.6	1.2	0.8	130
LCS-4-03	0-32	1.0	0.9	0.7	0.5	130
LCS-4-04	0-60	0.55	0.5	0.43	0.3	140
LCS-4-05	0-120	0.25	0.25	0.22	0.16	140

LCS-C SINGLE OUTPUT MODELS

3 3/16" x 4 15/16" x 9 3/8"

REGULATION: 0.01% + 1 mV
RIPPLE: 250 μV RMS

MODEL	ADJ. VOLT. RANGE VDC	MAX. AMPS AT AMBIENT OF: (1) 40°C	50°C	60°C	71°C	PRICE(2)
LCS-C-01	0-7	4.5	4.1	3.8	3.3	$150
LCS-C-02	0-18	2.3	2.1	1.9	1.6	150
LCS-C-03	0-32	1.6	1.5	1.4	1.2	150
LCS-C-04	0-60	0.85	0.8	0.74	0.65	165
LCS-C-05	0-120	0.33	0.33	0.33	0.33	180

LM-C SINGLE OUTPUT MODELS

3 3/16" x 4 15/16" x 9 3/8"

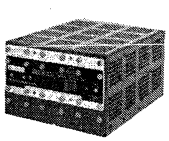
REGULATION:
0.05% + 4 mV — line
0.03% + 3 mV — load
RIPPLE: 1 mV RMS

MODEL	ADJ. VOLT. RANGE VDC	MAX. AMPS AT AMBIENT OF: (1) 40°C	50°C	60°C	71°C	PRICE(2)
LM-225	0-7	4.0	3.6	3.0	2.4	$149
LM-C-0-14	0-14	2.2	2.0	1.8	1.5	149
LM-C-0-32	0-32	1.1	1.0	0.90	0.80	149
LM-226	8.5-14	3.3	3.0	2.5	2.0	149
LM-227	13-23	2.3	2.1	1.7	1.4	149
LM-228	22-32	2.0	1.8	1.5	1.2	149
LM-229	30-60	1.1	1.0	0.80	0.60	159

LM-D SINGLE OUTPUT MODELS

4 15/16" x 7 1/2" x 9 3/8"

REGULATION:
0.05% + 4 mV — line
0.03% + 3 mV — load
RIPPLE: 1 mV RMS



MODEL	ADJ. VOLT. RANGE VDC	MAX. AMPS AT AMBIENT OF: (1) 40°C	50°C	60°C	71°C	PRICE(2)
LM-234	0-7	8.3	7.3	6.5	5.5	$199
LM-D-0-14	0-14	4.9	4.2	3.4	2.7	199
LM-D-0-32	0-32	2.5	2.1	1.7	1.3	180
LM-235	8.5-14	7.7	6.8	6.0	4.8	199
LM-236	13-23	5.8	5.1	4.5	3.6	209
LM-237	22-32	5.0	4.4	3.9	3.1	219
LM-238	30-60	2.6	2.3	2.0	1.6	239

***Note: Additional voltage and current ratings available at slight surcharge. Consult factory.**

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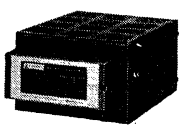
Modular power supplies* single output wide range models

voltage and current ratings

LM-E SINGLE OUTPUT MODELS

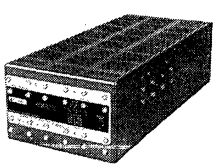
4 15/16" x 7½" x 11¾"
REGULATION:
0.05% + 4 mV — line
0.03% + 3 mV — load
RIPPLE: 1 mV RMS



MODEL	ADJ. VOLT. RANGE VDC	MAX. AMPS AT AMBIENT OF: (1) 40°C	50°C	60°C	71°C	PRICE(2)
LM-E-0-7	0-7	12.0	10.5	8.5	6.8	$249
LM-E-0-14	0-14	7.4	6.4	5.2	4.1	249
LM-E-0-32	0-32	3.7	3.2	2.6	2.1	249

LM-EE SINGLE OUTPUT MODELS

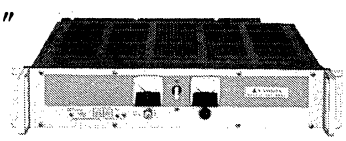
4 15/16" x 7½" x 16½"
REGULATION:
0.05% + 4 mV — line
0.03% + 3 mV — load
RIPPLE: 1 mV RMS



MODEL	ADJ. VOLT. RANGE VDC	MAX. AMPS AT AMBIENT OF: (1) 40°C	50°C	60°C	71°C	PRICE(2)
LM-EE-0-7	0-7	16.0	13.5	11.2	9.2	$340
LM-EE-0-14	0-14	10.2	8.6	7.3	6.1	340
LM-EE-0-32	0-32	5.2	4.4	3.8	3.2	340

LM-F SINGLE OUTPUT MODELS

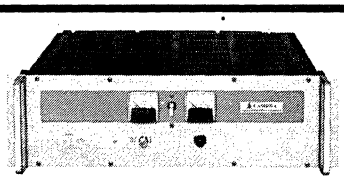
3½" x 19" x 16½"
REGULATION:
0.05% + 4 mV — line
0.03% + 3 mV — load
RIPPLE: 1 mV RMS



MODEL	ADJ. VOLT. RANGE VDC	MAX. AMPS AT AMBIENT OF: (1) 40°C	50°C	60°C	71°C	PRICE(2)
LM-F-0-7	0-7	25.0	21.0	17.0	14.0	$475

LM-G SINGLE OUTPUT MODELS

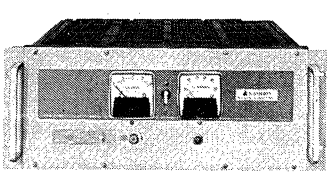
5 3/16" x 19" x 16½"
REGULATION:
0.05% + 4 mV — line
0.03% + 3 mV — load
RIPPLE: 1 mV RMS



MODEL	ADJ. VOLT. RANGE VDC	MAX. AMPS AT AMBIENT OF: (1) 40°C	50°C	60°C	71°C	PRICE(2)
LM-G-0-7	0-7	35.0	29.0	24.0	20.0	$605

LM-H SINGLE OUTPUT MODELS

7" x 19" x 18½"
REGULATION:
0.05% + 4 mV — line
0.03% + 3 mV — load
RIPPLE: 1 mV RMS



MODEL	ADJ. VOLT. RANGE VDC	MAX. AMPS AT AMBIENT OF: (1) 40°C	50°C	60°C	71°C	PRICE(2)
LM-H-0-7-OV-Y-M	0-7	52	46	37	30	$995

*Note: Additional voltage and current ratings available at slight surcharge. Consult factory.

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Modular power supplies* dual output wide range models

voltage and current ratings

LCD-2 DUAL OUTPUT MODELS

3 5/32" x 3 3/32" x 3 3/32"
REGULATION: 0.01% + 1 mV
RIPPLE: 250 μV RMS

MODEL	ADJ. VOLT. RANGE VDC (EACH SIDE)	MAX. MA. AT AMBIENT OF: [1] 40°C	50°C	60°C	71°C	PRICE[2]
LCD-2-11	0-7	300	240	175	115	$125
	0-7	300	240	175	115	
LCD-2-12	0-18	160	130	100	65	125
	0-7	300	240	175	115	
LCD-2-22	0-18	160	130	100	65	125
	0-18	160	130	100	65	
LCD-2-33	0-32	120	95	70	45	125
	0-32	120	95	70	45	
LCD-2-44	0-60	65	52	37	23	170
	0-60	65	52	37	23	
LCD-2-55	0-120	30	30	22	14	170
	0-120	30	30	22	14	

LCD-3 DUAL OUTPUT MODELS

3 3/16" x 3 5/16" x 5"
REGULATION: 0.01% + 1 mV
RIPPLE: 250 μV RMS

MODEL	ADJ. VOLT. RANGE VDC	MAX. MA. AT AMBIENT OF: [1] 40°C	50°C	60°C	71°C	PRICE[2]
LCD-3-11	0-7	700	590	480	340	$145
	0-7	700	590	480	340	
LCD-3-12	0-7	700	590	480	340	145
	0-18	400	350	300	210	
LCD-3-22	0-18	400	350	300	210	145
	0-18	400	350	300	210	
LCD-3-33	0-32	225	190	160	120	145
	0-32	225	190	160	120	

LCD-A DUAL OUTPUT MODELS

3 3/16" x 3 3/4" x 6 1/2"
REGULATION: 0.01% + 1 mV
RIPPLE: 250 μV RMS

MODEL	ADJ. VOLT. RANGE VDC	MAX. AMPS AT AMBIENT OF: [1] 40°C	50°C	60°C	71°C	PRICE[2]
LCD-A-11	0-7	1.0	0.9	0.7	0.5	$155
	0-7	1.0	0.9	0.7	0.5	
LCD-A-12	0-18	0.5	0.45	0.4	0.3	155
	0-7	1.0	0.9	0.7	0.5	
LCD-A-13	0-32	0.35	0.3	0.25	0.2	155
	0-7	1.0	0.9	0.7	0.5	
LCD-A-22	0-18	0.5	0.45	0.4	0.3	155
	0-18	0.5	0.45	0.4	0.3	
LCD-A-33	0-32	0.35	0.3	0.25	0.2	155
	0-32	0.35	0.3	0.25	0.2	
LCD-A-44	0-60	0.2	0.18	0.14	0.12	180
	0-60	0.2	0.18	0.14	0.12	

LCD-4 DUAL OUTPUT MODELS

4 29/32" x 4 29/32" x 5"
REGULATION: 0.01% + 1 mV
RIPPLE: 250 μV RMS

MODEL	ADJ. VOLT. RANGE VDC	MAX. AMPS AT AMBIENT OF: [1] 40°C	50°C	60°C	71°C	PRICE[2]
LCD-4-11	0-7	1.8	1.5	1.2	0.7	$190
	0-7	1.8	1.5	1.2	0.7	
LCD-4-12	0-18	1.0	0.8	0.65	0.4	190
	0-7	1.8	1.5	1.2	0.7	
LCD-4-13	0.32	0.6	0.53	0.4	0.24	190
	0-7	1.8	1.5	1.2	0.7	
LCD-4-22	0-18	1.0	0.8	0.65	0.4	190
	0-18	1.0	0.8	0.65	0.4	
LCD-4-33	0-32	0.6	0.53	0.4	0.24	190
	0-32	0.6	0.53	0.4	0.24	
LCD-4-55	0-120	0.12	0.12	0.12	0.075	240
	0-120	0.12	0.12	0.12	0.075	

***Note: Additional voltage and current ratings available at slight surcharge. Consult factory.**

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Modular power supplies*
single output fixed voltage models
voltage and current ratings

UNREGULATED POWER SUPPLY

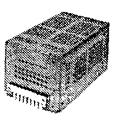
$3\frac{5}{32}$" x $3\frac{9}{32}$" x $1\frac{21}{32}$"
UNREGULATED

MODEL	VOLT., MAX.	CURRENT RANGE	PRICE[2]
LUS-1-06	180 Vdc	25 ma up to 71°C at nominal line voltage for use with up to 7 Nixie® tubes.	$35

(Nixie is trademark of Burroughs Corp.)

LCS-A SINGLE OUTPUT MODELS

$3\frac{3}{16}$" x $3\frac{3}{4}$" x $6\frac{1}{2}$"
REGULATION: 0.01% + 1 mV
RIPPLE: 250 μV RMS



MODEL	FIXED VOLT. RANGE VDC	MAX. AMPS AT AMBIENT OF: [1] 40°C	50°C	60°C	71°C	PRICE[2]
LCS-A-3	3±5%	3.0	2.5	2.0	1.4	$99
LCS-A-3P6	3.6±5%	2.9	2.4	1.9	1.3	99
LCS-A-4	4±5%	2.9	2.4	1.9	1.3	99
LCS-A-4P5	4.5±5%	2.8	2.3	1.8	1.2	99
LCS-A-5	5±5%	2.7	2.3	1.8	1.2	99
LCS-A-6	6±5%	2.6	2.2	1.8	1.2	99
LCS-A-8	8±5%	2.4	2.0	1.7	1.1	99
LCS-A-10	10±5%	2.1	1.8	1.5	1.0	99
LCS-A-12	12±5%	1.9	1.7	1.3	0.9	99
LCS-A-15	15±5%	1.8	1.5	1.2	0.9	99
LCS-A-18	18±5%	1.6	1.3	1.1	0.8	99
LCS-A-20	20±5%	1.4	1.2	1.0	0.8	99
LCS-A-24	24±5%	1.1	1.0	0.85	0.70	99
LCS-A-28	28±5%	1.0	0.9	0.75	0.60	99
LCS-A-36	36±5%	0.90	0.80	0.70	0.50	99
LCS-A-48	48±5%	0.60	0.55	0.50	0.45	99
LCS-A-100	100±5%	0.18	0.18	0.18	0.18	109
LCS-A-120	120±5%	0.15	0.15	0.15	0.15	109
LCS-A-150	150±5%	0.10	0.10	0.10	0.10	109

LM-B SINGLE OUTPUT MODELS

$3\frac{3}{16}$" x $4\frac{15}{16}$" x $6\frac{1}{2}$"
REGULATION:
0.05% + 4 mV — line
0.03% + 3 mV — load
RIPPLE: 1 mV RMS

MODEL	FIXED VOLT. RANGE VDC	MAX. AMPS AT AMBIENT OF: [1] 40°C	50°C	60°C	71°C	PRICE[2]
LM-B-5	5±5%	3.7	3.2	2.5	1.5	$119
LM-B-6	6±5%	3.2	2.9	2.4	1.4	119
LM-B-12	12±5%	2.5	2.3	2.1	1.3	119
LM-B-15	15±5%	2.2	2.0	1.8	1.3	119
LM-B-20	20±5%	1.8	1.6	1.5	1.2	119
LM-B-24	24±5%	1.4	1.3	1.2	1.1	119
LM-B-28	28±5%	1.3	1.2	1.1	1.0	119

LCS-B SINGLE OUTPUT MODELS

$3\frac{3}{16}$" x $4\frac{15}{16}$" x $6\frac{1}{2}$"
REGULATION: 0.01% + 1 mV
RIPPLE: 250 μV RMS

MODEL	FIXED VOLT. RANGE VDC	MAX. AMPS AT AMBIENT OF: [1] 40°C	50°C	60°C	71°C	PRICE[2]
LCS-B-20	20±5%	2.7	2.3	2.0	1.4	$125
LCS-B-24	24±5%	2.1	2.0	1.8	1.2	125
LCS-B-28	28±5%	1.8	1.7	1.6	1.0	125
LCS-B-36	36±5%	1.4	1.3	1.1	0.7	125
LCS-B-48	48±5%	1.1	1.0	0.9	0.6	140
LCS-B-100	100±5%	0.46	0.46	0.46	0.34	140
LCS-B-120	120±5%	0.40	0.40	0.40	0.30	140
LCS-B-150	150±5%	0.32	0.32	0.32	0.25	150

***Note: Additional voltage and current ratings available at slight surcharge. Consult factory.**

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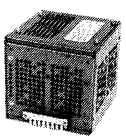
Modular power supplies* single output fixed voltage models

voltage and current ratings

LCS-4 SINGLE OUTPUT MODELS

$4\frac{29}{32}$" x $4\frac{29}{32}$" x 5"
REGULATION: 0.01% + 1 mV
RIPPLE: 250 μV RMS



MODEL	FIXED VOLT. RANGE VDC	MAX. AMPS AT AMBIENT OF: [1] 40°C	50°C	60°C	71°C	PRICE[2]
LCS-4-5	5±5%	4.4	3.7	2.9	1.8	$130
LCS-4-6	6±5%	4.0	3.4	2.6	1.5	130
LCS-4-12	12±5%	3.1	2.8	2.2	1.3	130
LCS-4-15	15±5%	2.8	2.6	2.1	1.3	130
LCS-4-20	20±5%	2.4	2.2	1.9	1.1	130
LCS-4-24	24±5%	2.2	1.8	1.5	0.95	130
LCS-4-28	28±5%	2.0	1.6	1.4	0.85	130
LCS-4-36	36±5%	1.8	1.5	1.3	0.85	140
LCS-4-48	48±5%	1.2	1.1	0.9	0.75	140

LM-C SINGLE OUTPUT MODELS

$3\frac{3}{16}$" x $4\frac{15}{16}$" x $9\frac{3}{8}$"
REGULATION:
0.05% + 4 mV — line
0.03% + 3 mV — load
RIPPLE: 1 mV RMS

MODEL	FIXED VOLT. RANGE VDC	MAX. AMPS AT AMBIENT OF: [1] 40°C	50°C	60°C	71°C	PRICE[2]
LM-C-5	5±5%	5.1	4.3	3.4	2.4	$139
LM-C-6	6±5%	4.8	4.1	3.3	2.4	139
LM-C-12	12±5%	4.0	3.5	2.9	1.9	139
LM-C-15	15±5%	3.5	3.2	2.8	1.9	139
LM-C-20	20±5%	3.1	2.9	2.6	1.8	139
LM-C-24	24±5%	2.5	2.4	2.2	1.5	139
LM-C-28	28±5%	2.3	2.1	2.0	1.4	139

LXS-B SINGLE OUTPUT MODELS

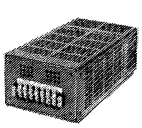
$3\frac{3}{16}$" x $4\frac{15}{16}$" x $6\frac{1}{2}$"
REGULATION: 0.1%
RIPPLE: 1.5 mV RMS

MODEL	FIXED VOLT. RANGE VDC	MAX. AMPS AT AMBIENT OF: [1] 40°C	50°C	60°C	71°C	PRICE[2]
LXS-B-5-OV*	5±5%	5.8	5.0	4.0	3.0	$125
LXS-B-6	6±5%	5.5	4.7	3.8	2.9	125
LXS-B-12	12±5%	3.8	3.6	3.0	2.2	125
LXS-B-15	15±5%	3.2	2.8	2.5	1.5	125

*Includes fixed overvoltage protection at 6.8V ±10%.

LXS-C SINGLE OUTPUT MODELS

$3\frac{3}{16}$" x $4\frac{15}{16}$" x $9\frac{3}{8}$"
REGULATION: 0.1%
RIPPLE: 1.5 mV RMS



MODEL	FIXED VOLT. RANGE VDC	MAX. AMPS AT AMBIENT OF: [1] 40°C	50°C	60°C	71°C	PRICE[2]
LXS-C-5-OV*	5±5%	9.0	8.0	6.8	5.3	$150
LXS-C-6	6±5%	8.8	7.8	6.7	5.2	150
LXS-C-12	12±5%	6.5	6.1	5.5	4.6	150
LXS-C-15	15±5%	6.0	5.6	5.1	4.5	150

*Includes fixed overvoltage protection at 6.8V ±10%.

*Note: Additional voltage and current ratings available at slight surcharge. Consult factory.

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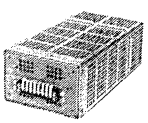
Modular power supplies* single output fixed voltage models

voltage and current ratings

LCS-C SINGLE OUTPUT MODELS

3 3/16" x 4 15/16" x 9 3/8"
REGULATION: 0.01% + 1 mV
RIPPLE: 250 μV RMS



MODEL	FIXED VOLT. RANGE VDC	MAX. AMPS AT AMBIENT OF: (1) 40°C	50°C	60°C	71°C	PRICE(2)
LCS-C-20	20±5%	4.2	4.0	3.5	3.0	$150
LCS-C-24	24±5%	3.6	3.4	3.0	2.5	150
LCS-C-28	28±5%	3.0	2.7	2.6	2.2	150
LCS-C-36	36±5%	2.3	2.2	2.1	1.6	150
LCS-C-48	48±5%	1.8	1.7	1.6	1.3	170
LCS-C-100	100±5%	0.65	0.65	0.65	0.65	170
LCS-C-120	120±5%	0.55	0.55	0.55	0.55	170
LCS-C-150	150±5%	0.42	0.42	0.42	0.42	170

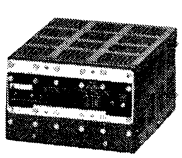
LM-CC SINGLE OUTPUT MODELS

4 15/16" x 4 15/16" x 9 3/8"
REGULATION:
0.05% + 4 mV — line
0.03% + 3 mV — load
RIPPLE: 1 mV RMS

MODEL	FIXED VOLT. RANGE VDC	MAX. AMPS AT AMBIENT OF: (1) 40°C	50°C	60°C	71°C	PRICE(2)
LM-CC-5	5±5%	10.5	9.0	8.0	5.5	$179
LM-CC-6	6±5%	9.0	8.4	7.7	5.5	179
LM-CC-12	12±5%	7.3	6.8	5.9	4.7	179
LM-CC-15	15±5%	6.0	5.6	5.1	4.3	179
LM-CC-20	20±5%	5.0	4.6	4.2	3.6	179
LM-CC-24	24±5%	4.0	3.7	3.4	3.0	179
LM-CC-28	28±5%	3.5	3.4	3.1	2.8	179
LM-CC-48	48±5%	2.5	2.4	2.2	1.9	199

LM-D SINGLE OUTPUT MODELS

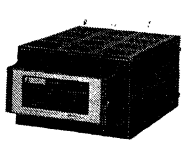
4 15/16" x 7 1/2" x 9 3/8"
REGULATION:
0.05% + 4 mV — line
0.03% + 3 mV — load
RIPPLE: 1 mV RMS



MODEL	FIXED VOLT. RANGE VDC	MAX. AMPS AT AMBIENT OF: (1) 40°C	50°C	60°C	71°C	PRICE(2)
LM-D-5	5±5%	12.6	10.8	9.2	6.1	$209
LM-D-6	6±5%	12.4	10.6	8.9	6.0	209
LM-D-12	12±5%	10.0	9.2	8.3	5.7	209
LM-D-15	15±5%	9.0	8.4	7.9	5.3	219
LM-D-20	20±5%	7.4	6.9	6.5	4.9	219
LM-D-24	24±5%	6.7	6.3	5.8	4.8	219
LM-D-28	28±5%	6.0	5.6	5.2	4.7	219
LM-D-48	48±5%	4.1	3.9	3.6	3.1	239
LM-D-100	100±5%	1.7	1.5	1.3	1.1	239
LM-D-120	120±5%	1.5	1.3	1.1	1.0	239
LM-D-150	150±5%	1.1	1.0	0.90	0.80	239

LM-E SINGLE OUTPUT MODELS

4 15/16" x 7 1/2" x 11 3/4"
REGULATION:
0.05% + 4 mV — line
0.03% + 3 mV — load
RIPPLE: 1 mV RMS



MODEL	FIXED VOLT. RANGE VDC	MAX. AMPS AT AMBIENT OF: (1) 40°C	50°C	60°C	71°C	PRICE(2)
LM-E-5	5±5%	20.0	18.0	16.4	10.0	$269
LM-E-6	6±5%	19.0	17.3	15.6	10.0	269
LM-E-12	12±5%	15.0	13.6	12.3	9.5	269
LM-E-15	15±5%	14.0	12.7	11.5	8.6	269
LM-E-20	20±5%	12.0	10.9	9.8	8.5	269
LM-E-24	24±5%	11.0	10.0	9.0	7.6	269
LM-E-28	28±5%	10.0	9.0	8.0	7.1	269
LM-E-48	48±5%	6.0	5.4	4.9	4.3	299

***Note: Additional voltage and current ratings available at slight surcharge. Consult factory.**

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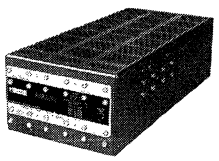
Modular power supplies*
single output fixed voltage models
voltage and current ratings

LM-EE SINGLE OUTPUT MODELS

4 15/16" x 7½" x 16½"

REGULATION:
0.05% + 4 mV — line
0.03% + 3 mV — load
RIPPLE: 1 mV RMS

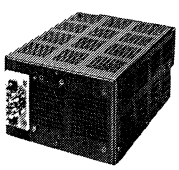


MODEL	FIXED VOLT. RANGE VDC	MAX. AMPS AT AMBIENT OF: (1) 40°C	50°C	60°C	71°C	PRICE(2)
LM-EE-5	5±5%	31.0	24.6	20.8	17.3	$340
LM-EE-6	6±5%	30.0	24.6	20.8	17.3	340
LM-EE-12	12±5%	21.0	19.0	16.1	13.2	340
LM-EE-15	15±5%	19.0	18.0	15.5	12.7	340
LM-EE-20	20±5%	15.2	13.7	11.8	9.7	340
LM-EE-24	24±5%	14.0	12.5	10.8	9.0	340
LM-EE-28	28±5%	13.0	11.5	9.8	8.2	340
LM-EE-48	48±5%	7.7	7.1	6.5	5.4	340

LV-E SINGLE OUTPUT MODELS

4 15/16" x 7½" x 11¾"

REGULATION: 0.15% + 10 mV
RIPPLE: 10 mV RMS



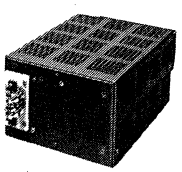
MODEL	FIXED VOLT. RANGE VDC	MAX. AMPS AT AMBIENT OF: (1) 40°C	50°C	60°C	71°C	PRICE(2)
LV-E-3-P-3-OV	2.8-3.8	47	39	28	13	$325
LV-E-4-OV	4±5%	44	39	28	13	325
LV-E-4-P-5-OV	4.5±5%	41	38	28	13	325
LV-E-5-OV	5±5%	37	34	28	13	325
LV-E-6-OV	6±5%	33	30	27	13	325

LV-E packages are only available with built-in overvoltage protection.

LW-E SINGLE OUTPUT MODELS

4 15/16" x 7½" x 11¾"

REGULATION: 2%
RIPPLE: 300 mV RMS

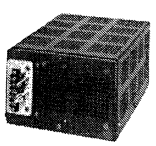


MODEL	FIXED VOLT. RANGE VDC	MAX. AMPS AT AMBIENT OF: (1) 40°C	50°C	60°C	71°C	PRICE(2)
LW-E-3-P-3	2.8-3.8	55	52	49	45	$270
LW-E-4	4±5%	53	50	47	43	270
LW-E-4-P-5	4.5±5%	49	46	43	40	270
LW-E-5	5±5%	45	42	40	37	270
LW-E-6	6±5%	39	37	35	32	270

LW-D SINGLE OUTPUT MODELS

4 15/16" x 7½" x 9⅜"

REGULATION: 2%
RIPPLE: 300 mV RMS

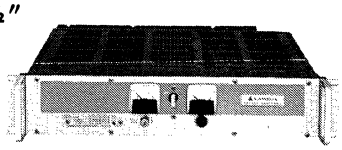


MODEL	FIXED VOLT. RANGE VDC	MAX. AMPS AT AMBIENT OF: (1) 40°C	50°C	60°C	71°C	PRICE(2)
LW-D-10	10±5%	27.0	25.0	23.0	17.0	$250
LW-D-12	12±5%	26.5	20.0	13.7	8.8	250
LW-D-15	15±5%	22.5	20.0	13.7	8.8	250
LW-D-18	18±5%	19.0	18.3	13.7	8.8	250
LW-D-20	20±5%	17.5	16.7	13.7	8.8	250
LW-D-24	24±5%	14.7	14.0	13.2	8.8	250
LW-D-28	28±5%	12.5	12.0	11.1	7.7	250
LW-D-48	48±5%	7.6	7.3	6.8	6.2	250

LM-F SINGLE OUTPUT MODELS

3½" x 19" x 16½"

REGULATION:
0.05% + 4 mV — line
0.03% + 3 mV — load
RIPPLE: 1 mV RMS



MODEL	FIXED VOLT. RANGE VDC	MAX. AMPS AT AMBIENT OF: (1) 40°C	50°C	60°C	71°C	PRICE(2)
LM-F-5	5±5%	48	41	33	25	$475
LM-F-6	6±5%	47	40	32	24	475
LM-F-12	12±5%	33	28	22	17	475
LM-F-15	15±5%	25	22	18	14	475
LM-F-20	20±5%	23	20	17	13	475
LM-F-24	24±5%	20	17	14	11	475
LM-F-28	28±5%	19	16	13	10	475

Prices of LM-F models are for non-metered models. For metered models, add Suffix "-M" to model number and $30.00 to the price.

***Note: Additional voltage and current ratings available at slight surcharge. Consult factory.**

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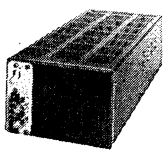
Modular power supplies*
single output fixed voltage models
voltage and current ratings

LV-EE SINGLE OUTPUT MODELS

4 15/16" x 7½" x 16½"
REGULATION: 0.15% + 10 mV
RIPPLE: 10 mV RMS

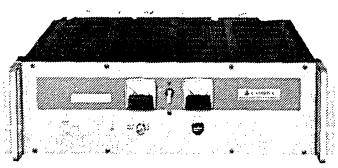


MODEL	RANGE VDC FIXED VOLT.	MAX. AMPS AT AMBIENT OF: [1] 40°C	50°C	60°C	71°C	PRICE[2]
LV-EE-3-OV	3±5%	98	90	74	61	$490
LV-EE-3-P-6-OV	3.6±5%	92	85	70	57	490
LV-EE-4-OV	4±5%	87	82	70	54	490
LV-EE-4-P-5-OV	4.5±5%	81	77	70	52	490
LV-EE-5-OV	5±5%	74	70	65	45	490
LV-EE-6-OV	6±5%	64	61	56	40	490
LV-EE-10-OV	10±5%	41	39	36	25	415
LV-EE-12-OV	12±5%	34	32	30	21	415
LV-EE-15-OV	15±5%	28	26	24	18	415

LV-EE packages are only available with built-in overvoltage protection.

LM-G SINGLE OUTPUT MODELS

5 3/16" x 19" x 16½"
REGULATION:
0.05% + 4 mV — line
0.03% + 3 mV — load
RIPPLE: 1 mV RMS

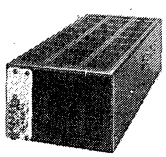


MODEL	FIXED VOLT. RANGE VDC	MAX. AMPS AT AMBIENT OF: [1] 40°C	50°C	60°C	71°C	PRICE[2]
LM-G-5	5±5%	80	75	62	45	$605
LM-G-12	12±5%	56	46	37	29	605
LM-G-15	15±5%	45	42	36	28	605
LM-G-20	20±5%	35	32	28	21	605
LM-G-24	24±5%	32	26	21	16	605
LM-G-28	28±5%	28	25	21	16	605

Prices of LM-G models are for non-metered models. For metered models, add Suffix "-M" to model number and $30.00 to the price.

LW-EE SINGLE OUTPUT MODELS

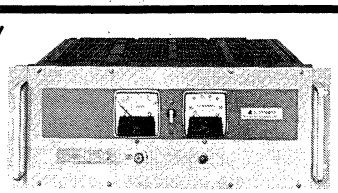
4 15/16" x 7½" x 16½"
REGULATION: 2%
RIPPLE: 300 mV RMS



MODEL	FIXED VOLT. RANGE VDC	MAX. AMPS AT AMBIENT OF: [1] 40°C	50°C	60°C	71°C	PRICE[2]
LW-EE-3	3±5%	120	113	98	80	$400
LW-EE-3-P-6	3.6±5%	113	108	98	77	400
LW-EE-4	4±5%	107	102	96	74	400
LW-EE-4-P-5	4.5±5%	99	95	89	70	400
LW-EE-5	5±5%	91	87	82	62	400
LW-EE-6	6±5%	78	75	70	54	400
LW-EE-10	10±5%	51	48	45	35	350
LW-EE-12	12±5%	42	40	37	28	350
LW-EE-15	15±5%	35	33	31	24	350
LW-EE-18	18±5%	33	32	30	23	350
LW-EE-20	20±5%	31	30	28	22	350
LW-EE-24	24±5%	26	25	23	17	350
LW-EE-28	28±5%	22	21	20	15	350
LW-EE-48	48±5%	13	13	12	9	350

LM-H SINGLE OUTPUT MODELS

7" x 19" x 18½"
REGULATION:
0.01% + 1 mV
0.02% + 2 mV
RIPPLE: .5 mV RMS



MODEL	FIXED VOLT. RANGE VDC	MAX. AMPS AT AMBIENT OF: [1] 40°C	50°C	60°C	71°C	PRICE[2]
LM-H-5-OV-Y-M	5±5%	130	110	90	70	$995
LM-H-12-OV-Y-M	12±5%	90	77	63	50	995

LM-H models are available only with overvoltage protection, high performance option and meters, all of which are includ[illegible] in the price.

***Note: Additional voltage and current ratings available at slight surcharge. Consult factory.**

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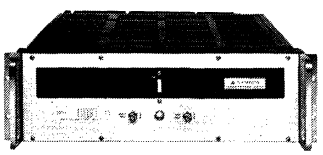
Modular power supplies* single output fixed voltage models

voltage and current ratings

LV-G SINGLE OUTPUT MODELS

5 3/16" x 19" x 16½"
REGULATION:
0.15% + 10 mV
RIPPLE: 10 mV RMS

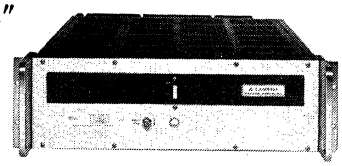


MODEL	RANGE VDC FIXED VOLT.	MAX. AMPS AT AMBIENT OF: [1] 40°C	50°C	60°C	71°C	PRICE[2]
LV-G-3-OV	3±5%	170	165	150	135	$750
LV-G-3-P-6-OV	3.6±5%	160	155	140	125	750
LV-G-4-OV	4±5%	150	145	132	120	750
LV-G-4-P-5-OV	4.5±5%	135	131	119	108	750
LV-G-5-OV	5±5%	130	126	115	100	750
LV-G-6-OV	6±5%	110	107	98	90	750
LV-G-10-OV	10±5%	74	71	65	61	750
LV-G-12-OV	12±5%	65	63	57	54	750
LV-G-15-OV	15±5%	50	48	44	40	750

LV-G models are only available without meters and with built-in overvoltage protection.

LW-G SINGLE OUTPUT MODELS

5 3/16" x 19" x 16½"
REGULATION: 2%
RIPPLE: 300 mV RMS



MODEL	FIXED VOLT. RANGE VDC	MAX. AMPS AT AMBIENT OF: [1] 40°C	50°C	60°C	71°C	PRICE[2]
LW-G-3	3±5%	200	195	180	165	$675
LW-G-3-P-6	3.6±5%	190	185	170	155	675
LW-G-4	4±5%	180	175	162	148	675
LW-G-4-P-5	4.5±5%	160	155	142	132	675
LW-G-5	5±5%	150	146	135	123	675
LW-G-6	6±5%	128	123	115	105	675
LW-G-10	10±5%	88	85	79	72	675
LW-G-12	12±5%	75	72	67	61	675
LW-G-15	15±5%	60	57	53	49	675
LW-G-18	18±5%	58	56	52	47	675
LWG-20	20±5%	53	51	47	43	675
LWG-24	24±5%	48	46	42	39	675
LWG-28	28±5%	39	37	34	32	675
LWG-48	48±5%	24	23	21	19	675

LW-G models are only available without meters.

***Note: Additional voltage and current ratings available at slight surcharge. Consult factory.**

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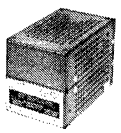
Modular power supplies* dual and dual tracking models
voltage and current ratings

LXD-3-152 DUAL OUTPUT MODELS

3 3/16" x 3 3/4" x 5"
REGULATION: 0.1%
RIPPLE: 1.5 mV RMS

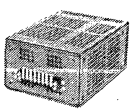


MODEL	ADJ. VOLT. RANGE VDC	MAX. AMPS AT AMBIENT OF: (1) 40°C	50°C	60°C	71°C	PRICE(2)
LXD-3-152	+(12 to 15)	400	370	340	300	$85
	−(12 to 15)	400	370	340	300	
		can also be used				
LXD-3-152	24-30	400	370	340	300	85

Only one overvoltage protector accessory is required for both outputs.

LXD-B DUAL OUTPUT MODELS

3 3/16" x 4 15/16" x 6 1/2"
REGULATION: 0.1%
RIPPLE: 1.5 mV RMS



MODEL	ADJ. VOLT. RANGE VDC	MAX. AMPS AT AMBIENT OF: (1) 40°C	50°C	60°C	71°C	PRICE(2)
LXD-B-062	±3 to ±6	2.1	2.0	1.6	1.2	$160
		2.7	2.4	1.9	1.4	
LXD-B-152	±12 to ±15	1.4	1.3	1.1	0.6	150
		1.6	1.4	1.2	0.7	

Only one overvoltage protector accessory is required for both outputs.

LCD-4-152 DUAL OUTPUT MODEL

4 29/32" x 4 29/32" x 5"
REGULATION: 0.01% + 1 mV
RIPPLE: 250μV RMS

MODEL	FIXED VOLT. RANGE VDC	MAX. AMPS AT AMBIENT OF: (1) 40°C	50°C	60°C	71°C	PRICE(2)
LCD-4-152	15±5%	1.5	1.3	1.0	0.6	$220
	15±5%	1.5	1.3	1.0	0.6	

Two separate, independent output voltages. One overvoltage protector accessory is required for each output.

LXD-C DUAL OUTPUT MODELS

3 3/16" x 4 15/16" x 9 3/8"
REGULATION: 0.1%
RIPPLE: 1.5 mV RMS

MODEL	ADJ. VOLT. RANGE VDC	MAX. AMPS AT AMBIENT OF: (1) 40°C	50°C	60°C	71°C	PRICE(2)
LXD-C-062	±3 to ±6	2.6	2.4	1.9	1.3	$170
		3.5	3.3	2.7	1.7	
LXD-C-152	±12 to ±15	2.0	1.8	1.5	1.2	160
		2.5	2.3	1.9	1.5	

Only one overvoltage protector accessory is required for both outputs.

***Note: Additional voltage and current ratings available at slight surcharge. Consult factory.**

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Specifications of LC series

Specifications of LC series

DC output

voltage range: refer to tables.

Regulated voltage

regulation, line	0.01% + 1 mV
regulation, load	0.01% + 1 mV
ripple and noise	250 μV RMS, 1 mV pk-pk
remote programming resistance	1000 ohms/volt, nominal
remote programming voltage	volt per volt
temperature coefficient	0.01% + 300 μV/°C with external programming resistor; 0.015% + 300 μV/°C with internal programming resistor.

AC input

line	105-132 Vac; 57-63 Hz. For operation at other than 57-63 Hz and 205-265 Vac, see AC input option.
power	LCS-1 13 watts; LCS-2, LCD-2 20 watts; LCS-3, LCD-3 40 watts; LCS-A 80 watts; LCD-A 55 watts; LCS-4, LCD-4 125 watts; LCS-B 125 watts; LCS-C 215 watts.

Ambient operating temperature range

continuous duty from −20°C to +71°C with corresponding load current ratings for all modes of operation.

Storage temperature range

−55°C to +85°C

Overload protection

Thermal

thermostat; automatic reset when overtemperature condition is eliminated. (Not applicable to LCS-1, LCS-3, LCD-3, LCS-A, and LCD-A models.)

Electrical

external overload protection: automatic electronic current limiting circuit limits the output current to a preset value, thereby providing protection for the load as well as the power supply.

Input and output connections

thru terminal block on chassis.

Integrated circuit regulation

integrated circuit provides regulation system, except for input and output capacitors, rectifiers and series regulation transistors.

Convection cooled

no external heat sinking or forced air required.

Number of package sizes

seven (7). Package 1, 2, 3, A, B, 4, C.

Controls

DC output control

simple screwdriver voltage adjustment over entire voltage range.

Remote sensing

provision is made for remote sensing to eliminate effect of power output lead resistance on DC regulation.

Current limit

140% of 40°C rating for LCS-1, LCS-2, LCD-2, LCS-3, LCD-3, LCS-A, LCD-A, 110% of 40°C rating for LCS-4, LCD-4, LCS-B, LCS-C.

Mounting

LCS-1 five mounting surfaces; LCS-2, LCD-2 four mounting surfaces; LCS-3, LCD-3, LCS-A, LCD-A, LCS-4, LCD-4, LCS-B and LCS-C three mounting surfaces, designed to mount in Lambda standard rack adapters.

Physical data

Weight

LCS-1 1 lb. net, 1⅞ lbs. ship; LCS-2, LCD-2 2¼ lbs. net, 3⅛ lbs. ship; LCS-3, LCD-3 3½ lbs. net, 4½ lbs. ship; LCS-A 6 lbs. net, 7 lbs. ship; LCD-A 5 lbs. net, 6 lbs. ship; LCS-4, LCD-4 8 lbs. net, 9 lbs. ship; LCS-B 7 lbs. net, 8 lbs. ship; LCS-C 10 lbs. net, 11 lbs. ship.

Size

LCS-1 3 5/32" x 3 3/32" x 1 21/32" single output models; LCS-2, LCD-2 3 5/32" x 3 3/32" x 3 3/32" single and dual output models; LCS-3, LCD-3 3 3/16" x 3¾" x 5" single and dual output model; LCS-A, LCD-A 3 3/16" x 3¾" x 6½" single and dual output models; LCS-4, LCD-4 4 29/32" x 4 29/32" x 5" single and dual output model; LCS-B 3 3/16" x 4 15/16" x 6½" single output models; LCS-C 3 3/16" x 4 15/16" x 9 3/8" single output models.

Finish

gray, FED. STD. 595 No. 26081

Accessories

rack adapters, overvoltage protectors, chassis slides and blank panels.

Options

AC input option

add suffix "-V" to model number for operation at 205-265 Vac, 47-440 Hz, except LCS-1 series and derate current 10% for 47-53 Hz operation except LCS-1 series. For 360-440 Hz operation consult factory. Add 10% or $10.00 to price, whichever is greater.

Guaranteed for 5 years

5-year guarantee includes labor as well as parts. Guarantee applies to operation at full published specifications at end of 5 years.

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Specifications of LX series

Specifications of LX series

DC output

voltage range: refer to tables.

Regulated voltage

regulation, line	0.1%
regulation, load	0.1%
ripple and noise	1.5 mV RMS; 5 mV pk-pk.
remote programming resistance	200 ohms/volt, nominal, for LXS models only.
temperature coefficient	0.03%/°C

AC input

line	105-132 Vac; 57-63 Hz. For operation at other than 57-63 Hz, consult factory for ratings and specifications.	
power	LXD-3	35 watts
	LXD-B	115 watts
	LXS-B	125 watts
	LXD-C	185 watts
	LXS-C	215 watts

Ambient operating temperature range

continuous duty from 0° to +71°C with corresponding load current ratings for all modes of operation.

Storage temperature range

−55°C to +85°C

Tracking accuracy (dual models)

2% absolute voltage difference; 0.2% change for all conditions of line, load and temperature.

Overload protection

available for all models up to 70 Vdc. On LXD models, only one (1) overvoltage protector accessory is required for both outputs. Models LXS-C-5-OV and LXS-B-5-OV include fixed overvoltage protection at 6.8 ± 10%.

Thermal

thermostat; automatic reset when overtemperature condition is eliminated. (Not applicable to LXD-3-152.)

Electrical

external overload protection: automatic electronic current limiting circuit limits the output current to a preset value, hereby providing protection for the load as well as the power supply.

Overshoot

no overshoot on turn-on, turn-off or power failure.

Input and output connections

through terminal block on chassis.

Integrated circuit regulation

integrated circuits provide regulation system, except for input and output capacitors, rectifiers and series regulation transistors.

Convection cooled

no external heat sinking or forced air required.

Number of package sizes

three (3) Packages 3, B, C.

Controls

DC output control

simple screwdriver voltage adjustment over entire voltage range.

Remote sensing

provision is made for remote sensing to eliminate effect of power output lead resistance on DC regulation.

Transformer

MIL-T-27C, Grade 6.

Mounting

three mounting surfaces, designed to mount in Lambda standard rack adapters.

Physical data

Weight

LXD-3:	3.0 lbs. net, 4.0 lbs. ship.
LXS-B:	7.0 lbs. net, 8.0 lbs. ship.
LXD-B:	7.0 lbs. net, 8.0 lbs. ship.
LXS-C:	10.0 lbs. net, 11.0 lbs. ship.
LXD-C:	10.0 lbs. net, 11.0 lbs. ship.

Size

LXD-3:	3 3/16" x 3 3/4" x 5" dual output models.
LXS-B, LXD-B:	3 3/16" x 4 15/16" x 6 1/2" single and dual output models.
LXS-C, LXD-C:	3 3/16" x 4 15/16" x 9 3/8" single and dual output models.

Finish

gray, FED. STD. 595 No. 26081.

Accessories

rack adapters, blank panels, chassis slides and overvoltage protectors.

Guaranteed for 5 years

5-year guarantee includes labor as well as parts. Guarantee applies to operation at full published specifications at end of 5 years.

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Specifications of LM series

Specifications of LM Series

DC output

voltage range: refer to tables.

Regulated voltage

regulation, line	0.05% plus 4 mV for line variations from 105-132 Vac. 0.01% plus 1.0 mV for line variations from 105-132 Vac. ("Y" option)
regulation, load	0.03% plus 3 mV for load variations from 0 to full load. 0.02% plus 2 mV for load variations from 0 to full load. ("Y" option)
remote programming resistance	200 ohms/volt, nominal
remote programming voltage	volt per volt
ripple and noise	1 mV RMS, 3 mV pk-pk with either pos. on neg. terminal grounded. 0.5 mV RMS, 1.5 mV pk-pk with 60 Hz input. ("Y" option)
temperature coefficient	0.03%/°C; 0.01%/°C ("Y" option)

AC input

line	105-132 Vac: 45-440 Hz. 40°C rating not applicable for 50 Hz operation. 205-265 Vac, see AC input option.
power	LM-B Models, 80 watts(1). LM-C Models, 140 watts(1); LM-CC Models, 220 watts(1); LM-D Models, 300 watts(1); LM-E Models, 450 watts(1); LM-EE Models, 750 watts(1); LM-F Models, 900 watts(1); LM-G Models, 1300 watts(1); LM-H Models, 2200 watts(1).

(1) With output loaded to 40°C rating, input 132 Vac and 55-65 Hz.

Ambient operating temperature range

continuous duty from −20°C to +71°C ambient with corresponding load current ratings for all modes of operation and mounting positions.

Storage temperature range

−55°C to +85°C

Overload protection

Thermal

thermostat; automatic reset when over-temp condition is eliminated.

Electrical

external overload protection: fixed, automatic electronic current limiting circuit limits the output current upon external overloads, including short circuit, thereby providing protection for load as well as power supply.

Input and output connections

heavy duty terminal block on rear of chassis; output terminals on LM-F, LM-G, and LM-H are two heavy duty studs.

Controls

DC output control

simple screwdriver voltage adjustment over entire voltage range.

Remote sensing

provision is made for remote sensing to eliminate effect of power output lead resistance on DC regulation.

Meters

voltmeter and ammeter on metered models of LM-F, G, and H.

Mounting

three surfaces, each with tapped mounting holes, can be utilized for mounting LM-B, C, CC, and D Models. One mounting surface for E and EE Models, and only in the horizontal plane. Designed to mount in Lambda Standard Rack Adapters.

Physical data

Weight

LM-B Models, 6 lbs. net, 7 lbs. ship; LM-C Models, 9 lbs. net, 10 lbs. ship; LM-CC Models, 15 lbs. net, 17 lbs. ship; LM-D Models, 20 lbs. net, 23 lbs. ship; LM-E Models, 28 lbs. net, 31 lbs. ship; LM-EE Models, 37 lbs. net, 47 lbs. ship; LM-F Models, 54 lbs. net, 64 lbs. ship; LM-G Models, 72 lbs. net, 84 lbs. ship; LM-H Models, 110 lbs. net, 145 lbs. ship.

Size

See tables.

Finish

LM-B, C, CC, D, E, EE, F, G, and H — grey, FED. STD. 595 No. 26081. LM-F, G, H front panels brushed aluminum clear anodized panels with grey inlay (standard).

Accessories

rack adapters, chassis slides, overvoltage protectors, metered and non-metered panels, blank panels.

Options

High performance option

add suffix "-Y" — all models available with these specifications for $15.00 extra: Line regulation .01% + 1 mV; Load regulation .02% + 2 mV; Ripple and noise — with 60 Hz input: ½ mV RMS; 1½ mV pk-pk with either positive or negative terminal grounded; Temp. coeff. .01%/°C. These specifications are standard on all H Packages and are included in the price.

AC input option

add suffix "-V" — all units are available with 205-265 Vac, 45-440 Hz (40°C rating not applicable.) Add 10% or $10.00 to the price, whichever is greater. For 400 Hz operation consult factory.

Fungus proofing option

add suffix "-R" — all models can be obtained with MIL-V-173 varnish for all fungi nutrient components. LM-B thru EE at $10.00 surcharge; LM-F, G, H at $15.00 surcharge.

Guaranteed for 5 years

5-year guarantee includes labor as well as parts. Guarantee applies to operation at full published specifications at end of 5 years.

Specifications of LV series

Specifications of LV series

DC output

voltage range: refer to tables.

Regulated voltage

regulation, line	0.15% + 10 mV for line variations from 105-132 Vac.
regulation, load	0.15% + 10 mV, no load to full load or full load to no load.
ripple and noise	10 mV RMS, max. with electronic ripple reducer.
remote programming resistance	200 ohms/volt nominal
remote programming voltage..	volt per volt
temperature coefficient	0.03% + 0.5 mV/°C

AC input

line	105-132 Vac, 57-63 Hz
power	LV-E Models, 450 watts; LV-EE Models, 850 watts; LV-G Models, 1350 watts.

Efficiency

greater than 50%, with advanced SCR circuitry.

Ambient operating temperature range

0°C to +71°C

Storage temperature range

−55°C to +85°C

Overload protection

Thermal

thermostat on LV-E and LV-EE models automatic reset when overtemp condition is eliminated; circuit breaker must be reset on all LV-G models.

Electrical

external overload protection: fixed, automatic electronic current limiting circuit limits the output current upon external overloads, including short circuit, thereby providing protection for loads as well as power supply.

internal failure protection: provided by fuse.

Overvoltage protection

built-in, continuously adjustable overvoltage protection crowbars output when trip level is exceeded. Included on all models.

Input connections

heavy duty terminal block on rear of chassis.

Output connections

2 heavy duty studs on rear of chassis; 1/4"-28 on all E and EE packages, 5/16"-24 on G packages.

Convection cooled

no external heat sinking or forced air required.

Number of package sizes

three (3) packages E, EE, G.

Controls

DC output control

screwdriver voltage adjustment over entire voltage range.

Overvoltage protector control

screwdriver adjustment covers entire operating range.

Remote sensing

provision is made for remote sensing to eliminate effect of power output lead resistance on DC regulation.

Mounting

one surface with tapped mounting holes for LV-E and LV-EE Models; designed to mount in standard Lambda rack adapters. LVG is rack mounted.

Physical data

Weight

LV-E Models, 40 lbs. net, 50 lbs. ship; LV-EE Models, 60 lbs. net, 75 lbs. ship; LV-G Models, 120 lbs. net, 140 lbs. ship.

Size

LV-E, 4 15/16"H x 7½"W x 11¾"D; LV-EE, 4 15/16"H x 7½"W x 16½"D; LV-G, 5¼"H x 19"W x 16½"D (full rack).

Finish

LV-E, EE, and G grey FED. STD. 595 No. 26081. LV-G. Front panel — brushed aluminum clear anodized panels with grey inlay (standard).

Accessories

rack adapters, chassis slides, blank panels.

Guaranteed for 5 years

5-year guarantee includes labor as well as parts. Guarantee applies to operation at full published specifications at end of 5 years.

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Specifications of LW series

Specifications of LW series

DC output

voltage range: refer to tables.

Regulated voltage

regulation, line	2% for line variations from 105-132 Vac.
regulation, load	2%, 20% load to full load or full load to 20% load, or 2% full load to no load with a 20% preload throughout voltage adjust range.
ripple and noise	300 mV RMS, max., or 2% of output voltage, whichever is greater.
remote programming resistance	200 ohms/volt nominal
remote programming voltage	volt per volt
temperature coefficient	0.03% + 0.5 mV/°C

AC input

line	105-132 Vac, 57-63 Hz
power	LW-D Models, 450 watts; LW-E Models, 450 watts; LW-EE Models, 850 watts; LW-G Models, 1350 watts.

Efficiency

greater than 50%, with advanced SCR circuitry.

Ambient operating temperature range

0°C to +71°C

Storage temperature range

−55°C to +85°C

Overload protection

Thermal

thermostat on all LW-D, LW-E and LW-EE models automatic reset when over-temp condition is eliminated; circuit breaker must be reset on LW-G models.

Electrical

external overload protection: fixed, automatic electronic current limiting circuit limits the output current upon external overloads, including short circuit, thereby providing protection for load as well as power supply.

internal failure protection: provided by input fuse.

Input connections

heavy duty terminal block on rear of chassis.

Output connections

2 heavy duty studs on rear of chassis, 1/4"-28 on all D, E and EE packages except LW-D-18 thru 48; 5/16"-24 on all G packages.

Convection cooled

no external heat sinking or forced air required.

Number of package sizes

four (4) Packages D, E, EE, G.

Controls

DC output control

screwdriver voltage adjustment over entire voltage range.

Remote sensing

provision is made for remote sensing to eliminate effect of power output lead resistance on DC regulation.

Mounting

one surface with tapped mounting holes for LW-E and LW-EE Models; three surfaces for LW-D; designed to mount in standard Lambda rack adapter. LW-G is rack mounted.

Physical data

Weight

LW-D Models, 40 lbs. net, 50 lbs. ship; LW-E Models, 40 lbs. net, 50 lbs. ship; LW-EE Models, 60 lbs. net, 75 lbs. ship; LW-G Models, 120 lbs. net, 140 lbs. ship.

Size

LW-D, 4 15/16"H x 7 1/2"W x 9 3/8"D; LW-E, 4 15/16"H x 7 1/2"W x 11 3/4"D; LW-EE, 4 15/16"H x 7 1/2"W x 16 1/2"D; LW-G, 5 3/16"H x 19"W x 16 1/2"D (full rack).

Finish

LW-D, E, EE, G grey, FED. STD. 505 No. 26081. LW-G Front Panel — brushed aluminum clear anodized panels with grey inlay (standard).

Accessories

rack adapters, chassis slides, blank panels.

Guaranteed for 5 years

5-year guarantee includes labor as well as parts. Guarantee applies to operation at full published specifications at end of 5 years.

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New IC regulated bench power supply with built-in, tracking overvoltage protection

0-10 volts, 1 amp, $90 with OV
0-10 volts, 1 amp, $75 less OV

Also available 0-20, 0-40, 0-120 vdc

Regulation
line 0.01% + 1mv
load 4 mv

Ripple and noise
250 μv rms; 1 mv p-to-p

All silicon DC power supply using integrated circuits to provide regulation system
except for input and output capacitors, rectifiers and series regulation transistors

Multi-position operation
lies flat or stands erect

AC input
105-132 vac 47-440 Hz (Current ratings based on 57-63 Hz.)

Weight
less than 5 lbs.

Output
5-way binding posts

Ambient operating temperature
0—50°C

Temperature coefficient
0.015% + 300 μv/°C

Adjustable current limiting
0% to 110% of rating

Storage temperature
—40°C to +85°C

Convection cooled

Die-cast aluminum construction

No overshoot
on turn-on, turn-off or power failure

Controls
coarse voltage adjust, fine voltage adjust, current adjust, ON/OFF switch, meter function switch.

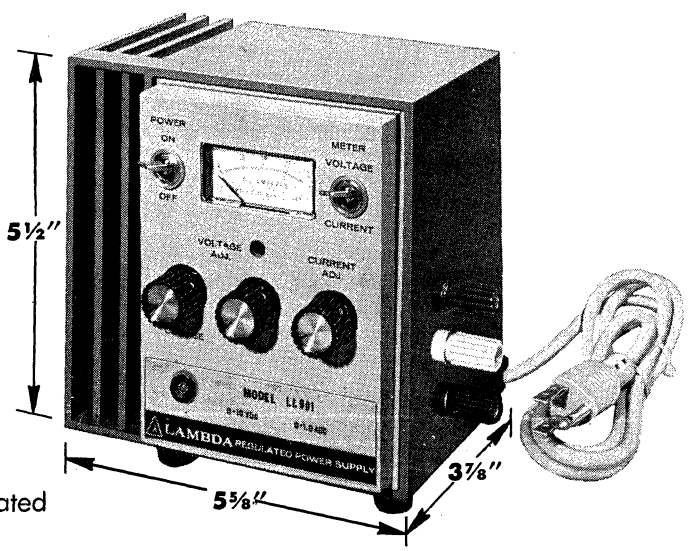
Indicators
power ON light and dual-function meter

Guaranteed for 5 years material and labor

LL series bench-type supply 5⅝" x 5½" x 3⅞"

Model	ADJ. VOLT RANGE VDC	CURRENT RANGE(1)	Price(2)
LL-901	0-10	0-1.0 amp	$85
LL-902	0-20	0-0.65 amp	85
LL-903	0-40	0-0.35 amp	85
LL-905	0-120	0-65 ma	99
WITH BUILT-IN TRACKING OVERVOLTAGE PROTECTION			
LL-901-OV	0-10	0-1.0 amp	$99
LL-902-OV	0-20	0-0.65 amp	99
LL-903-OV	0-40	0-0.35 amp	99

NOTES:
(1) Consult factory for operation at 50 Hz or temperatures above 50°C. Ratings apply 0-50°C.
(2) Independently adjustable OV protection available as accessory on LL-901, 902 (LC-OV-10, range 3-24 vdc) and LL-903 (LC-OV-11. range 3-47 vdc) price $20.
(3) All prices F.O.B. Melville, N. Y. All prices and specifications subject to change without notice.



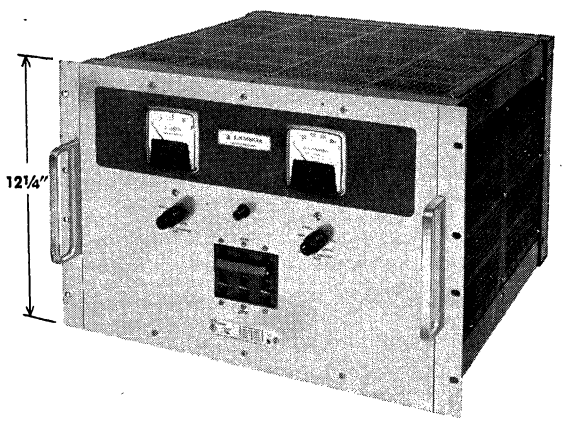
LL series I-C regulated power supply

Lambda Electronics Corp., 515 Broad Hollow Road, Melville, L. I., New York 11746 • Tel. 516-694-4200.

New.

high-current, high efficiency power supplies

Lambda's LB series high-current power supplies with up to 85% efficiency, up to 300 volts; up to 500 amps; less than 10 mV RMS ripple. Designed for main frames of computers, life-test equipment, aging racks and on-line testing.



Up to 85% efficiency

Low ripple
10 mV rms max.

Regulation
line .05% + 6 mV
load 0.1% + 10 mV

AC input
208 ± 10% Vac; 57-63 Hz, 3 phase, 4 wire

All silicon semiconductors
for maximum reliability

Convection cooled
no blowers, no external heat sinks

Overvoltage protection up to 70 Vdc
standard on all models up to 60 Vdc

Remotely programable

Remote sensing

Transformer
designed to MIL-T-27C Grade 6

Completely protected
short circuit proof. Continuously adjustable automatic current limiting.

Constant voltage/constant current
by automatic crossover

Temperature coefficient
0.03% + 0.5 mV/°C

Series/parallel operation

LB SERIES, METERED, FULL-RACK SIZE: 7" x 19" x 20 1/16"

Model	Voltage Range	Max. Current (Amps) at Ambient of: (1) 40°C	50°C	60°C	71°C	Price(2)
LB-701-FM-OV	0-7.5	300	270	235	200	$1,500
LB-702-FM-OV	0-15	180	170	160	150	1,500
LB-703-FM-OV	0-36	80	75	70	65	1,400
LB-704-FM-OV	0-60	50	47	44	40	1,400
LB-705-FM	0-125	25	22	19	16	1,400
LB-706-FM	0-300	10	9.5	9.0	8.0	1,400

LB SERIES, METERED, FULL-RACK SIZE: 12¼" x 19" x 22 1/16"

Model	Voltage Range	Max. Current (Amps) at Ambient of: (1) 40°C	50°C	60°C	71°C	Price(2)
LB-721-FM-OV	0-7.5	500	450	400	350	$2,700
LB-722-FM-OV	0-15	300	265	225	180	2,700
LB-723-FM-OV	0-36	135	130	125	120	2,500
LB-724-FM-OV	0-60	80	75	70	65	2,500
LB-725-FM	0-125	40	36	32	28	2,500
LB-726-FM	0-300	16	15	14	13	2,500

NOTES:
1. Current rating applies over entire voltage range.
2. Prices include meters. LB Series models are not available without meters. Prices for all models up to and including 60 Vdc include built-in overvoltage protection. Prices are FOB Melville, New York. Prices and specifications are subject to change without notice.

LAMBDA
ELECTRONICS CORP.
A Vesco Company

515 Broad Hollow Road, Melville, L.I., New York 11746. Telephone: 516-694-4200. TWX: 510-224-6484. CABLE: LAMBDATRON, MELVILLE, N.Y.

Lambda has over 10,000 power supply units on-the-shelf for 1-day delivery. Every one fully guaranteed for 5 years . . . material and labor.

Lambda's LPD series offer more amps per $ than any other general-purpose dual lab supply.

also available with single output... LP series

Features of LPD series dual output power supply

5 models with two independent DC outputs
up to ±250 vdc, up to 1.7 amps. Either output may be + or − or both outputs may be + or −

Series/parallel operation
of both outputs yields two times the voltage or two times the current—up to 500 volts or up to 3.4 amps.

Auto series/auto parallel (master-slave)
permits tracking to a common reference.

4 meters
provide simultaneous monitoring of both voltage and current.

Regulation
line or load .01% + 1 mv.

Ripple
500 μv rms (1.5 mv p-p)

A-C input
105-132 vac 47-440 Hz (ratings based on 57-63 Hz operation). For operation at 205-265 vac, add suffix "-V" to model numbers and 10% or $25.00 (whichever is greater) to price.

Multi-current-rated
Bench or rack use
Remotely programable
Remote sensing
Designed to meet RFI per MIL-STD-826A

Fungus-proofing option
add suffix "R" to model number and add $15.00 to price.

Overvoltage protection
available as an option up to 70 vdc

LPD dual output models

5 3/16" x 8 3/8" x 10 3/32"

MODEL	Voltage Range Per Output/ Outputs in Series VDC	MAX AMPS AT AMBIENT OF: (1) Per output. Outputs in parallel 30°C	40°C	50°C	60°C	PRICE
*LPD-421-FM	0-±20/ 0-40	1.7A/ 3.4A	1.5A/ 3.0A	1.3A/ 2.6A	0.9A/ 1.8A	$290
*LPD-422-FM	0-±40/ 0-80	1.0A/ 2.0A	0.85A/ 1.7A	0.7A/ 1.4A	0.56A/ 1.1A	290
*LPD-423-FM	0-±60/ 0-120	0.7A/ 1.4A	0.6A/ 1.2A	0.5A/ 1.0A	0.4A/ 0.8A	325
LPD-424-FM	0-±120/ 0-240	0.38A/ 0.76A	0.32A/ 0.64A	0.26A/ 0.52A	0.20A/ 0.40A	325
LPD-425-FM	0-±250/ 0-500	0.13A/ 0.28A	0.12A/ 0.24A	0.11A/ 0.22A	0.10A/ 0.20A	350

LPD NOTES:
* OVERVOLTAGE PROTECTION AVAILABLE AS AN ACCESSORY — $35.00 EACH.
1 CURRENT RATING APPLIES OVER ENTIRE VOLTAGE RANGE.

LP single output models

5 3/16" x 4 3/16" x 10"

MODEL	ADJ. VOLT. RANGE Vdc	MAX. AMPS AT AMBIENT OF: (1) 30°C	40°C	50°C	60°C	PRICE
* LP-410A-FM	0-10	0-2	0-1.8	0-1.6	0-1.4	$140
* LP-411A-FM	0-20	0-1.2	0-1.1	0-1.0	0-0.8	140
* LP-412A-FM	0-40	0-1.0	0-0.9	0-0.8	0-0.6	140
* LP-413A-FM	0-60	0-0.45	0-0.41	0-0.37	0-0.33	140
LP-414A-FM	0-120	0-0.20	0-0.18	0-0.16	0-0.12	160
LP-415A-FM	0-250	0-80 mA	0-72 mA	0-65 mA	0-60 mA	175

LP single output models

5 3/16" x 4 3/16" x 15 1/2"

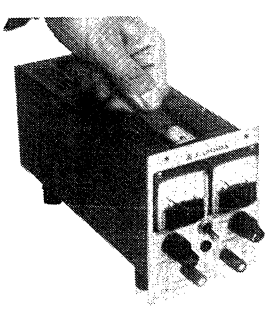
MODEL	ADJ. VOLT. RANGE Vdc	MAX. AMPS AT AMBIENT OF: (1) 30°C	40°C	50°C	60°C	PRICE
* LP-520-FM	0-10	0-5.0	0-4.7	0-4.3	0-3.7	$210
* LP-521-FM	0-20	0-3.3	0-3.0	0-2.6	0-2.3	200
* LP-522-FM	0-40	0-1.8	0-1.6	0-1.4	0-1.2	200
* LP-523-FM	0-60	0-0.9	0-0.8	0-0.7	0-0.6	215
LP-524-FM	0-120	0-0.5	0-0.45	0-0.4	0-0.35	270

LP NOTES:
* OVERVOLTAGE PROTECTION AVAILABLE AS AN ACCESSORY — $35.00 EACH.
1 CURRENT RATING APPLIES OVER ENTIRE VOLTAGE RANGE.

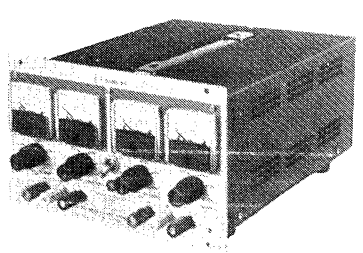
Overvoltage protectors (accessories)

FOR USE WITH	MODEL	ADJ. VOLT RANGE	PRICE*
LP-410A-FM, LP-411A-FM, LP-520-FM, LP-521-FM, LPD-421-FM	LH-OV-4	3-24V	$35
LP-412A-FM, LP-522-FM, LPD-422-FM	LH-OV-5	3-47V	35
LP-413A-FM, LP-523-FM, LPD-423-FM	LH-OV-6	3-70V	35

*PRICE IS FOR A SINGLE OVERVOLTAGE ACCESSORY. LPD SERIES MODELS REQUIRE ONE LH-OV FOR EACH OUTPUT.



LP Series



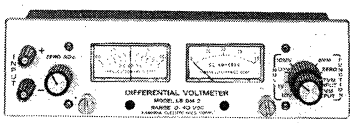
LPD Series
Dual Output
Lab Supplied

5 Year Guarantee

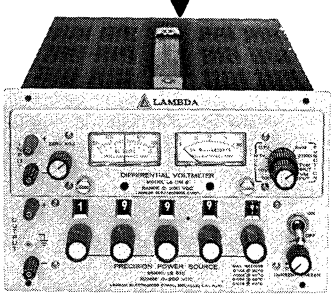
Lambda Electronics Corp. 515 Broad Hollow Road, Melville, L. I., New York 11746. Tel. 516-694-4200.

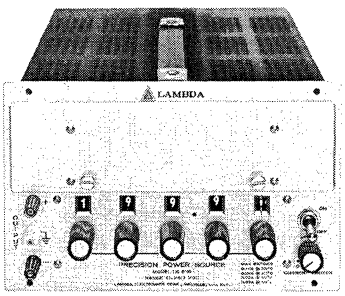
LS series is two instruments in one
Expand the capability of your laboratory

With this plug-in



it becomes a high precision power differential voltmeter

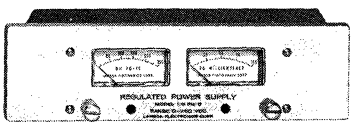




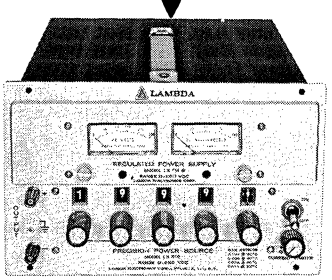
LS power source

ONE DAY DELIVERY ALL MODELS

With this plug-in



it becomes a metered high precision power supply



FEATURES OF THE HIGH PRECISION POWER DIFFERENTIAL VOLTMETER

- **Draw power as you measure voltage...**

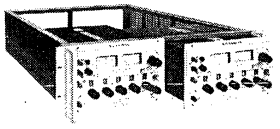
  The first and only differential voltmeter to furnish high stability power output while being used as a voltmeter... no need for a separate power supply.

- **Plus all power supply specifications**

FEATURES OF THE METERED HIGH PRECISION POWER SOURCE

- **0.0005% plus 100μV Regulation** — best of any high stability power supply in this price range.
- **Ripple** — 35μV rms; 100μV p-p.
- **Accuracy** — 0.01% + 1mV.
- **2 Meters** — monitor both voltage and current simultaneously and continuously.
- **Twice the power** — in a convenient ½-rack package.
- **Guaranteed for 5 years** — the only 5-year guarantee that includes labor as well as parts. Guarantee applies to operation at full published specifications at end of 5 years.

- **Multi-Current-Rated** — for 30°C, 40°C, 50°C, 60°C — Covers temperatures most often encountered in laboratory work.
- **5 Models** — with ranges of 0-10, 0-20, 0-40, 0-120, 0-250VDC—Wide selection of ranges to suit your specific needs.
- **Illuminated digital readout** — 5-digital voltage dials provide convenient precise adjustment (200μV resolution over entire range).
- **Only 5¼" high**—convenient half-rack size for rack or bench use.
- **Stability** — 0.001% + 100μV for 8 hours.
- **All silicon-designed for maximum reliability.**
- **Convection-cooled** — no blowers, no external heat sinks.
- **Remote programing**—by changes in voltage or resistance for convenience in systems, test equipment and automatic equipment applications.
- **Auto Series/Auto Parallel** — with Master-Slave tracking.
- **Constant voltage/Constant current.**
- **Completely protected** — short-circuit proof; continuously adjustable automatic current limiting.
- **Overvoltage protection**—available as low cost add-on accessory.
- **Rubber feet** — provided for bench use.
- **AC Input** — 105-132VAC, 47-440 Hz (derate dc output current 10% at 50 Hz) 205-265VAC at extra charge. ("-V" option)
- **Fungus Proofing Option**—Add suffix "R" to model number and add $20.00 to price



- **Mount in Rack Adapters**—LRA-1 ($60.00) or LRA-2 ($35.00). Rack adapter LRA-1 only is available with chassis slides mounted. Add suffix "CS" to rack adapter model number and $50 to price.

Basic Non-Metered Model	Voltage Range	Max. Amps at Ambient of (1) 30°C	40°C	50°C	60°C	(2) Price
LS-511A	0-10VDC	2.8A	2.5A	2.1A	1.7A	$445
LS-512A	0-20VDC	1.8A	1.6A	1.3A	1.1A	445
LS-513A	0-40VDC	1.0A	0.9A	0.75A	0.6A	445
LS-515A	0-120VDC	0.33A	0.29A	0.25A	0.21A	445
LS-516A	0-250VDC	0.1A	0.09A	0.08A	0.07A	445

Metered Accessory Model	(2) Price
LS-FM1	$55
LS-FM2	55
LS-FM3	55
LS-FM5	55
LS-FM6	55

Diff. VM Accessory Model	(2) Price
LS-DM1	$125
LS-DM2	125
LS-DM3	125
LS-DM5	125
LS-DM6	125

Over Volt. Protect. Model	Adj. V. Range	Price
LHOV-4	3-24	$35
LHOV-4	3-24	35
LHOV-5	3-47	35

NOTES:

1 Current rating applies over entire voltage range. Ratings based on 55-65 Hz operation. Derate current 10% for 50 Hz.

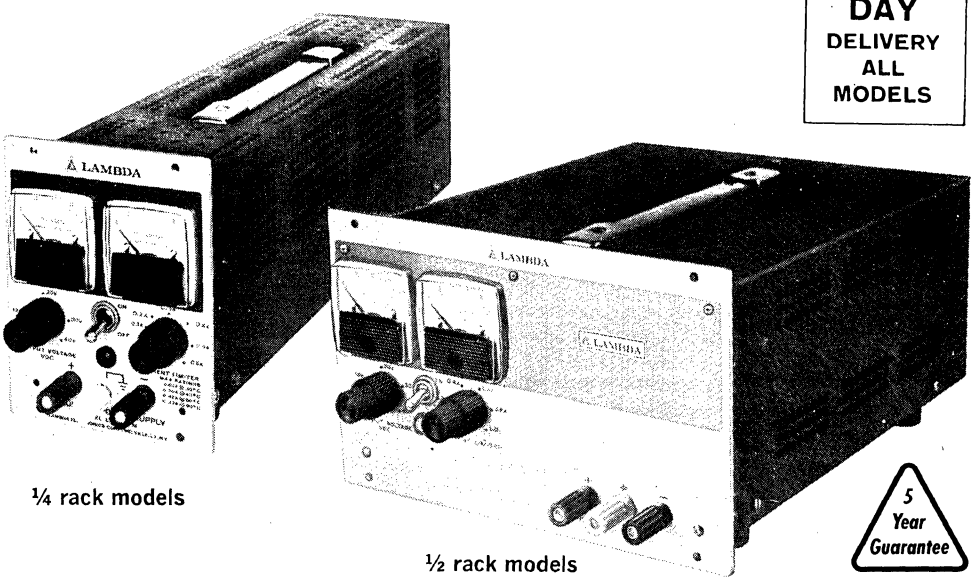
2 This price is for non-metered Precision Power Source. Addition of Metered Accessory Plug-In (next two columns) is necessary to have Metered High Precision Power Supply. Addition of Differential Voltmeter Accessory Plug-In to the basic model is necessary for the unit to function as a High Precision Differential Voltmeter.

LAMBDA
ELECTRONICS CORP.
515 BROAD HOLLOW ROAD, MELVILLE, L.I., N.Y. 11746
TEL. 516-694-4200, TWX: 510-224-6484
CABLE: LAMBDATRON, MELVILLE, N.Y.

LR series high-performance power supplies regulation—0.0005%, ripple—35μv

For test equipment and lab use—rack or bench 0-20, 0-40, 0-120, 0-250 VDC, from 60 ma. to 1.8 amps.

ONE DAY DELIVERY ALL MODELS



¼ rack models

½ rack models

5 Year Guarantee

Features and Data

- **0.0005% plus 100μV regulation.**
- **35μV rms, 100μV p-to-p ripple.**
- **AC Input:** 105-132 VAC, 47-440 Hz (Ratings based on 55-65 Hz; derate current 10% at 50 Hz.) 205-265 VAC on request at extra charge ("-V" option).
- **2 meters** monitor both voltage and current simultaneously and continuously.
- **Accuracy**—0.01% plus 1mV
- **Stability**—0.001% plus 100μV for 8 hours
- **Temperature coefficient**—0.001% plus 10μV/°C
- **Multi-Current-Rated.**
- **Guaranteed for 5 years.** The only 5-year guarantee that includes labor as well as parts. Guarantee applies to operation *at full published specifications* at end of 5 years.
- **Only 5¼" high.** Convenient ¼ and ½ rack sizes for rack or bench use.
- **All silicon-designed for maximum reliability.**
- **Convection Cooled**—no blowers, no external heat sinks.
- **Auto Series/Auto Parallel** with Master-Slave tracking.
- **Constant Voltage/Constant Current**
- **Completely protected**—short-circuit proof—continuously adjustable, automatic current limiting.
- **Overvoltage protection** available for all models up to 70 VDC.
- **Remotely Programable**

LR Series ¼-rack models				Size: 5 3/16" x 4 3/16" x 15½"		
Model	Voltage Range	MAX. AMPS AT AMBIENT OF:[1]				Price
		30°C	40°C	50°C	60°C	
LR-602-FM	0-20 VDC	1.1	.95	.80	.64	$265
LR-603-FM	0-40 VDC	.60	.50	.42	.33	265

LR Series ½-rack models				Size: 5 3/16" x 8 3/8" x 10 5/8"		
Model	Voltage Range	MAX. AMPS AT AMBIENT OF:[1]				Price[2]
		30°C	40°C	50°C	60°C	
LR-612-FM	0-20 VDC	1.8A	1.6A	1.3A	1.1A	$305
LR-613-FM	0-40 VDC	1.0A	0.9A	0.75A	0.6A	305
LR-615-FM	0-120 VDC	0.33A	0.29A	0.25A	0.21A	320
LR-616-FM	0-250 VDC	100ma	90ma	80ma	70ma	340

NOTES:
1 Current rating applies over entire voltage range. Ratings based on 55-65 Hz operation. Derate current 10% for 50 Hz input.
2 Prices are for metered models. LR Series models are not available without meters.

Accessories

Rack Adapter LRA-1 Price $60.00 • 5¼" H x 16½" D

Rack Adapter LRA-2 Price $35.00 • 5¼" H

OVERVOLTAGE PROTECTION ACCESSORIES			
For Use With	Model	Adj. Volt Range	Price
LR-602-FM, LR-612-FM	LH-OV-4	3-24 V	$35
LR-603-FM, LR-613-FM	LH-OV-5	3-47 V	35

Prices F.O.B. factory, Melville, N. Y. All specifications and prices subject to change without notice.

LAMBDA
ELECTRONICS CORP.
515 BROAD HOLLOW ROAD, MELVILLE, L.I., N.Y. 11746
TEL. 516-694-4200, TWX: 510-224-6484
CABLE: LAMBDATRON, MELVILLE, N.Y.

LH series 1/2 rack general purpose power supplies offering high power ratings for bench, for rack, or test equipment usage

Outstanding features

Convection cooled
no blowers, no external heat sinks

Regulation
.015% or 1 mV (line or load)

Ripple
250 μV RMS

No voltage spikes or overshoot
on "turn-on," "turn-off" or power failure.

Series/parallel operation
Completely protected
short circuit proof; continuously adjustable automatic current limiting.

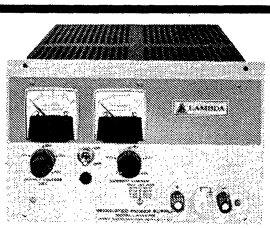
Constant voltage/constant current
Remotely programmable
200 ohms/volt, or volt/volt

Remote sensing
provision is made for remote sensing to eliminate effect of power output lead resistance on DC regulation.

Meet Mil. environment specs.
vibration: MIL-T-4807A
shock: MIL-E-4907A Proc. 1 and 2
RFI: MIL-I-26600
humidity: MIL-STD-819 Meth. 507
temp. shock: MIL-E-5272C (ASG) Proc. 1
altitude: MIL-E-4970A (ASG) Proc. 1
marking: MIL-STD-130
quality: MIL-Q-9858

LH SERIES ½-RACK MODELS

5 3/16" x 8 3/8" x 15 5/8"
REGULATION: 0.015% + 1 mV
RIPPLE: 250 μV RMS



MODEL	ADJ. VOLT. RANGE VDC	MAX. CURRENT (AMPS) AT AMBIENT OF:[1] 30°C	50°C	60°C	71°C	PRICE[4]
LH-119A-FM	0-10	9.0	8.0	6.9	5.8	$320
LH-122A-FM	0-20	5.7	4.7	4.0	3.3	300
LH-125A-FM	0.40	3.0	2.7	2.3	1.9	300
LH-128A-FM	0-60	2.4	2.1	1.8	1.5	345
LH-131-FM	0-120	1.2	0.9	0.8	0.6	350

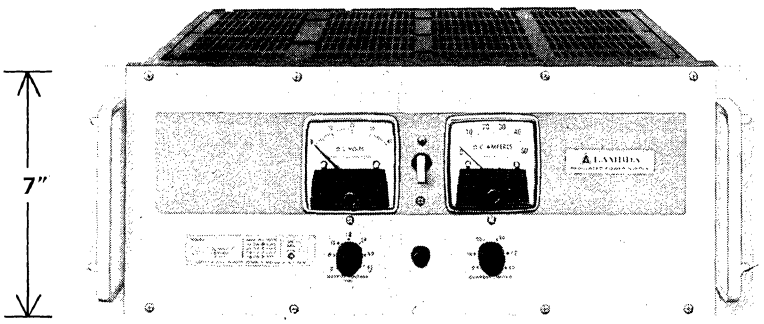
OVERVOLTAGE PROTECTOR ACCESSORIES

ADJ. VOLT RANGE VDC	MODEL	FOR USE WITH	PRICE[4]
3-24	LH-OV-4	LH-119A-FM, -122A-FM	$35
3-47	LH-OV-5	LH- -125A-FM	35
3-70	LH-OV-6	LH -128A-FM	35

NOTES:
[1] Current rating applies over entire voltage range. Derate 10% for 50 Hz operation.
[2] Prices are for metered models. Non-metered models available at same price.
[3] Overvoltage protection up to 70 Vdc is available as a bolt-on accessory for models with suffix (A) or (B). To order, see chart.
[4] Prices subject to change without notice.

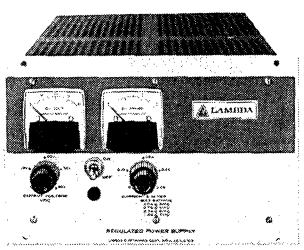
LK series high-current power supplies all silicon, convection cooled–bench or rack

For test equipment and lab use–
0-20, 0-36, 0-60 VDC from 0-4.0 amps. to 0-66 amps.

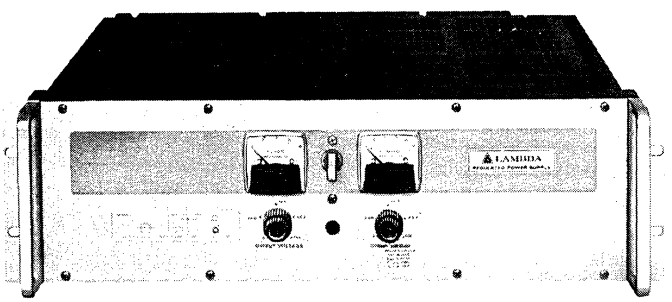


ONE DAY DELIVERY ALL MODELS

5 Year Guarantee



LK Series metered ½-rack



LK Series metered full-rack

Features and Data

- **All silicon-designed for maximum reliability**
- **Convection Cooled**—no blowers, no external heat sinks.
- **Regulation**—.015% or 1 mV (line or load)
- **Ripple**—500μV RMS
- **AC Input**—105-132 VAC, 57-63 Hz. LK7 "series" 188-238 VAC, 57-63 Hz (derate current 10% at 50 Hz.)
- **No Voltage Spikes or Overshoot** on "turn on", "turn off" or power failure
- **Temperature coefficient**—0.015% + 0.5mV/°C.
- **Series/Parallel Operation**
- **Completely Protected**—short circuit proof—Continuously adjustable automatic current limiting
- **Constant Voltage/Constant Current**
- **Remotely Programable**
- **Meet Mil. Environment Specs.**
  Vibration: MIL-T-4807A
  Shock: MIL-E-4970A Proc. 1 & 2
  Humidity: MIL-STD-819 Meth. 507
  Temp. Shock: MIL-E-5272C (ASG) Proc. 1
  Altitude: MIL-E-4970A (ASG) Proc. 1
  Marking: MIL-STD-130
  Quality: MIL-Q-9858

LK Series full-rack models — Size 7" x 19" x 18½"

Model[2]	ADJ. VOLT. RANGE VDC	CURRENT RANGE AT AMBIENT OF:[1] 40°C	50°C	60°C	71°C	Price[2]
LK-360 FM	0-20	0-66A	0-59A	0-50A	0-40A	$1,100
LK-361 FM	0-36	0-48A	0-43A	0-36A	0-30A	1,000
LK-362 FM	0-60	0-25A	0-24A	0-22A	0-19A	1,100

LK Series full-rack models — Size 5 3/16" x 19" x 16½"

Model[2]	ADJ. VOLT. RANGE VDC	CURRENT RANGE AT AMBIENT OF:[1] 40°C	50°C	60°C	71°C	Price[2]
LK-350 FM	0-20	0-35A	0-31A	0-26A	0-20A	$705
LK-351 FM	0-36	0-25A	0-23A	0-20A	0-15A	670
LK-352 FM	0-60	0-15A	0-14A	0-12.5A	0-10A	680

LK Series ½-rack models — Size 5 3/16" x 8⅜" x 16½"

Model[2]	ADJ. VOLT. RANGE VDC	CURRENT RANGE AT AMBIENT OF:[1] 40°C	50°C	60°C	71°C	Price[2]
LK-340 A-FM	0-20	0- 8.0A	0- 7.0A	0- 6.1A	0-4.9A	$360
LK-341 A-FM	0-20	0-13.5A	0-11.0A	0-10.0A	0-7.7A	415
LK-342 A-FM	0-36	0- 5.2A	0- 5.0A	0- 4.5A	0-3.7A	365
LK-343 A-FM	0-36	0- 9.0A	0- 8.5A	0- 7.6A	0-6.1A	425
LK-344 A-FM	0-60	0- 4.0A	0- 3.5A	0- 3.0A	0-2.5A	370
LK-345 A-FM	0-60	0- 6.0A	0- 5.2A	0- 4.5A	0-4.0A	425

Prices F.O.B. factory, Melville, N. Y. All specifications and prices subject to change without notice.

OVERVOLTAGE PROTECTION ACCESSORIES

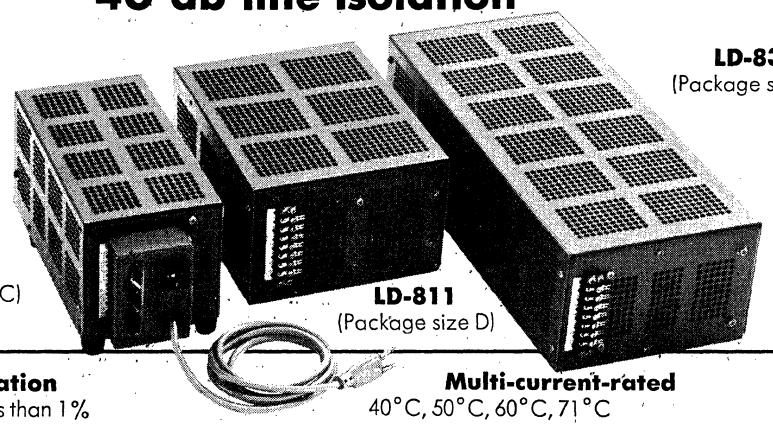
For Use With	Model	Adj. Volt Range	Price
LK-340A, 341A	LH-OV-4	3-24 VDC	$35
LK-342A, 343A	LH-OV-5	3-47 VDC	35
LK-344A, 345A	LH-OV-6	3-70 VDC	35
LK-350-352	Overvoltage Protection up to 70 VDC as a built-in option for full-rack models. To order, add suffix (-OV) and add $90.00 to price of models LK-350—352-FM; add $120.00 for models LK-360-FM—362-FM.		
LK-360 FM-362 FM			

NOTES:
[1] Current rating applies over entire voltage range.
[2] Prices are for metered models. Non-metered models available at same price. Models LK-360-FM, LK-361-FM, and LK-362-FM which are metered models not available without meters.
[3] Chassis Slides for full rack models: Add suffix (-CS) to model number and add $60.00 to the price, except for models LK-360-FM and LK-362-FM, for which add $100.00.

LAMBDA
ELECTRONICS CORP.
515 BROAD HOLLOW ROAD, MELVILLE, L.I., N.Y. 11746
TEL. 516-694-4200, TWX: 510-224-6484
CABLE: LAMBDATRON, MELVILLE, N.Y.

Now from Lambda. All solid state ac power conditioners

1% line and load regulation 3% harmonic distortion 40 db line isolation



LD-831
(Package size EE)

LD-801
(Package size CC)

LD-811
(Package size D)

Regulation
line or load: less than 1%

Response time
less than 50 msec.

All silicon semiconductors

Convection cooled
no external heat sinks

Sinusoidal output
less than 3% distortion

High efficiency
greater than 80%

Wide power factor range
+0.7 PF leading to 0 PF lagging

Remote sensing

Multi-current-rated
40°C, 50°C, 60°C, 71°C

Adjustable output voltage

Remote programing
LD 802, LD 812 and LD 832

Wide frequency range
57-63 Hz or 47-53 Hz

Wide temperature range
0 to 71° C

Wide input voltage range
100-132, 180-235, 200-265 vac

Automatic current limiting
protects load as well as power supply

Completely repairable
all components replaceable

	Model[3]	INPUT VAC Resistive Load	INPUT VAC Inductive Load	OUTPUT VAC (Adjustable)	Frequency Hz	MAXIMUM VA AT AMBIENT OF [1] 40°C	50°C	60°C	71°C	Price[2]
4 15/16" x 4 15/16" x 9 3/8"	LD-801	100-132	105-132	110-120	57-63	250	200	160	85	$140
	LD-802*	100-132	105-132	100-132	57-63	225	180	130	70	200
	LD-803	180-235	190-235	200-220	57-63	200	165	120	70	200
	LD-803-V	200-265	210-265	220-240	47-53	200	165	120	70	200
4 15/16" x 7 1/2" x 9 3/8"	LD-811	100-132	105-132	110-120	57-63	500	440	300	170	150
	LD-812*	100-132	105-132	100-132	57-63	450	350	270	120	225
	LD-813	180-235	190-235	200-220	57-63	400	320	250	120	225
	LD-813-V	200-265	210-265	220-240	47-53	400	320	250	120	225
4 15/16" x 7 1/2" x 16 1/2"	LD-831	100-132	105-132	110-120	57-63	1000	800	600	350	230
	LD-832*	100-132	105-132	100-132	57-63	900	725	550	300	275
	LD-833	180-235	190-235	200-220	57-63	800	640	500	280	275
	LD-833-V	200-265	210-265	220-240	47-53	800	640	500	280	275

*Models LD-802, 812, and 832 are remotely programable.

Note 1. Ratings do not apply for capacitive load; consult factory.
2. All prices F.O.B. Melville, N.Y. All prices and specifications subject to change without notice.
3. "–V option" units are same as LD-803, 813 & 833 respectively except that internal taps on transformer are rewired for input frequency change.

One day delivery–90% of all models

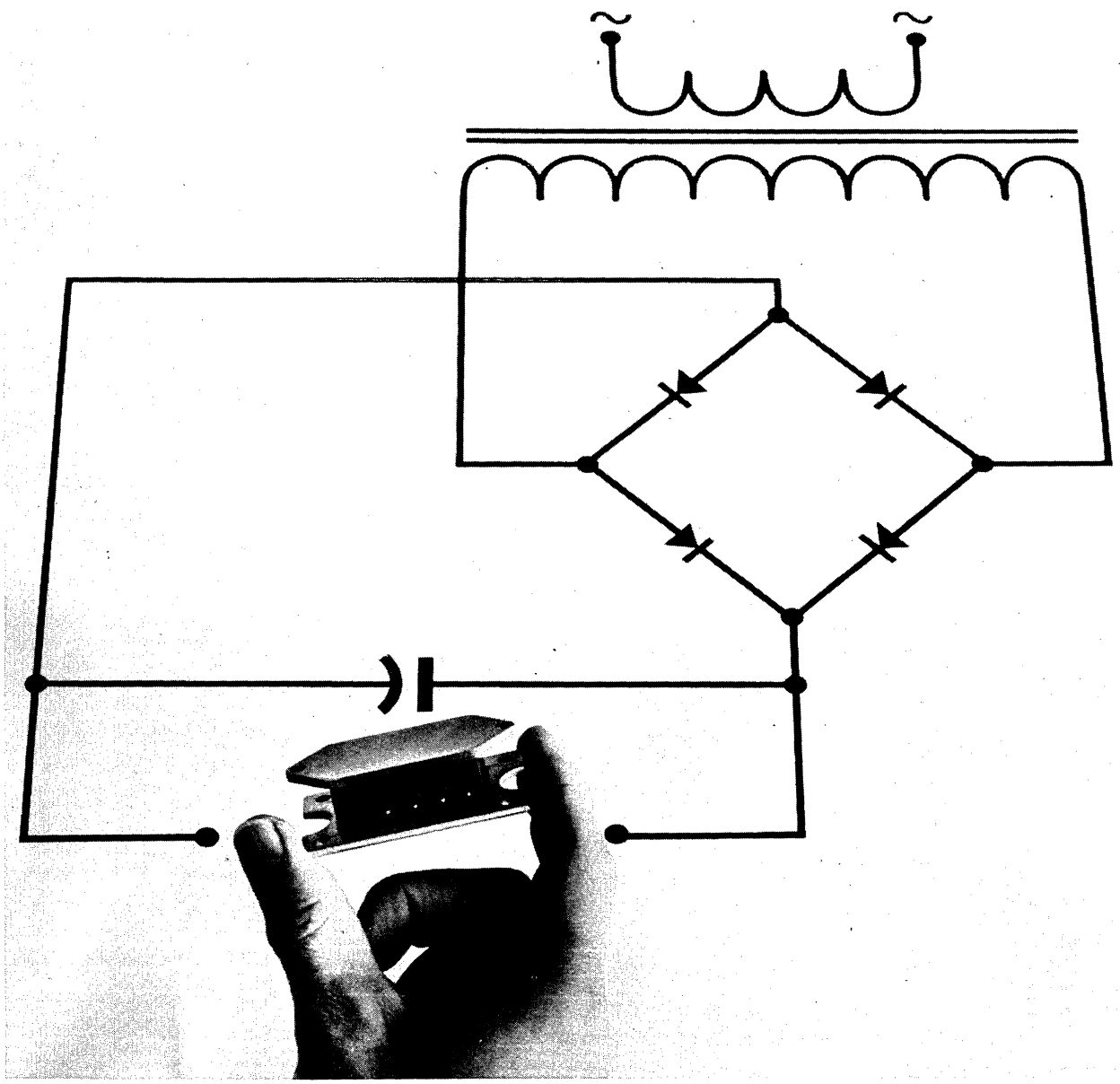
Guaranteed for five years material and labor

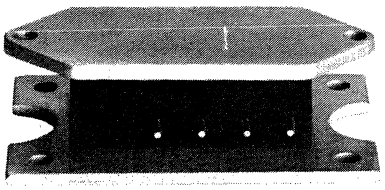
A Veeco Company

LAMBDA ELECTRONICS CORP.
515 BROAD HOLLOW ROAD, MELVILLE, L.I., N.Y. 11746
TEL. 516-694-4200, TWX: 510-224-6484
CABLE: LAMBDATRON, MELVILLE, N.Y.

LAMBDA POWER HYBRID VOLTAGE REGULATORS

The world's first... 22 models... 5 volts 5 amp model @ $20 in quantities of 100





"actual size"

DO YOU FACE A "MAKE OR BUY" DECISION ON POWER SUPPLIES?

A revolutionary development by Lambda offers you improved power supply performance at lower cost whether you "make" OR "buy." It is the Series LAS2 Power Hybrid Voltage Regulator, which provides 0.1% line or load regulation for any DC power supply with output ratings up to 28V and 5A.

The Power Hybrid Voltage Regulator replaces all discrete components of conventional regulator circuitry. It converts any source of filtered DC into a regulated power supply. Designed and built by Lambda in a new microelectronic facility, the Power Hybrid Voltage Regulator is available as a separate component for the buyer or builder of custom power supplies. It is also incorporated in many of Lambda's off-the-shelf supplies and in Lambda's power kits.

What it is

The Series LAS2 Power Hybrid Voltage Regulator utilizes cermet thick-film resistors, capacitors and monolithic integrated circuits, and power transistors in chip form, to achieve optimum regulator performance at minimum cost.

A key feature of its construction is the high degree of thermal isolation between the heat generating power elements and the heat sensitive control and reference elements. This thermal isolation results in extremely low thermal drift characteristics for changes in power levels. In addition, a unique thermal power limiting circuit is built into the power section of the unit for increased operational reliability.

What it offers

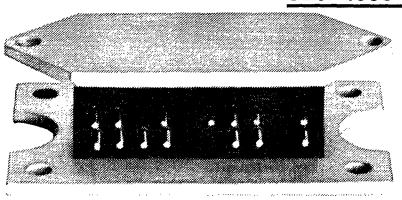
The Power Hybrid Voltage Regulator allows the power supply builder to achieve rock-bottom simplicity in his design. This is one of its major advantages. The regulator package, occupying about 2.5 cubic inches of space, replaces all of the transistors, diodes, resistors, capacitors and circuit boards of present-day voltage regulators. 22 electrical configurations provide exceptional versatility to meet specific design requirements.

For the builder of power supplies . . .

this means lower cost at every stage of production: lower engineering costs, simpler incoming inspection, smaller and simpler parts inventory, lower manufacturing costs. Of course, these same benefits accrue to us as a manufacturer of regulated power supplies. This is why we can offer a wide range of high-performance packaged supplies at moderate cost.

For the user of power supplies...

the Power Hybrid Voltage Regulator means, above all, unequaled reliability. The advantages of ICs over discrete circuitry need no elaboration. Moreover, this ruggedly packaged unit is less susceptible to physical damage than exposed IC or discrete components, thus, longer MTBF is achieved. If a malfunction should occur, the low cost of the Power Hybrid Voltage Regulator makes it economically practical to simply replace the entire unit.



ONLY LAMBDA'S POWER HYBRID VOLTAGE REGULATORS OFFER YOU THESE 15 FEATURES IN A PACKAGE THIS SMALL

(and at a price of $20 each in lots of 100)

Features

1
Up to 5 Amperes D.C. output

2
Up to 28 Volts D.C. output

3
Up to 85 Watts dissipation

4
0.2% Regulation, line or load

5
0.007% /°C temperature coefficient

6
Short circuit and overload protection

7
Thermal protection

8
Remote programming

9
Remote sensing

10
Electrically isolated case

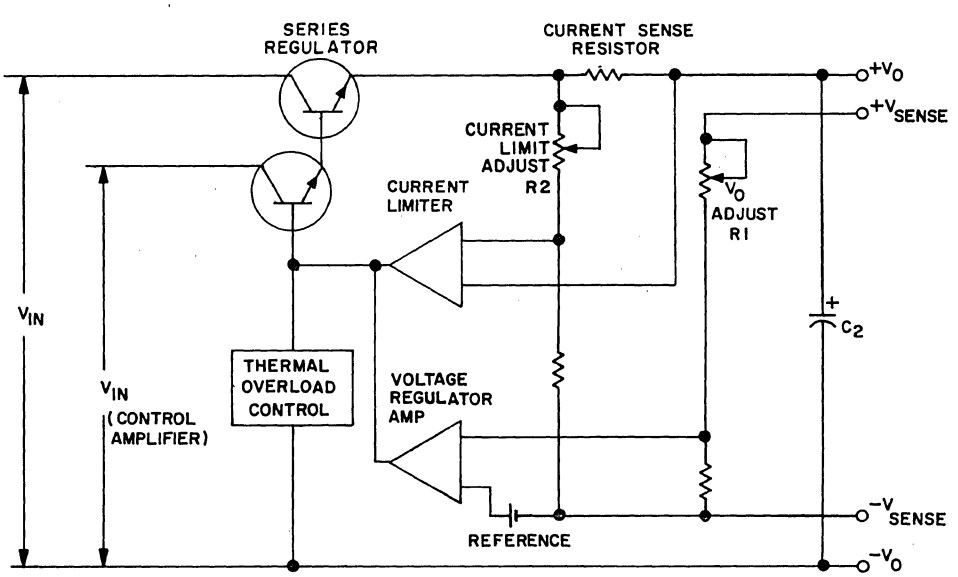
11
Increased power handling capability with external regulation transistor

12
Increased current output when used as a driver for series regulation transistors

13
Positive regulator

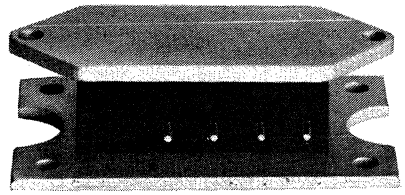
14
Dual tracking connection and negative regulator connection with transformer isolation

15
22 models available



BLOCK DIAGRAM—POWER HYBRID VOLTAGE REGULATOR

Lambda Electronics Corp. • 515 Broad Hollow Road, Melville, L.I., New York 11746 • Tel. (516) 694-4200



22 MODELS PROVIDE ALL THESE CAPABILITIES

FIXED OUTPUT VOLTAGE (2) 4 Pin Package	MODEL	V_0 (volts)	I_0 (amps)[1]	PRICE[9]
REGULATION:	**LAS 2105**	5.0	5.0	**$40**
0.2% — line[4]	**LAS 2106**	6.0	5.0	**40**
0.2% — load[5]	**LAS 2112**	12.0	5.0	**40**
RIPPLE: 2 mV RMS[6]	**LAS 2115**	15.0	5.0	**40**
	LAS 2120	20.0	4.0	**40**
	LAS 2124	24.0	3.0	**40**
	LAS 2128	28.0	2.0	**40**

ADJUSTABLE OUTPUT VOLTAGE (±5%) (3) 14 Pin Package	MODEL	V_0 (volts)	I_0 (amps)[1]	PRICE[9]
REGULATION:	**LAS 2205**	5.0	5.0	**$40**
0.2% — line[4]	**LAS 2206**	6.0	5.0	**40**
0.2% — load[5]	**LAS 2212**	12.0	5.0	**40**
RIPPLE: 2 mV RMS[6]	**LAS 2215**	15.0	5.0	**40**
	LAS 2220	20.0	4.0	**40**
	LAS 2224	24.0	3.0	**40**
	LAS 2228	28.0	2.0	**40**

WIDE RANGE INPUT VOLTAGE, FIXED OUTPUT VOLTAGE. (±1%). (7) 4 pin package	MODEL	V_0 (volts)	MAX. AMPS AT AMBIENT OF:[10] 40°C I_0 (amps)	50°C I_0 (amps)	60°C I_0 (amps)	71°C I_0 (amps)	PRICE[9]
REGULATION:	**LAS 2305**	5.0	3.3	3.0	2.7	2.3	**$40**
0.2% — line[4]	**LAS 2306**	6.0	3.2	2.9	2.6	2.3	**40**
0.2% — load[5]	**LAS 2312**	12.0	2.5	2.3	2.1	1.8	**40**
RIPPLE: 2 mV RMS[6]	**LAS 2315**	15.0	2.3	2.1	1.9	1.7	**40**

WIDE RANGE INPUT VOLTAGE, ADJUSTABLE OUTPUT VOLTAGE. (8) (9) 14 pin package	MODEL	V_0 (volts)	MAX. AMPS AT AMBIENT OF:[10] 40°C I_0 (amps)	50°C I_0 (amps)	60°C I_0 (amps)	71°C I_0 (amps)	PRICE[9]
REGULATION:	**LAS 2405**	5.0	3.3	3.0	2.7	2.3	**$40**
0.2% — line[4]	**LAS 2406**	6.0	3.2	2.9	2.6	2.3	**40**
0.2% — load[5]	**LAS 2412**	12.0	2.5	2.3	2.1	1.8	**40**
RIPPLE: 2 mV RMS[6]	**LAS 2415**	15.0	2.3	2.1	1.9	1.7	**40**

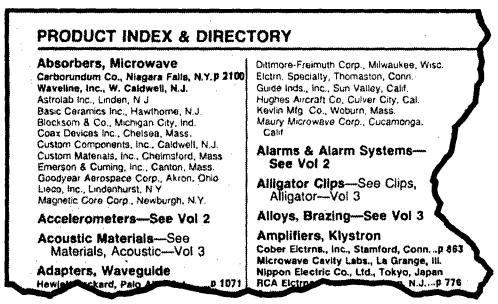
NOTES:

1. See curve (L2 catalog) for limitations imposed by heat sink thermal resistance and input–output differential.
2. Current limiter adjusted to foldback at 125% of current rating shown in table.
3. External component required for adjustment of output voltage
4. For line variations from 105 – 132 VAC.
5. For load variations from 0 to full load.
6. See general ratings.
7. Current limiter adjusted to foldback at 125% of 40°C current rating.
8. External components required for adjustment of output voltage
9. For quantities 1-9; for quantities 100, $20.00; consult factory for other quantities.
10. Maximum current rating (based on 2°C/W heatsink).

How to use eem

to find manufacturers of a specific product

GREEN SECTION



PRODUCT INDEX & DIRECTORY

Absorbers, Microwave
Carborundum Co., Niagara Falls, N.Y.p 2100
Waveline, Inc., W. Caldwell, N.J.
Astrolab Inc., Linden, N.J.
Basic Ceramics Inc., Hawthorne, N.J.
Blocksom & Co., Michigan City, Ind.
Coax Devices Inc., Chelsea, Mass.
Custom Components, Inc., Caldwell, N.J.
Custom Materials, Inc., Chelmsford, Mass.
Emerson & Cuming, Inc., Canton, Mass.
Goodyear Aerospace Corp., Akron, Ohio
Lieco, Inc., Lindenhurst, N.Y.
Magnetic Core Corp., Newburgh, N.Y.

Accelerometers—See Vol 2

Acoustic Materials—See Materials, Acoustic—Vol 3

Adapters, Waveguide
Hewl[illegible]ckard, Palo [illegible] p 1071
Dittmore-Freimuth Corp., Milwaukee, Wisc.
Electm. Specialty, Thomaston, Conn.
Guide Inds., Inc., Sun Valley, Calif.
Hughes Aircraft Co, Culver City, Cal.
Kevlin Mfg. Co., Woburn, Mass.
Maury Microwave Corp., Cucamonga, Calif

Alarms & Alarm Systems—See Vol 2

Alligator Clips—See Clips, Alligator—Vol 3

Alloys, Brazing—See Vol 3

Amplifiers, Klystron
Cober Elctrns., Inc., Stamford, Conn. ..p 863
Microwave Cavity Labs., La Grange, Ill.
Nippon Electric Co., Ltd., Tokyo, Japan
RCA Elctrn[illegible] N.J....p 776

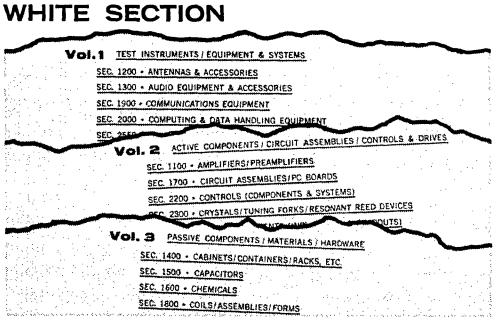
Each of the three volumes of **eem** contains a Product Index and Directory, the Green Section. This Index is a complete alphabetical listing of products. If the product you are looking for appears in the particular volume you are consulting, the green pages will provide a complete list of manufacturers who make that product. If the product is included in another volume of **eem**, the Index will provide a cross reference, directing you to the correct volume.

Boldface listings under product headings indicate that the listed manufacturer has products cataloged in **eem. Boldface** listings with page numbers indicate that this manufacturer's catalog pages include detailed data on the product indicated in the product heading.

Similar products are grouped together. For example, the many kinds of meters are listed in this manner: "Meters, Ampere," "Meters, Capacitance," "Meters, Flux" etc. To help you locate the prime product heading, there are hundreds of cross references, e.g. "Voltmeters — See Meters, Volt."

to find manufacturers' catalog information

WHITE SECTION



Vol. 1 TEST INSTRUMENTS / EQUIPMENT & SYSTEMS
SEC. 1200 • ANTENNAS & ACCESSORIES
SEC. 1300 • AUDIO EQUIPMENT & ACCESSORIES
SEC. 1900 • COMMUNICATIONS EQUIPMENT
SEC. 2000 • COMPUTING & DATA HANDLING EQUIPMENT
SEC. 2[illegible]

Vol. 2 ACTIVE COMPONENTS / CIRCUIT ASSEMBLIES / CONTROLS & DRIVES
SEC. 1100 • AMPLIFIERS/PREAMPLIFIERS
SEC. 1700 • CIRCUIT ASSEMBLIES/PC BOARDS
SEC. 2200 • CONTROLS (COMPONENTS & SYSTEMS)
SEC. 2300 • CRYSTALS/TUNING FORKS/RESONANT REED DEVICES
SEC. 2[illegible] [illegible]PUTS)

Vol. 3 PASSIVE COMPONENTS / MATERIALS / HARDWARE
SEC. 1400 • CABINETS/CONTAINERS/RACKS, ETC.
SEC. 1500 • CAPACITORS
SEC. 1600 • CHEMICALS
SEC. 1800 • COILS/ASSEMBLIES/FORMS

Catalog pages in **eem** are divided into three volumes based on very broad product groupings. These are:

Volume 1 — Test Instruments / Equipment and Systems

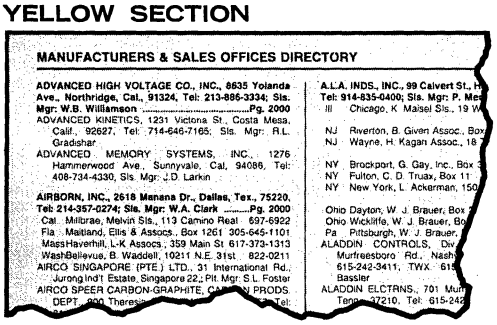
Volume 2 — Active Components / Circuit Assemblies / Controls and Drives

Volume 3 — Passive Components / Materials / Hardware

These volumes are further divided into 55 **eem** Product Sections which are assigned individually to the most appropriate volume. Within each of the 55 product sections manufacturers are arranged alphabetically, wherever possible. A complete index of all manufacturers' catalog pages is included in every volume. To locate the catalog pages of a specific manufacturer, refer to this index at the beginning of the white section in any of the three volumes. This index will provide the page numbers you require. In Volume 1, the index begins on page 302, in Volume 2 on page 1274 and in Volume 3, page 2310.

to find manufacturers' addresses, phones and sales offices

YELLOW SECTION



MANUFACTURERS & SALES OFFICES DIRECTORY

ADVANCED HIGH VOLTAGE CO., INC., 8635 Yolanda Ave., Northridge, Cal., 91324, Tel: 213-886-3334; Sls. Mgr: W.B. Williamson .....Pg. 2000
ADVANCED KINETICS, 1231 Victoria St., Costa Mesa, Calif., 92627, Tel: 714-646-7165; Sls. Mgr: R.L. Gradshar
ADVANCED MEMORY SYSTEMS, INC., 1276 Hammerwood Ave., Sunnyvale, Cal, 94086, Tel: 408-734-4330, Sls. Mgr: J.D. Larkin

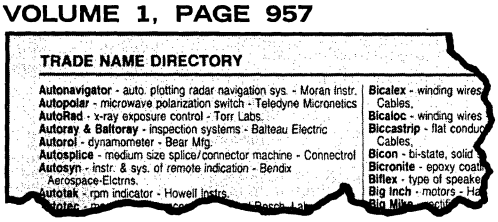
AIRBORN, INC., 2618 Menana Dr., Dallas, Tex., 75220, Tel: 214-357-0274; Sls. Mgr: W.A. Clark .....Pg. 2000
Cal. Millbrae, Melvin Sls., 113 Camino Real 697-6922
Fla. Maitland, Ellis & Assocs., Box 1261 305-645-1101
Mass Haverhill, L-K Assocs., 359 Main St 617-373-1313
Wash Bellevue, B. Waddell, 10211 N.E. 31st. 822-0211
AIRCO SINGAPORE (PTE.) LTD., 31 International Rd., Jurong Ind'l Estate, Singapore 22,; Plt. Mgr: S.L. Foster
AIRCO SPEER CARBON-GRAPHITE, CA[illegible]N PRODS. DEPT., [illegible] Tel:

A.L.A. INDS., INC., 99 Calvert St., H[illegible] Tel: 914-835-0400; Sls. Mgr: P. Me[illegible]
Ill. Chicago, K. Maisel Sls., 19 W[illegible]
NJ. Riverton, B. Given Assoc., Box [illegible]
NJ. Wayne, H. Kagan Assoc., 18 [illegible]
NY. Brockport, G. Gay, Inc., Box [illegible]
NY. Fulton, C. D. Truax, Box 11[illegible]
NY. New York, L. Ackerman, 150[illegible]
Ohio Dayton, W. J. Brauer, Box [illegible]
Ohio Wickliffe, W. J. Brauer, Bo[illegible]
Pa. Pittsburgh, W. J. Brauer, [illegible]
ALADDIN CONTROLS, Div[illegible] Murfreesboro Rd., Nash[illegible] 615-242-3411, TWX 615[illegible] Bassler
ALADDIN ELCTRNS., 701 Mur[illegible] Tenn. 37210, Tel: 615-242[illegible]

More than 6,000 manufacturers of electronic components, materials, instruments, assemblies, systems and key services are listed in the Yellow Section. An identical Yellow Section appears in each of the three volumes of **eem,** listing addresses, phone numbers and sales managers' names. TWX numbers are also included where available. **Boldface** listings indicate that detailed information on the manufacturers' products is cataloged in the White Section of **eem. Boldface** listings also indicate that local sales offices or representatives are listed for that manufacturer.

to find trade name sources

VOLUME 1, PAGE 957



TRADE NAME DIRECTORY

Autonavigator - auto. plotting radar navigation sys. - Moran Instr.
Autopolar - microwave polarization switch - Teledyne Micronetics
AutoRad - X-ray exposure control - Torr Labs.
Autoray & Baltoray - inspection systems - Balteau Electric
Autorol - dynamometer - Bear Mfg.
Autosplice - medium size splice/connector machine - Connectrol
Autosyn - instr. & sys. of remote indication - Bendix Aerospace-Elctrns.
Autotak - rpm indicator - Howell Instrs.
[illegible]

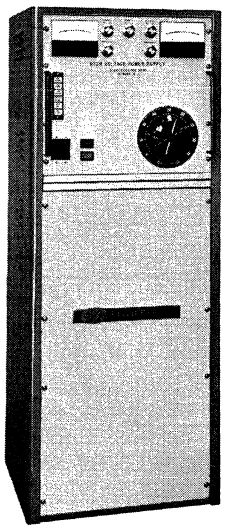
Bicalex - winding wires Cables.
Bicaloc - winding wires
Biccastrip - flat conduc Cables.
Bicon - bi-state, solid
Bicronite - epoxy coati
Biflex - type of speake
Big Inch - motors - He
[illegible]

If you know only the trade name, brand name or trade mark of a product, you can locate it in **eem** by using the **Trade Name Directory.** This appears only in Volume 1, beginning on page 957 of the White Section. These pages can be identified by a vertical black band along the outside edge.

if you require additional assistance

contact the Editorial Department, United Technical Publications, Inc., 645 Stewart Ave., Garden City, N.Y. 11530, or phone (516) 248-9700.

LIGHT ELECTRIC
High Voltage Power Supplies



- ☐ Power Supplies
- ☐ Transformers
- ☐ Saturable Reactors
- ☐ AC & DC Insulation Testers
- ☐ Anti-Corona Hardware
- ☐ Magnetic Devices
- ☐ H.V. Bushings
- ☐ Kilovoltmeters
- ☐ Spark Gaps

High Voltage Adjustable DC Power Supplies

FEATURES:

- High voltage grounding switch
- Functional indicating lamps
- Surge limiting
- Variable output voltage control
- Reversible polarity
- Door, external and zero start interlocks
- Dual range kilovoltmeter and current meter

Output (DC)		
Voltage KV	Current MA	Model
0-1	1,000	ADC1-1,000
	2,000	ADC1-2,000
	3,000	ADC1-3,000
	6,000	ADC1-6,000
	15,000	ADC1-15,000
	30,000	ADC1-30,000
	60,000	ADC1-60,000
	100,000	ADC1-100,000
0-3	300	ADC3-300
	500	ADC3-500
	1,000	ADC3-1,000
	2,000	ADC3-2,000
	3,000	ADC3-3,000
	5,000	ADC3-5,000
	10,000	ADC3-10,000
	20,000	ADC3-20,000
	32,000	ADC3-32,000
0-5	150	ADC5-150
	300	ADC5-300
	600	ADC5-600
	1,200	ADC5-1,200
	2,000	ADC5-2,000
	3,000	ADC5-3,000
	6,000	ADC5-6,000
	12,000	ADC5-12,000
	20,000	ADC5-20,000
0-10	50	ADC10-50
	100	ADC10-100
	200	ADC10-200
	300	ADC10-300

Output (DC)		
Voltage KV	Current MA	Model
0-10	600	ADC10-600
	1,000	ADC10-1,000
	3,000	ADC10-3,000
	6,000	ADC10-6,000
	10,000	ADC10-10,000
0-20	50	ADC20-50
	150	ADC20-150
	300	ADC20-300
	500	ADC20-500
	800	ADC20-800
	1,500	ADC20-1,500
	3,000	ADC20-3,000
	5,000	ADC20-5,000
0-30	30	ADC30-30
	60	ADC30-60
	100	ADC30-100
	200	ADC30-200
	300	ADC30-300
	500	ADC30-500
	1,000	ADC30-1,000
	2,000	ADC30-2,000
	3,000	ADC30-3,000
0-50	50	ADC50-50
	100	ADC50-100
	200	ADC50-200
	300	ADC50-300
	600	ADC50-600
	1,000	ADC50-1,000
	2,000	ADC50-2,000

Output (DC)		
Voltage KV	Current MA	Model
0-60	10	ADC60-10
	30	ADC60-30
	50	ADC60-50
	100	ADC60-100
	250	ADC60-250
	500	ADC60-500
	1,000	ADC60-1,000
	1,500	ADC60-1,500
0-100	5	ADC100-5
	10	ADC100-10
	30	ADC100-30
	60	ADC100-60
	150	ADC100-150
	300	ADC100-300
	600	ADC100-600
	1,000	ADC100-1,000
0-150	5	ADC150-5
	10	ADC150-10
	25	ADC150-25
	50	ADC150-50
	100	ADC150-100
	200	ADC150-200
	400	ADC150-400
	600	ADC150-600
0-200	5	ADC200-5
	10	ADC200-10
	30	ADC200-30
	50	ADC200-50

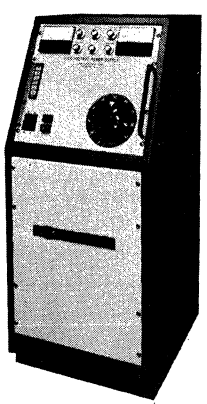
Output (DC)		
Voltage KV	Current MA	Model
0-200	150	ADC200-150
	300	ADC200-300
	500	ADC200-500
0-250	5	ADC250-5
	10	ADC250-10
	30	ADC250-30
	60	ADC250-60
	120	ADC250-120
	300	ADC250-300
0-300	5	ADC300-5
	10	ADC300-10
	30	ADC300-30
	50	ADC300-50
	100	ADC300-100
	200	ADC300-200
	300	ADC300-300
0-500	2	ADC500-2
	5	ADC500-5
	10	ADC500-10
0-600	2	ADC600-2
	5	ADC600-5
	10	ADC600-10
0-1,000	2	ADC1,000-2
	5	ADC1,000-5
	10	ADC1,000-10

High Voltage DC Insulation Testers

FEATURES:

- Triple range kilovoltmeter
- Door, external and zero start interlocks
- Reversible polarity
- Complete transient protection
- Variable output voltage control (coarse or fine)
- Adjustable overcurrent and overvoltage
- Fail-safe output shorting mechanism
- Surge limiting

Model	Output (DC)	
	KV	MA
IDC30-5	0-30	5
IDC60-5	0-60	5
IDC100-5	0-100	5
IDC150-5	0-150	5
IDC200-5	0-200	5
IDC250-5	0-250	5
IDC300-5	0-300	5
IDC500-5	0-500	5
IDC600-5	0-600	5
IDC1000-5	0-1000	5

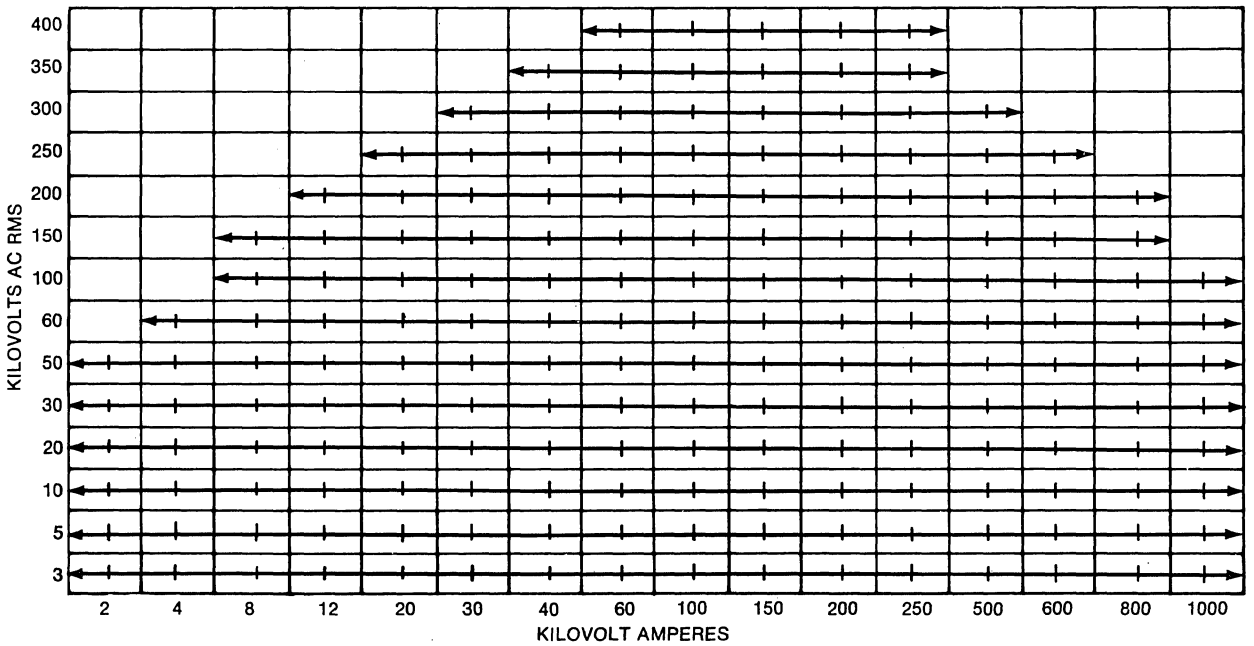


LIGHT ELECTRIC CORPORATION
50 INDEL AVENUE • RANCOCAS, N.J. 08073
TELEPHONE
609-267-6750

High Voltage AC Insulation Testers/Power Supplies

FEATURES:

- Surge limiting
- Functional indicating lamps
- RF suppression
- Adjustable overcurrent and overvoltage
- Continuously variable voltage control
- Door, external and zero start interlocks
- Triple range kilovoltmeter, single range current meter
- Transient suppression



1. Regulation:
   Line: Output voltage varies directly with line changes.
   Load: 10% max. at full resistive load.

2. Input:
   115V 1 ϕ — 2 KVA.
   440/480V 1 ϕ — 60 KVA to 1000 KVA.
   208/240V 1 ϕ — 4 KVA to 40 KVA.

3. Insulation:
   Air: Up to 20 KV rms.
   Oil: 30 KV to 400 KV.
   Most units shipped without oil.

common for all AC insulation testers
Kilovolts
KVA
ACI-200-40-2.0 ← Option

High Voltage Regulated Power Supplies

A wide range of high voltage "regulated" power supplies is available from Light Electric. Models are compatible with the family of unregulated power supplies listed on the opposite page, except for regulations of 0.05% for line and load. All models employ electronic regulation and exhibit excellent stability.

INDUSTRIAL POWER TRANSFORMERS

Light Electric has had more than 35 years of experience in designing and manufacturing a wide range of transformers and related magnetic devices.

Some of these products are listed here:

RECTIFIER SUPPLY TYPES

- ☐ Transformers available for all rectifier configurations
- ☐ H.V.: air insulated, 1 KV to 20 KV[1]; oil or gas insulated, 10 KV[1] and above
- ☐ High Current: air cooled 500A to 10,000A; water cooled 5000A to 25,000A[2]

AC TYPES

- ☐ H.V.: air insulated, 1 KV to 20 KV; oil or gas insulated, 10 KV to 500 KV
- ☐ High Current: 500 amps to 25,000 amps
- ☐ Low voltage: auto, multi-tap, impedance matching, phase changing, isolation

Power Ratings All Rectifier and AC Types

- ☐ **1 ϕ to 500 KVA**
- ☐ **3 ϕ to 1000 KVA**

Cooling available: convection, forced air, water, oil-to-air and oil-to-water heat exchangers

POWER SUPPLY ACCESSORY COMPONENTS

Filament Transformers:

- ☐ Voltage regulating, low capacitance, high reactance, multi-winding

Reactors: filter, charging, current limiting, balance coil.[3]

Isolation: air to 50 KV DC; oil or gas to 500 KV DC

POWER SUPPLY CONTROL ACCESSORIES

- ☐ Saturable Reactors: for resistive, capacitive, inductive or transformer-coupled loads
- ☐ 1 ϕ to 500 KVA; 3 ϕ to 1500 KVA
- ☐ S.C.R. Controllers[3]: Check factory for power ratings and control features.

Send for literature on our complete transformer line.

NOTES: [1] Values shown for rectified outputs.
[2] Higher values may be available, depending on rectifier configuration.
[3] Available only with Light Electric designed and manufactured transformers or systems.

LIGHT ELECTRIC CORPORATION
50 INDEL AVENUE • RANCOCAS, N.J. 08073
TELEPHONE
609-267-6750

marathon (formerly SONOTONE) Sintered-Plate Nickel-Cadmium

SEALED CELLS Physical and Electrical Characteristics

MARATHON CELL NUMBER	SIZE	OVERALL DIMENSIONS (in inches) DIAMETER ±.010 WITH LABEL AND JACKET	DIAMETER ±.010 WITHOUT LABEL AND JACKET	HEIGHT ±.015 WITH POSITIVE BUTTON WITH LABEL AND JACKET	HEIGHT ±.015 WITH POSITIVE BUTTON WITHOUT LABEL AND JACKET	HEIGHT ±.015 WITHOUT POSITIVE BUTTON WITH LABEL AND JACKET	HEIGHT ±.015 WITHOUT POSITIVE BUTTON WITHOUT LABEL AND JACKET	WEIGHT IN OUNCES	CAPACITY IN MAH	CHARGE RATE IN MA
S-101	AA	.568	.550	1.947	1.947	1.869	1.869	0.80	500	50
S-102	½C	1.018	1.000	1.000	1.000	.950	.945	1.2	710	80
S-103	D	1.286	1.268	2.385	2.385	2.295	2.290	5.5	4000	400
S-104	C	1.018	1.000	1.930	1.930	1.875	1.875	2.6	1800	190
S-106	CD	1.018	1.000	3.055	3.055	3.005	3.000	4.0	2800	300
S-108	F	1.286	1.268	*	*	3.445	3.435	8.3	6500	650
S-113	.875 x 1.625 (Sub-C)	—	.865	*	*	—	1.650	1.6	1200	120
S-126	.625 x .6	—	.625	*	*	—	.610	0.3	170	20
S-142	1 x 1.25	—	1.000	*	*	—	1.250	1.9	1400	145
S-143	1 x 1.14	—	1.000	*	*	—	1.140	1.7	1200	120
S-144	1.27 x 1.42	—	1.268	*	*	—	1.42	3.0	2300	230
S-147	½AA	.568	.550	1.340	1.340	1.255	1.255	0.55	250	25
†S-213	.875 x 1.625 (Sub-C)	—	.865	*	*	—	1.650	1.6	750	75
‡S-313	.875 x 1.625 (Sub-C)	—	.865	*	*	—	1.650	1.6	800	300
‡S-343	1 x 1.14	—	1.000	*	*	—	1.140	1.5	800	300

*Not Available in this Configuration
†Low Capacity, Sub-C Cell
‡Fastback Cell—Recharges at 3-hour Rate

For individual cell and battery characteristics for a specific Marathon sealed cell or battery — such as voltage, capacity, size and other electrical features — write: Marathon Battery Co., Cold Spring, New York 10516 • Phone: (914) 265-9282

MODULE BATTERIES Physical and Electrical Characteristics

MARATHON BATTERY NUMBER	BATTERY CELL SIZE	VOLTAGE	NUMBER OF CELLS	CAPACITY (5-hour rate)	DIMENSIONS (in inches) ±1/64" L	DIMENSIONS (in inches) ±1/64" W	DIMENSIONS (in inches) ±1/64" H	WEIGHT (in pounds)
5-S-113	⅞ x 1⅝	6	5	1.2 A.H.	5	1	1¾	¾
10-S-113	⅞ x 1⅝	12	10	1.2 A.H.	5	2	1¾	1½
20-S-113	⅞ x 1⅝	24	20	1.2 A.H.	10	2	1¾	3
20-S-113	⅞ x 1⅝	24	20	1.2 A.H.	5	4	1¾	3
5-S-104	C	6	5	1.8 A.H.	5 13/16	1 13/16	2	1¼
10-S-104	C	12	10	1.8 A.H.	5 13/16	2 3/8	2	2½
20-S-104	C	24	20	1.8 A.H.	11 7/8	2 3/8	2	5
20-S-104	C	24	20	1.8 A.H.	5 13/16	4¼	2	5
5-S-103	D	6	5	4 A.H.	7½	1½	2½	2¼
10-S-103	D	12	10	4 A.H.	7½	3	2½	4½
20-S-103	D	24	20	4 A.H.	15	3	2½	9
20-S-103	D	24	20	4 A.H.	7½	6	2½	9

FLASHLIGHT BATTERIES Carbon-Zinc

MARATHON CATALOG NUMBER	SIZE	VOLTAGE	DESCRIPTION	TERMINAL
111	C	1.5	Metal Jacket Heavy-Duty Type	Flashlight
121	D	1.5	Metal Jacket Heavy-Duty Type	Flashlight
122	D	1.5	Industrial Heavy-Duty Type	Flashlight
170	AA	1.5	Labeled Jacket	Flashlight
180	AAA	1.5	Labeled Jacket	Flashlight

LANTERN BATTERIES Carbon-Zinc

MARATHON CATALOG NUMBER	SIZE	VOLTAGE	DESCRIPTION	TERMINAL
49NL	4F	6	Metal Jacket Individually Wrapped	Spring
496F	4F	6	Metal Jacket	Plug In
496S	4F	6	Metal Jacket	Screw
896	8F	6	Metal Jacket	Binding Post
491	4F	1.5	Hobby/Ignition	Screw

ELECTRIC FENCE, IGNITION, TOY, EMERGENCY LIGHTING BATTERIES Carbon-Zinc

MARATHON CATALOG NUMBER	SIZE	VOLTAGE	DESCRIPTION	TERMINAL
6T	No. 6	1.5	Telephone Battery	Fahnstock
66	No. 6	1.5	Heavy-Duty Industrial/Ignition	Screw
640	16F	6	Electric Fence Battery	Screw
642	16G	12	Multi-Purpose/Hobby/Farm	Screw
903	20F	7.5	Emergency Lighting	Screw

Cells and Batteries and Carbon-Zinc Batteries

VENTED BATTERY CELLS

Physical and Electrical Characteristics

	CELL SERIES	CELL CASE MATERIAL	CAPACITY NOM A.H.	W	T	H	CELL WEIGHT FILLED
HIGH RATE	1H120	N	0.8	1.160	.680	2.258	1.7 oz.
	2H120	N	2.0	1.160	.675	4.000	3.2 oz.
	3H120	N	4.0	2.145	.650	4.016	5.8 oz.
	5H120	N	6.5	2.180	.955	4.060	9.1 oz.
	10H120	N	13	2.740	1.195	4.750	1 lb. 4 oz.
	12H120	N	13	2.419	1.080	6.950	1 lb. 4 oz.
	20H120	N	22	3.110	1.657	5.446	2 lb. 0 oz.
	24H120	N	24	3.180	1.075	8.278	2 lb. 4 oz.
	36H120	N	40	3.135	1.390	9.400	3 lb. 8 oz.
	65H130	N	72	4.980	1.350	11.375	6 lb. 10 oz.
	81H120	N	80	5.120	1.924	8.510	6 lb. 10 oz.
MEDIUM RATE	5BM220	N	5.5	2.110	.850	3.875	9.1 oz.
	12M220	N	13	2.419	1.080	6.950	1 lb. 4 oz.
	24M220	N	25	3.180	1.075	8.278	2 lb. 2 oz.
	36M220	N	40	3.135	1.390	9.400	3 lb. 8 oz.
	65M220	N	72	4.980	1.350	11.375	6 lb. 10 oz.
	100M220	P	111	6.813	2.172	8.730	11 lb. 0 oz.
	280M220	N	260	9.126	3.655	9.925	21 lb. 0 oz.
	24ME220*	N	25	3.180	1.075	11.278	2 lb. 6 oz.

N—Nylon P—Polystyrene *Elongated Cell

COMMERCIAL AIRCRAFT BATTERIES

Marathon FAA-Approved Aircraft Battery Specifications

MARATHON BATTERY TYPE	CELL TYPE	BATTERY VOLTS	AMP. HOURS AT 5-HR. RATE	CAPACITY 20-MIN. AMP.	5-MIN. AMP.	OVERALL DIMENSIONS IN INCHES (not including mounting brackets) LENGTH	WIDTH	HEIGHT	POUND WEIGHT	CONNECTOR
CA-4	24M220	24	25	65	200	10½	7 13/16	8¾	55	Elcon
CA-5	36M220	24	40	100	320	10½	9 15/16	10¼	80	Elcon
CA-7	12M220	24	13	30	100	8⅜	7¾	7¾	33	Elcon
CA-9	24H120	24	24	75	225	10½	7 13/16	8¾	55	Elcon
CA-10	10H120	24	13	35	120	12¾	5 1/16	5⅜	26	Elcon
CA-13	36H120	14	40	100	320	9	3 1/16	4 23/32	45½	Elcon
CA-15A unit	12M220	12	15*	30	100	7 15/16	3⅞	7⅝	16	Nut
CA-15B unit**	12M220	12	15*	30	100	7 15/16	3⅞	7⅝	16	Nut
CA-20H	20H120	24	22	65	200	12	9 13/16	6⅝	49	Elcon
CA-21H-1	20H120	24	22	65	200	11¾	9⅝	6½	48	Elcon
CA 24A unit	24M220	12	25	65	200	9	4 1/16	8⅝	26	Wing Nut
CA-24B unit**	24M220	12	25	65	200	9	4 1/16	8⅝	24	Wing Nut
CA-27	24ME220	24	25	65	200	10½	7 13/16	11¾	68	Elcon
CA-31	3H120	24	4	10	30	14⅛	2⅜	4½	10	Spec Cannon
CA-51	5H120	24	6.5	15	50	10 1/16	4¾	4⅝	16	Special
CA-52	5H120	24	6.5	15	50	9 15/16	4 13/16	4 5/16	15	Term Stud
CA-54†	5H120	24	6.5	15	50	14⅜	5 1/16	6¼	16	Special
CA-54-1††	5H120	24	6.5	15	50	14⅜	5 1/16	6¼	16	Special
CA-101	10H120	24	13	35	120	12 1/16	5⅝	5 5/16	26	Special
CA-103	10H120	24	13	35	120	12⅛	5⅝	5⅝	26½	Nut
CA-106	10H120	24	13	35	120	14½	6	5	24	Bendix Receptacle
CA-121	12M220	26	13	30	100	9 7/16	7 15/16	7¾	37	Elcon
CA-125	3H120	24	4	10	30	9	3 3/16	4 23/32	10½	Special
CA-154†	15M220	24	15	40	125	14⅜	5 1/16	6¼	27	Special
CA-727-3	24M220	24	25	65	200	10½	7 13/16	8¾	55	Elcon
CA-737	24M220	24	25	65	200	10 5/16	7 13/16	8⅞	47	Elcon

*At 8-hour rate. **B unit used with A unit to make 24-volt set.
†Battery used in the AC ELECTRONICS Navigation System. ††Battery used in the LITTON Navigation System.

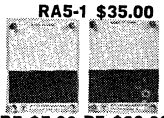
TRANSISTOR BATTERIES Carbon-Zinc

MARATHON CATALOG NUMBER	SIZE	VOLTAGE	DESCRIPTION	TERMINAL
113	C	1.5	Metal Jacket	Flat Button
123	D	1.5	Metal Jacket	Flat Button
173	AA	1.5	Tube Label	Flat Button
1604	6UL	9	Rectangular Metal Jacket	Flat Button

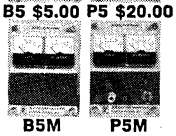
Mid-Eastern Industries
A Division of Eanco, Inc.
660 Jerusalem Road • Scotch Plains, New Jersey 07076 • (201) 233-5900.

MIC Modular Power Supply System

RA5-1 $35.00



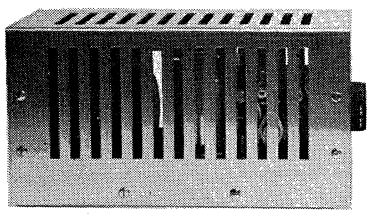
B5 $5.00 P5 $20.00

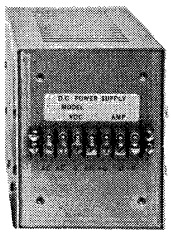


B5M $35.00 P5M $40.00

Features

- .02% Load Regulation
- .02% Line Regulation
- 500 Microvolts Ripple
- 0-50°/71°C Operation
- Low Cost
- Parallel or Series Operation
- Full Repairability
- Remote Sensing
- Integrated Circuit Control





Model Number	Output		Price	Model Number	Output		Price
	Volts	Amps			Volts	Amps	
MIC A3	3	5.0	$129.00	MIC A36	36	1.8	$143.00
MIC A5	5	4.5	129.00	MIC A50	50	1.5	143.00
MIC A6	6	4.25	129.00	MIC A60	60	1.25	143.00
MIC A8	8	4.0	129.00	MIC A70	70	1.2	143.00
MIC A10	10	3.7	129.00	MIC A80	80	1.0	143.00
MIC A12	12	3.2	129.00	MIC A100	100	0.7	143.00
MIC A15	15	3.0	129.00	MIC A125	125	0.5	151.00
MIC A18	18	2.6	129.00	MIC A150	150	0.5	151.00
MIC A24	24	2.2	129.00	MIC A175	175	0.5	151.00
MIC A28	28	2.0	129.00	MIC A200	200	0.5	151.00

About Mid-Eastern Industries

Mid-Eastern's engineering experience in the design and manufacture of standard and custom power supplies covers a span of 11 years. Over this period Mid-Eastern power supplies have proven their performance in computers, data processing, communications, nuclear research, machine tools; medical apparatus, ground support equipment, process controls and many other special applications.

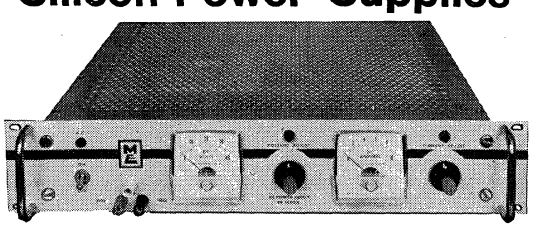
Mid-Eastern engineers have to their credit the solution of many difficult engineering problems. Superior engineering has been applied to all Mid-Eastern power supplies with the result that every unit meets the high standards of reliability and quality of the most exacting customer. Ease of checkout, calibration, and maintenance is maintained in each model by the use of interchangeable plug-ins and modular design. Complete step-by-step trouble shooting and adjustment procedures, schematics, and comprehensive parts data are provided with all standard power supplies.

Along with technical competence, Mid-Eastern offers you the advantages of doing business with a customer-oriented organization. Not only do we want you to buy our equipment, but we want you to be secure in the knowledge that we stand behind it with an integrity and reliability that goes beyond the legal terms of our warranty. We have earned the confidence our customers have in us.

PR Constant Voltage / Current Silicon Power Supplies

Features

- High Power — Small Size
- Remotely Programmable
- All Silicon Semiconductors
- Mode Lites
- .01% Regulation
- Low Ripple
- Constant Voltage/Constant Current
- Parallel Operation



Model Number	Output		Regulation				Panel Height	Price
			Line		Load			
	Volts	Current Amps	CV	CC	CV	CC		
PR 20-15	0-20	0-15	0.01%	0.01%	0.01%	0.25%	3½"	$495.00
PR 40-10	0-40	0-10	0.01%	0.01%	0.01%	0.25%	3½"	485.00
PR 60-7	0-60	0-7	0.01%	0.01%	0.01%	0.25%	3½"	500.00
PR 125-3.2	0-125	0-3.2	0.01%	0.01%	0.01%	0.25%	3½"	575.00
PR 20-30	0-20	0-30	0.01%	0.01%	0.01%	0.25%	5¼"	670.00
PR 40-20	0-40	0-20	0.01%	0.01%	0.01%	0.25%	5¼"	675.00
PR 60-14	0-60	0-14	0.01%	0.01%	0.01%	0.25%	5¼"	670.00
PR 125-6.5	0-125	0-6.5	0.01%	0.01%	0.01%	0.25%	5¼"	875.00

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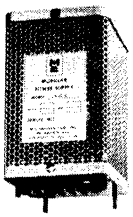
660 Jerusalem Road • Scotch Plains, New Jersey 07076 • (201) 233-5900.

LA Silicon Modular Power Supplies



■ Features

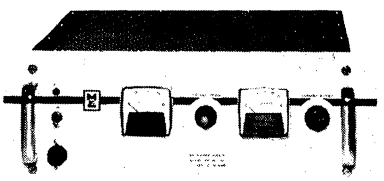
.02% Load Regulation
.01% Line Regulation
Plug-in Regulator Card
Remote Sensing
Fully Repairable
No Cooling Required
<1 millivolt Ripple RMS
All Silicon Semiconductors
Remotely Programmable
Models to 200 Volts Output

Model Number	Output Volts	Output Amps	Price	Model Number	Output Volts	Output Amps	Price
LA 5-3	5-6	3.0	$135.00	LA 40-.75	38-42	0.75	$129.00
LA 7-2.5	7-9	2.5	125.00	LA 45-.75	42-45	0.75	129.00
LA 10-2.5	9-10	2.5	125.00	LA 48-.5	46-50	0.50	129.00
LA 12-2	10-12	2.0	125.00	LA 55-.5	50-58	0.50	129.00
LA 14-2	12-14	2.0	125.00	LA 60-.5	58-65	0.50	129.00
LA 15-1.5	14-16	1.5	125.00	LA 75-.375	70-80	0.375	140.00
LA 18-1.5	16-18	1.5	125.00	LA 90-.375	80-90	0.375	150.00
LA 20-1.5	18-20	1.5	125.00	LA 100-.25	90-110	0.25	155.00
LA 24-1.25	20-25	1.25	125.00	LA 125-.25	110-130	0.25	165.00
LA 28-1	26-30	1.0	125.00	LA 150-.20	130-170	0.20	175.00
LA 32-1	30-33	1.0	125.00	LA 200-.20	170-220	0.20	190.00
LA 36-.75	35-38	0.75	125.00	LA 225-.20	220-240	0.20	225.00

*Special voltage and current ranges available. Inquire of factory.

RA Constant Voltage Silicon Supplies

■ Features



High Power — Small Size
Remotely Programmable
Low Ripple
Parallel Operation
.01% Regulation
All Silicon Semiconductors

Model Number	Output Voltage	Output Amps	Voltage Regulation Line	Voltage Regulation Load	Panel Height	Price
RA 20-15	0-20	0-15	0.01%	0.01%	3½"	$415.00
RA 40-10	0-40	0-10	0.01%	0.01%	3½"	415.00
RA 60-7	0-60	0-7	0.01%	0.01%	3½"	425.00
RA 125-3.2	0-125	0-3.2	0.01%	0.01%	3½"	425.00
RA 20-25	0-20	0-25	0.01%	0.01%	5½"	465.00
RA 40-20	0-40	0-20	0.01%	0.01%	5½"	440.00
RA 60-14	0-60	0-14	0.01%	0.01%	5½"	510.00
RA 125-6.5	0-125	0-6.5	0.01%	0.01%	5½"	560.00
RA 40-30	0-40	0-30	0.01%	0.01%	7"	665.00
RA 60-20	0-60	0-20	0.01%	0.01%	7"	675.00
RA 125-10	0-125	0-10	0.01%	0.01%	7"	725.00

Options include: meters, overvoltage, 10-turn potentiometers, and special input voltages.

■ How to Order

The power supplies in this catalog are all standard production units and are delivered from stock (normally within 7 days). Call your local Mid-Eastern representative for complete information on price and delivery schedules. A list of representatives is included for your convenience.
In order to avoid delay, use the full model number when ordering your supply. Unless otherwise specified, orders are shipped via motor freight or UPS.

■ Warranty

Mid-Eastern power supplies are backed by an unconditional repair or replacement warranty for one year after date of sale.

■ Applications Assistance

If you are uncertain as to which ME power supply best meets your existing or anticipated need, please consult the factory or your nearest representative. Mid-Eastern power supply experts will welcome the opportunity to assist you and to recommend the best supply for your use.

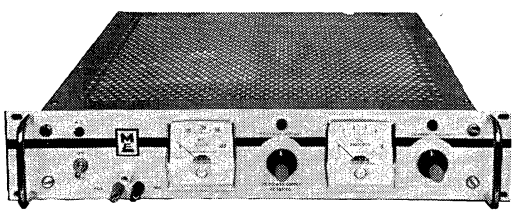
■ Other Mid-Eastern Products

In addition to standard power supplies, Mid-Eastern manufactures custom-made power supplies and standard and custom diversity combiners. Detailed information on this other equipment is available upon request.

HV Constant High Voltage Power Supplies

■ Features

All Solid State
Adjustable Current Limit
1 Millivolt Ripple
0.01% Regulation
10-Turn Voltage Adjustments
Remote Programming
Remote Sensing



Model Number	Output Volts	Output Amps	RMS Ripple	Regulation Line	Regulation Load	Size	Price
HV 350-1	0-350	1	< 1mv	0.005%	0.01%	3½ x 19 x 16½	$605.00
HV 350-2	0-350	2	< 1mv	0.005%	0.01%	5¼ x 19 x 16½	725.00
HV 350-3	0-350	3	< 1mv	0.005%	0.01%	7 x 19 x 16½	905.00

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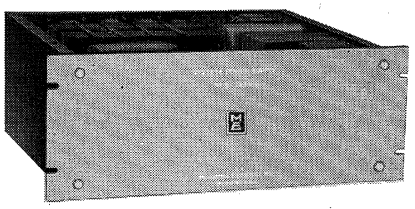
660 Jerusalem Road • Scotch Plains, New Jersey 07076 • (201) 233-5900.

MS High Power System Component Power Supplies

■ Features

Most Complete Coverage
Up to 600 Volts
Up to 1200 Amperes
139 Standard Models

Low Cost
All Solid State
Extreme Reliability
10 Year Guarantee



Model Number	Inches in Height	Model Number	Inches in Height	Model Number	Inches in Height	Model Number	Inches in Height	Model Number	Inches in Height	Model Number	Inches in Height
MS9-600	4⅝	MS20-10	3½	MS34-6	3½	MS65-3	3½	MS128-2	3½	MS350-1.5	5¼
MS9-1200	6⅞	MS20-30	5¼	MS34-20	5¼	MS65-10	5¼	MS128-6	5¼	MS350-3	8¾
MS12-12	3¼	MS20-45	8¾	MS34-30	8¾	MS65-15	8¾	MS128-10	8¾	MS350-5	12¼
MS12-40	5¼	MS20-80	12¼	MS34-50	12¼	MS65-25	12¼	MS128-15	12¼	MS350-7	17½
MS12-60	8¾	MS20-120	17½	MS34-75	17½	MS65-35	17½	MS128-24	17½	MS350-10	24
MS12-100	12¼	MS20-180	24	MS34-125	24	MS65-50	24	MS128-35	24	MS350-30	67⅞
MS12-150	17½	MS20-400	67⅞	MS34-300	67⅞	MS65-75	48⅝	MS128-45	48⅝	MS410-1.5	5¼
MS12-225	24					MS65-150	67⅞	MS128-90	67⅞	MS410-3	8¾
MS12-400	67⅞	MS25-8	3½	MS38-6	3½	MS77-3	3½			MS410-5	12¼
MS13.5-12	3½	MS25-25	5¼	MS38-20	5¼	MS77-10	5¼	MS240-.75	3½	MS410-7	17½
MS13.5-40	5¼	MS25-37	8¾	MS38-30	8¾	MS77-15	8¾	MS240-3	5¼	MS410-10	24
MS13.5-60	8¾	MS25-60	12¼	MS38-50	12¼	MS77-25	12¼	MS240-5	8¾	MS410-30	67⅞
MS13.5-100	12¼	MS25-90	17½	MS38-75	17½	MS77-35	17½	MS240-7	12¼	MS470-2	8¾
MS13.5-150	17½	MS25-140	24	MS38-125	24	MS77-50	24	MS240-10	17½	MS470-3	12¼
MS13.5-225	24	MS25-200	48⅝	MS38-300	67⅞	MS77-75	48⅝	MS240-15	24	MS470-5	17½
MS13.5-400	67⅞	MS25-400	67⅞			MS77-150	67⅞	MS240-40	67⅞	MS470-7	24
		MS29-8	3½	MS46-5	3½	MS109-2	3½			MS470-10	48⅝
MS17-10	3½	MS29-25	5¼	MS46-15	5¼	MS109-6	5¼	MS273-.75	3½	MS470-20	67⅞
MS17-30	5¼	MS29-37	8¾	MS46-22	8¾	MS109-10	8¾	MS273-3	5¼	MS545-2	8¾
MS17-45	8¾	MS29-60	12¼	MS46-40	12¼	MS109-15	12¼	MS273-5	8¾	MS545-3	12¼
MS17-80	12¼	MS29-90	17½	MS46-60	17½	MS109-24	17½	MS273-7	12¼	MS545-5	17½
MS17-120	17½	MS29-140	24	MS46-90	24	MS109-35	24	MS273-10	17½	MS545-7	24
MS17-180	24	MS29-200	48⅝	MS46-120	48⅝	MS109-45	48⅝	MS273-15	24	MS545-10	48⅝
MS17-400	67⅞	MS29-400	67⅞	MS46-240	67⅞	MS109-90	67⅞	MS273-40	67⅞	MS545-20	67⅞

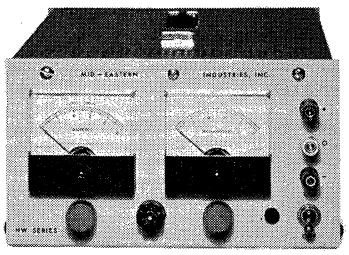
NOTE: The digits of the Model Number indicate the output voltage and current in amps. Example: MS9-600 has an output of 9 volts, current of 600 amps. MS9-1200 has an output of 9 volts at 1200 amps. **Consult factory for prices.**

HW Constant Voltage/Constant Current Power Supplies

■ Features

Models up to 100 Volts
Remotely Programmable
Remote Sensing
Series and Parallel Operation
500μ Volts Rippie

.01% Load Regulation
Half Rack Size
Separate Voltmeter and Ammeter
Rack or Bench mounted
.005% Line Regulation



Model Number	Output		Regulation				Price
	Voltage	Current Amps	Line		Load		
			CV	CC	CV	CC	
HW 10-8	0-10	0-8	0.01%	0.1%	0.01% or 1 mv	0.5%	$225.00
HW 10-15	0-10	0-15	0.01%	0.1%	0.01% or 1 mv	0.5%	310.00
HW 20-4	0-20	0-4	0.01%	0.1%	0.01% or 1 mv	0.5%	225.00
HW 20-10	0-20	0-10	0.01%	0.1%	0.01% or 1 mv	0.5%	310.00
HW 40-2	0-40	0-2	0.01%	0.1%	0.01% or 1 mv	0.5%	225.00
HW 40-5	0-40	0-5	0.01%	0.1%	0.01% or 1 mv	0.5%	295.00
HW 60-1.5	0-60	0-1.5	0.01%	0.1%	0.01% or 1 mv	0.5%	225.00
HW 60-3	0-60	0-3	0.01%	0.1%	0.01% or 1 mv	0.5%	310.00
HW 100-2	0-100	0-2	0.01%	0.1%	0.01% or 1 mv	0.5%	360.00
HW 200-1	0-200	0-1	0.01%	0.1%	0.01% or 1 mv	0.5%	395.00

Prices include: meters, case, carry handle, and rubber feet. Options: overvoltage, 10-turn potentiometers, and special input voltage.

Mauratron, Incorporated

13333 N. CENTRAL EXPRESSWAY • DALLAS, TEXAS 75231 • 214-235-2640

TRANSISTOR RADIATORS • TR SERIES

Self-adjusting to the Following Outlines:

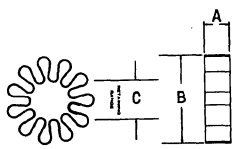
TR 118..... TO-18
TR 108..... TO- 8
TR 101..TO- 5, TO- 9, TO-11, TO-12, TO-16, TO-29, TO-33, TO-39, TO-42, TO-43

Specifications

Material..... Beryllium Copper #25
Finish..... Black Ebanol

Features

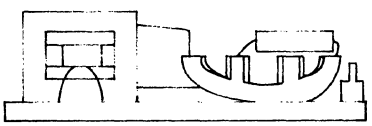
- Protects solid state devices against destructive heat rise
- Reduces stock inventory



Type	Dimensions		
	A	B	C
TR101	.250	.600 / .650	.290 / .400
TR120	.185	.600 / .650	.290 / .400
TR108	.250	.650 / .825	.360 / .525
TR118	.150	.450 / .500	.150 / .200

TR Ordering Information:
SPECIFY MODEL NO.
EXAMPLE: TR 101

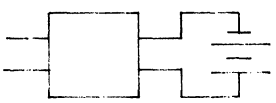
CURRENT REGULATED BATTERY CHARGERS



Current Range: 2MA to 50A Regulated Current Control
Voltage Range: 1.2 VDC to 500 VDC

Packaging: PC card (shown)
Rack
Wall Hanging

POWER PAKS

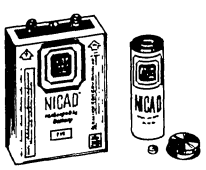


(Consisting of Current Regulated Battery Charger plus Batteries integrally packaged)

Low — Medium — High Power
Uninterruptable power systems

NICKEL - CADMIUM RECHARGEABLE BATTERIES

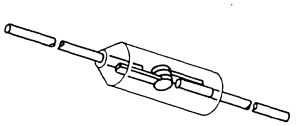
STOCKING DISTRIBUTOR FOR **GOULD, INC.**



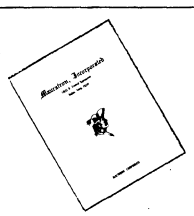
Individual cells and packaged configurations in Button, Cylindrical, and Rectangular Cell types.
AH ratings from 20MAH to 23AH

1 WATT ZENER DIODES • VARISTORS • STABISTORS

STOCKING DISTRIBUTOR FOR **SCHAUER MANUFACTURING CORP.**



Voltage Range: 2 volts to 16 volts



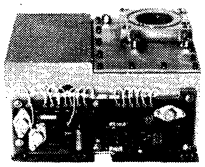
FOR COMPLETE LITERATURE AND SPECIFICATIONS ON ALL MAURATRON PRODUCTS REQUEST CATALOG NO. **SDE 70**

Multitech Power Systems

Multitech Power Systems (a Multitech Company) is a leading designer and manufacturer of power sources and power systems. Prototype development, design engineering and production make for a total systems capability.

HIGH POWER RF MODULATORS
TWT and Klystron Sources (Grid Pulsers, Anode Modulators, Cathode Pulsers), Solid State Pulse Modulators (Ground or Airborn Application for Magnetron and TWT's)

POWER SOURCES
Precision High Voltage Supplies, Micro Circuit Voltage Regulators, Multi-Output Power Systems, High Current High Efficiency Logic Supplies.



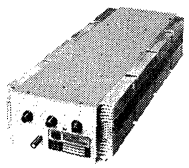
Model: 900008 Pulse Modulator
Input Requirements: ....+205 VDC
Output Characteristics:
Pulse Voltage .....4.5 KV
Pulse Current .....4.5 A
Current Pulse Width.....3.5 μ SEC
PRF .....265 PPS
Time Jitter .....N/A
RF Power .....8 KW
Load .....L 5274 MAGNETRON
Protection Circuits .....Internal short protection
Open and shorted load protection
Size: .....6″ x 4″ x 3″
Weight: .....4.3 lbs.
Altitude Range: .....65,000 ft.
Temperature Range: ....—54°C. to +71°C.
Cooling Method: .....Forced Air

Model: 100383 X-Band Transmitter
Input Requirements: ....115v, 3 phase, 400 Hz, +28 VDC
Output Characteristics:
Pulse Voltage .....12 KV
Pulse Current .....12 A
Current Pulse Width.....0.5 μ SEC and 2 μ SEC
PRF .....1000 PPS and 500 PPS
Time Jitter .....20 N SEC
RF Power .....70 KW
Load .....L-5047 MAGNETRON
Protection Circuits .....Internal short protection
Size: .....13″ x 6″ x 4.2″
Weight: .....11 lbs.
Altitude Range: .....40,000 ft.
Temperature Range: ....—10°F. to +200°F.
Cooling Method: .....Internal Fan

Model: 900004 Pulse Modulator
Input Requirements: ....115v, 1 phase, 400 Hz
Output Characteristics:
Pulse Voltage .....8.5 KV
Pulse Current .....8.5 A
Current Pulse Width.....5.75 μ SEC
PRF .....200 PPS
Time Jitter .....N/A
RF Power .....28 KW
Load .....SFD-305 MAGNETRON
Protection Circuits .....Internal short protection
Open and shorted load protection
Size: .....7″ x 7.5″ x 4
Weight: .....8.5 lbs.
Altitude Range: .....65,000 ft.
Temperature Range: ....—54°C. to +85°C.
Cooling Method: .....Forced Air

CONTROL SYSTEMS
Digital Positioning & Control, Analog Servo Control Amplifiers, Motor Drives and Controllers, Vector Resolvers and Computers, Analog Computation, Servo System Design.

MAGNETIC COMPONENTS
Pulse Transformers, Pulse Forming Networks, Saturable Reactors, Power Transformers, High Voltage Step-Up Transformers, Isolation Transformers, Charging Chokes, Polyphase Transformers.



Klystron supply shown

Model: 900002 Power Supply
Input Requirements: ....115v, 1 phase, 400 Hz
Output Characteristics:
Pulse Voltage .....—400 VDC, 50 ma
Pulse Current .....6.3 VDC, .5 A
Current Pulse Width.....—400 VDC to 560 VDC 100 μA
PRF .....Regulation 0.1%
Time Jitter .....30 MV peak to peak
RF Power .....Load, Klystron Oscillator
Protection Circuits .....
Size: .....4.5″ x 3″ x 2.65″
Weight: .....2 lbs.
Altitude Range: .....10,000 ft.
Temperature Range: ....—10°F. to +200°F.
Cooling Method: .....Conduction

Model: 90018-1 Power Supply
Input Requirements: ....115v, 1 phase, 400 Hz
Output Characteristics:
Pulse Voltage .....6 KVDC, 200 ma
Pulse Current .....Unregulated
Size: .....19″ x 18″ x 7″ Rack mount
Weight: .....50 lbs.
Altitude Range: .....Sea Level
Temperature Range: ....—10°F. to +150°F.
Cooling Method: .....Convection

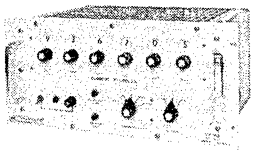
Model: 900003 Pulse Modulator
Input Requirements: ....115v, 1 phase, 400 Hz
Output Characteristics:
Pulse Voltage .....15 KV
Pulse Current .....13.5 A
Current Pulse Width.....5.75 μ SEC.
PRF .....200 PPS
Time Jitter .....N/A
RF Power .....80 KW
Load .....RCA 6521 MAGNETRON
Protection Circuits .....Internal short protection
Open and shorted load protection
Size: .....16.5″ x 10″ x 3″
Weight: .....15.5 lbs.
Altitude Range: .....30,000 ft.
Temperature Range: ....—54°C. to +71°C.
Cooling Method: .....Forced Air

a MULTITECH company
Multitech Power Systems
3100 Pullman St., Costa Mesa
California 92627 Telephone: (714) 557-3962

NORTH HILLS • PRECISION POWER SOURCES

DC CONSTANT CURRENT

CS-151
CS-152
CS-153



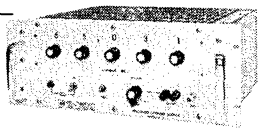
0.01% ACCURACY, 2 PPM STABILITY

Model No.	Current Range mA	Decades	Compliance Range V.
CS-151	±0.1/1/10	6	0 to ±10
CS-152	±0.1/1/10/100/150	6	0 to ±25
CS-153	±0.1/1/10/100/150	6	0 to ±100

FEATURES AND APPLICATIONS

All solid state, convection cooled; digital readout; bi-directional output, polarity reversal switch; 5 ppm line and load regulation; low noise and ripple; modulation capability; patented circuits; fast recovery from overload. For testing inertial gyros, IC's, reference zeners, and many other precision current-sensitive devices.

CS-11
CS-12

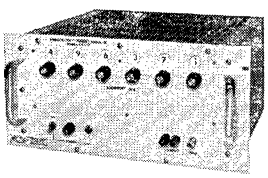


0.015% ACCURACY, 10 PPM STABILITY

CS-11	0 to 100	5	0 to 100
CS-12	0 to 1000	6	0 to 12

All solid state, convection cooled; 10 ppm line and load regulation; low noise and ripple; modulation capability; automatic overload protection. For testing gyros, semiconductors and calibration.

CS-111

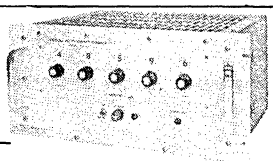


0.1% ACCURACY. 0.01% STABILITY

CS-111	0 to 500	6	0 to 250

All solid state, convection cooled; low noise and ripple; 25 ppm line and load regulation; modulation capability; automatic overload protection. Tests of transistors, zeners, relays, solenoids and other current-sensitive components.

CS-120

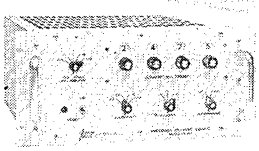


2% ACCURACY, 0.1% STABILITY

CS-120	0 to 10	5	0 to 2 kV

Hybrid design; modulation capability; automatic overload protection and safety high voltage shutdown. Rectifier PIV and other semiconductor tests.

CS-210



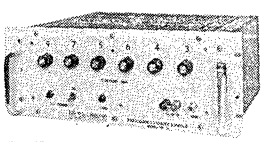
DIGITALLY PROGRAMMABLE

CS-210	±0.01/0.1/1/10/100	4	0 to ±100

All solid state, convection cooled; local and remote programming of range, setting, polarity and voltage limiting. Logic "0":0.4 V. max., logic "1":2.4 V. min. 50 ppm stability; 50 ppm line and load regulation, low ripple and noise. Computer-controlled automatic test systems.

DC CONSTANT VOLTAGE

VS-35
VS-36

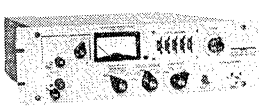


0.01% ACCURACY, 25 PPM STABILITY

Model No.	Voltage Range V	Decades	Current Range mA
VS-35	0 to 111.1	6	100
VS-36	0 to 21.1	6	1000

All solid state, convection cooled; digital readout; 25 ppm line and load regulation; low ripple and noise; over current protection; modulated output capability. Typically used for testing semiconductors, magnetic components, resistors, and meter calibration.

DC CONSTANT VOLTAGE/ CURRENT



TC-100.2BR, TC-602CR

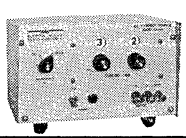
.01% ACCURACY, 3 PPM STABILITY

TC-100.2BR	1/10/100@ 200mA max.	5 Plus Vernier	1/10/100@ 100 V. max.
TC-602CR	6/60@ 2A max.	5 Plus Vernier	6/60/2000 @60V. max.

Combined constant voltage and current sources; all solid state; digital readout; 2 ppm line and load regulation; low ripple and noise; programmed output capability; remote sensing; automatic voltage and current limiting; meter monitor; 5¼" panel height. Meets all requirements for precision constant voltage and current sources.

AC CONSTANT CURRENT

CS-180



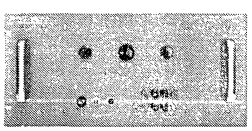
60/400/1000 Hz

Model No.	Current Range mA rms	Decades	Compliance Range V rms
CS-180	10/100/1000	3	0 to 5

All solid state. For measurement of fuel cell impedance and transducer characteristics; supply for lamp filaments and other ac current-sensitive devices and components. Capacitor impedance measurement.

AC CONSTANT VOLTAGE

VS-66
VS-78



GYRO, SYNCHRO, MICROSYN SUPPLIES

Model No.	Voltage Range V rms	Frequency Hz	Phase	Rating VA
VS-66	50	800	2	25/ϕ
VS-78	50	800/9600	1	25

VS-66 — All solid state, convection cooled; 0.1% stability; 0.1% line and load regulation; 1% total harmonic distortion; remote sensing; phase-locked output; automatic overload protection; other frequencies and outputs available. For use as gyro wheel or synchro supply.

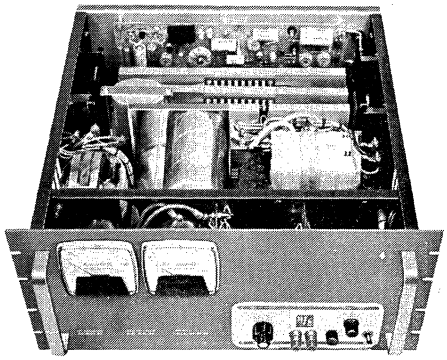
VS-78 — All solid state, convection cooled; 0.1% stability; 0.1% line and load regulation; 0.5% total harmonic distortion; phase-locked output; remote sensing; automatic overload protection; other dual frequencies available. For use as microsyn supply.

SEE EEM SECTION 2200 FOR HIGH PERFORMANCE SYSTEM MODULES, AND SECTION 5600 FOR WIDEBAND TRANSFORMERS AND HYBRIDS

North Hills Electronics, INC.
GLEN COVE, N.Y. 11542 • 516 671-5700

Frequency converters

50-60 cps to 400 cps



TFC Line
FC Line

DESIGN CONCEPT: Completely solid state, Silicon power rectifiers, silicon zener diode reference, germanium control and power transistors.

Model No.	OUTPUT			400 CPS OUTPUT CHARACTERISTICS					TRANSIENT RESPONSE				INPUT POWER			DIMENSIONS	App. Ship. Wgt.	Price
	AC Volts	* Volt. Amps	△ Freq.	Distortion	Amplitude Mod.	Static Regulation Load	Line	Freq.	Recovery NL-FL	FL-NL	Over Shoot	±10% Line	Volts Single Phase	△ Freq.	Max. Amps.	H x W x D		
TFC-26-100	24-30	0-100	380-420	5%	3%	±1%	±½%	±½%	30MS	10MS	5 volts	2%	105-125**	50-60	3.5	4½" x 8" x 14⅜"	30	$ 420.
TFC-26-200	24-30	0-200	380-420	5%	3%	±1%	±½%	±½%	30MS	10MS	5 volts	2%	105-125**	50-60	7	5¼" x 19" x 16⅝"	60	640.
TFC-115-100	105-130	0-100	380-420	5%	3%	±1%	±½%	±½%	30MS	10MS	15 volts	2%	105-125**	50-60	3.5	4½" x 8" x 14⅜"	30	410.
TFC-115-200	105-130	0-200	380-420	5%	3%	±1%	±½%	±½%	30MS	10MS	15 volts	2%	105-125**	50-60	7	5¼" x 19" x 16⅝"	60	630.
FC-26-500	24-30	0-500	380-420	5%	3%	±1%	±½%	±¼%	100MS	30MS	5 volts	2%	105-125**	50-60	15	8¾" x 19" x 16⅝"	150	1180.
FC-115-500	95-135	0-500	380-420	5%	3%	±1%	±½%	±¼%	100MS	30MS	15 volts	2%	105-125**	50-60	15	8¾" x 19" x 16⅝"	150	1175.
FC-115-1000	95-135	0-1000	380-420	5%	3%	±1%	±½%	±¼%	100MS	30MS	15 volts	2%	188-228†	50-60	17	17½" x 19" x 16⅝"	300	2110.

* All output ratings are given for unity power factor loads. Ratings may be increased linearly to 125% for FC models and to 140% for TFC models at zero lagging power factor loads.

△ CONTACT NJE SALES DEPT. FOR OTHER INPUT AND OUTPUT FREQUENCY REQUIREMENTS.

** Available with 210-250 Volts input at half input current shown in chart above (no extra charge). When ordering specify model number followed by (-230) suffix, i.e. TFC-26-200-230.

† Available with 198-242 Volts input at 15 amps input current at no extra charge. When ordering specify FC-115-1000-220.

VOLTAGE STABILITY: After a ½ hour warm up with constant load and constant ambient temperature, the voltage will not drift more than 0.1% for an 8 hour period.

VOLTAGE TEMPERATURE COEFFICIENT: After a ½ hour warm up with constant load the average temperature coefficient will not exceed 0.1%/°C.

FREQ. STABILITY: After a ½ hour warm up with constant load, and constant ambient temperature, the frequency will not drift more than 0.2% for an 8 hour period.

FREQUENCY TEMPERATURE COEFFICIENT: After a ½ hour warm up with constant load, the average temperature coefficient will not exceed 0.05%/°C.

METERS: Ammeter and voltmeter furnished. Meters are accurate to 3% of full scale rating.

POLARITY: All supplies can be floated up to 500V peak off ground. Either line may be grounded to the chassis ground terminal provided.

DUTY: Continuous at unity power factor at ambient temperatures from 0° to 45°C for FC models and 0° to 40°C for TFC models (35°C at 50 cps input). FC models may be operated above 45°C provided that the output current is derated linearly to zero at 60°C. Consult factory for derating characteristic on TFC models.

REMOTE SENSING: The FC Supplies are provided with circuitry to sense and regulate the voltage at the load rather than at the output terminals, eliminating the otherwise unavoidable load regulation due to the resistance of the wire connecting the supply to the load.

REMOTE PROGRAMMING: The output voltage and/or frequency may be accurately controlled from a remote point, if desired, by inserting a resistance across "Remote Program" terminals provided on rear.

OUTPUT ADJUSTMENT: Output Voltage and Frequency adjustments are accomplished by a dual potentiometer on front panel.

EXTERNAL SYNCHRONIZATION: All models may be synchronized to an external standard by the use of terminals on rear of chassis.

TERMINATION: A barrier type terminal strip is provided at the rear of the unit for all input, output, sensing, remote programming and external synchronization connections. Output is also available on the front panel through binding posts.

PROTECTION: During overloads or short circuit the load is electronically **disconnected** on FC models and electronically **limited** on TFC models. If the overload persists on TFC models, the load is disconnected from the supply by a fuse. Internal components are protected by an automatic resetting thermal switch.

MOUNTING: All Models supplied with full dust cover. All Models except the two 100VA units are supplied as 19" rack equipment: The 100VA units are supplied for laboratory bench use. Rack mounting is obtainable by means of the following rack adapter panels.

RP1 — 5¼" high. 19" wide, with cutout for one unit.

RP1A — Same as RP1 except cutout is offset to leave half of panel blank.

RP2 — 5¼" high. 19" wide, with cutouts for two units.

FINISH: Front Panel finished in dark grey enamel equivalent to FED STD 595 Chip No. 26132. Marking is white. All other finishes are appropriate paint, plating or chemical film as required.

INSPECTION: MIL-I-45208A.

OPTIONAL FEATURES:

The following optional features are available on any given unit. Consult Field Representative for option prices not provided on price page.

MULTIPHASE OPERATION: Single phase models can be combined to produce a three phase 4 wire or two phase 4 wire output, by using the multiphase adapters which have a maximum phase shift of 2.5° per phase and maximum line to line output distortion of 3%. When operating in the multiphase mode the single phase regulation and VA specifications become the line to neutral specifications.

TUNING FORK: For frequency stability up to 0.005%. Can be mounted within units on all models except 100 VA units.

Bench Adapter: Available for all 19" rack models up through 8¾" panel sizes. Add suffix (-B) to model number.

Power Cord: All models available with power cord. Add suffix (-P) to model number.

427

NJE CORPORATION
20 BORIGHT AVENUE, KENILWORTH, N. J. 07033
Phone: (201) 272-6000 / Telefax: FFP / TWX: (710) 996-5967

RSA

Voltage (Range)	CURRENT 40°C	50°C	60°C	71°C	Model No.	Price	OVP	OVP Adj. Range
0-7V	.85	.75	.70	.55	**RSA-07A-OVP**	**$ 79.00**	incl.	4-10V
0-7V	1.7	1.5	1.4	1.1	**RSA-07B-OVP**	**89.00**	incl.	4-10V
0-7V	2.0	1.9	1.6	1.1	**RSA-07C-OVP**	**99.00**	incl.	4-10V
0-15V	.45	.4	.38	.38	**RSA-015A-OVP**	**79.00**	incl.	6-20V
0-15V	.9	.8	.75	.55	**RSA-015B-OVP**	**89.00**	incl.	6-20V
0-15V	1.2	1.1	1.0	.8	**RSA-015C-OVP**	**99.00**	incl.	6-20V
0-24V	.8	.75	.70	.60	**RSA-024-OVP**	**99.00**	incl.	15-31V
0-32V	.66	.60	.50	.32	**RSA-032**	**99.00**	10.00	15-42V
0-60V	.35	.31	.28	.25	**RSA-060**	**99.00**	20.00	20-70V
0-120V	.15	.10	.10	.10	**RSA-0120**	**109.00**	20.00	20-140V

SPECIFICATIONS

ELECTRICAL

INPUT: 105 to 132 volts, 47 Hz to 440 Hz (no derating for 50 Hz operation).

LOAD REGULATION: .01% + 1 mv for a no load to full load change in output current within rating of supply.

LINE REGULATION: .01% + 1 mv for input voltage change of 105 to 132 volts.

RIPPLE AND NOISE: 3 mv p.p; 1.0 mv R.M.S. (DC to 10 meg. Hz). 10 mv p.p. on 60-120 models.

TEMPERATURE COEFFICIENT: (with Remote Programming Resistor) less than 0.01%/°C change in output following a 30 minute warm-up.

TEMPERATURE RATINGS:

Operating Temperature: —20°C to 71°C
Storage Temperature: —55°C to 85°C

STABILITY: Less than 0.1% total drift for 8 hours following a 30 minute warm-up under constant ambient conditions.

OVERSHOOT: No voltage spikes for turn on-turn off or power failure.

TRANSIENT RECOVERY TIME: Less than 50 micro second to recover to within the regulated region for line changes of ±10% around nominal, or ±50% load changes around nominal.

CURRENT PROTECTION: Electronic current regulation that will protect load and also provide current regulation within 1%; internally adjustable over a range of 10% to 120%.

REMOTE PROGRAMMING: RSA-07A, B, C (500Ω/V); RSA-015A, B, C, 032 (600Ω/V); RSA-024, 060, 0120 (800Ω/V)

REMOTE SENSING: Sensing terminals separate from the load terminals provide regulation against the voltage at the load rather than the voltage at the power supply output terminals. This eliminates the otherwise unavoidable load regulation due to the voltage drop in the wires connecting the supply to the load.

COOLING: Convection cooling on all models.

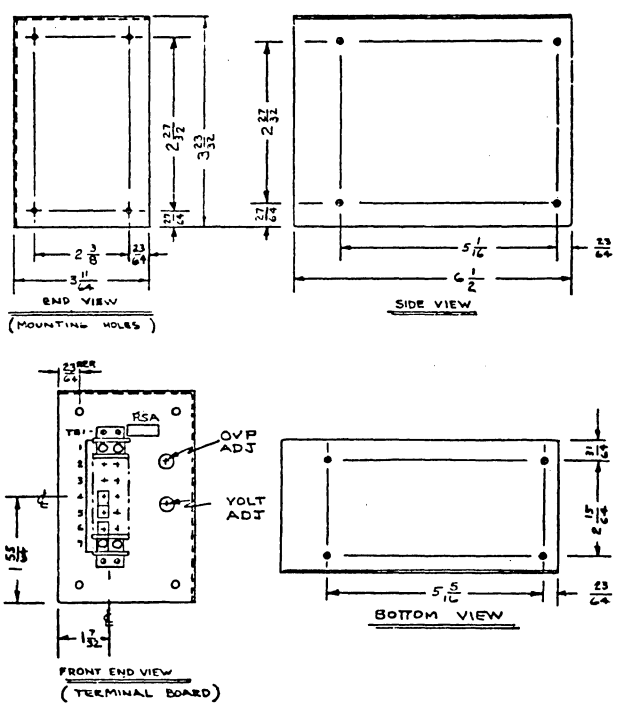
CONTROLS: Voltage and optional overvoltage controls.

OPTIONS

(—OVP) OVER VOLTAGE PROTECTION: Crowbar to limit maximum output voltage. Normally factory set at 3.0V above the maximum voltage. Adjustable over range as specified in chart above.

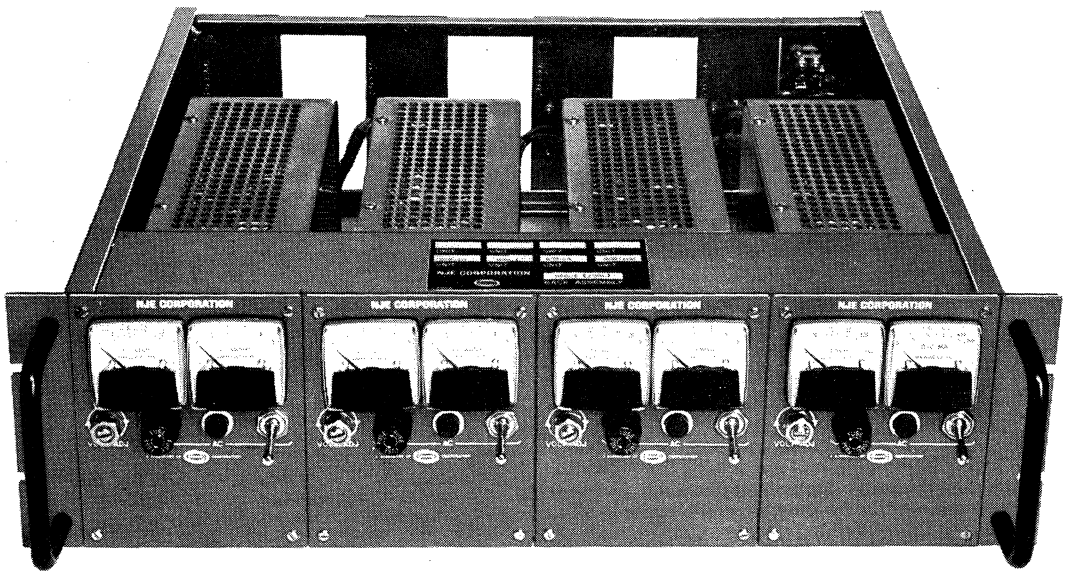
(—230): Change in normal input voltage to 205-265 VAC.

(—E): Mil. type conformal coating over all P.C. boards.



NJE CORPORATION 20 BORIGHT AVENUE, KENILWORTH, N. J. 07033
Phone: (201) 272-6000 / Telefax: FFP / TWX: (710) 996-5967

System Power Modular or Rack



SPECIFICATIONS

ELECTRICAL

INPUT: 105 to 132 volts, 47 Hz to 440 Hz (no derating for 50 Hz operation).

LOAD REGULATION: .01% + 1 mv for a no load to full load change in output current within rating of supply.

LINE REGULATION: .01% + 1 mv for input voltage change of 105 to 132 volts.

RIPPLE AND NOISE: 3 mv p.p; 1.0 mv R.M.S. (DC to 10 meg. Hz).

TEMPERATURE COEFFICIENT: (with Remote Programming Resistor) less than 0.01%/°C change in output following a 30 minute warm-up.

TEMPERATURE RATINGS:

Operating Temperature: —20°C to 71°C
Storage Temperature: —55°C to 85°C

STABILITY: Less than 0.1% total drift for 8 hours following a 30 minute warm-up under constant ambient conditions.

OVERSHOOT: No voltage spikes for turn on-turn off or power failure.

TRANSIENT RECOVERY TIME: Less than 50 micro second to recover to within the regulated region for line changes of ±10% around nominal, or ±50% load changes around nominal.

OVERLOAD PROTECTION: Electronic overload and short circuit protection with automatic reset upon removal of load, internally adjustable from 75% to 125% of max. rating.

REMOTE PROGRAMMING: 1 volt/per volt or 500 ohms/per volt (output terminal strip).

REMOTE SENSING: Sensing terminals separate from the load terminals provide regulation against the voltage at the load rather than the voltage at the power supply output terminals. This eliminates the otherwise unavoidable load regulation due to the voltage drop in the wires connecting the supply to the load.

COOLING: Convection cooling on all models.

CONTROLS: Voltage and optional overvoltage controls.

OPTIONS

(—OVP) OVER VOLTAGE PROTECTION: SCR crowbar to limit maximum output voltage. Normally factory set at 1.5V or 20% (whichever is greater) above the nominal voltage range.

(—230): Change in normal input voltage to 205-265 VAC.

(—E): Mil. type conformal coating over all P.C. boards.

(—M): Meters (RSF, G, H) have optional meters available—Prices shown are less meters.

(—Y): High Performance option provides full .01% regulation, improved temp. coefficient, and improved stability.

(—R): Redundant operation. NJE can provide a modification to the power supply that will allow for (2) power supplies to operate in parallel and become redundant. Decoupling diodes, and circuit modification all for complete performance to specifications, with diodes being within the supply loop. (Consult factory for prices and details.)

Higher current ratings can be provided if forced air or reduced line voltage conditions are available.

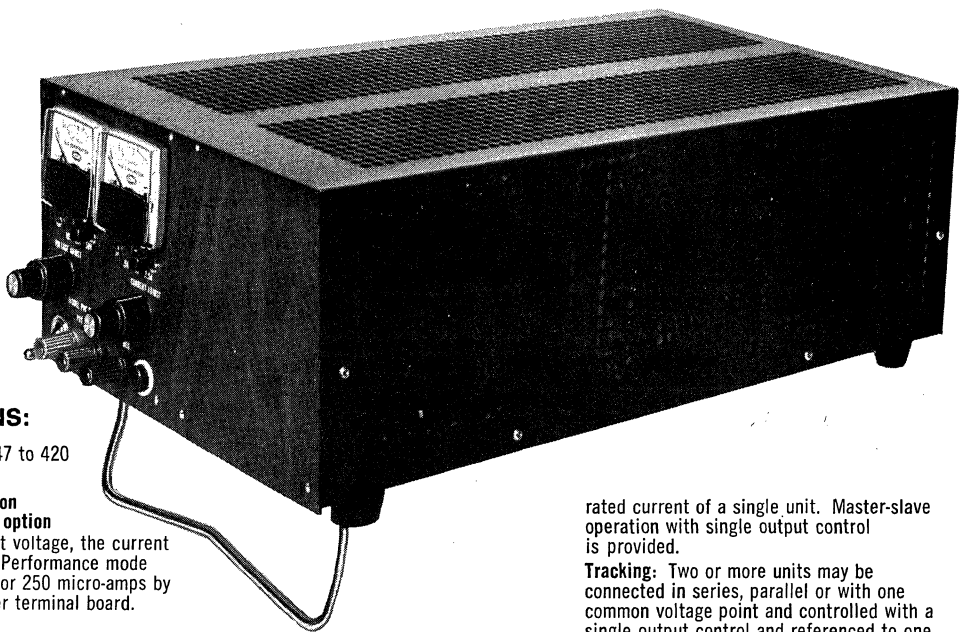
Additional ratings can be adapted for RS models, by slight modifications of standard models. (Example: RSB-5 can be modified to provide 6V @ 5A.)

NJE has many discount plans that will fit your individual needs—OEM contract plans also available.

Voltage (Nominal)	Voltage (Range)	CURRENT 40°C	50°C	60°C	71°C	Model No.	Price	OVP
5V	4.5 to 5.5V	6.0	5.2	3.9	2.3	RSB-5-OVP	$ 94.	incl.
		9.0	7.6	6.0	4.3	RSC-5-OVP	114.	incl.
		12.0	10.2	9.0	6.2	RSCC-5-OVP	139.	incl.
		15.0	13.0	11.0	7.3	RSD-5-OVP	189.	incl.
		22.0	20.0	18.0	11.0	RSE-5-OVP	235.	incl.
		34.0	27.0	23.0	19.0	RSEE-5	275.	$50.
		60.0	51.0	41.0	31.0	RSF-5	395.	60.
		100.0	94.0	78.0	57.0	RSG-5	495.	60.
		140.0	120.0	105.0	82.0	RSH-5	850.	incl.
10V	9 to 11V	4.0	3.6	3.2	2.8	RSB-10-OVP	$ 94.	incl.
		6.0	5.2	3.9	2.3	RSC-10-OVP	114.	incl.
		9.0	8.1	7.2	6.3	RSCC-10-OVP	139.	incl.
		12.0	10.8	9.6	9.48	RSD-10-OVP	189.	incl.
		18.0	16.2	14.4	12.6	RSE-10-OVP	235.	incl.
		27.0	24.3	21.6	18.9	RSEE-10	275.	$50.
		39.0	35.1	31.2	27.3	RSF-10	395.	60.
		64.0	57.6	51.2	44.8	RSG-10	495.	60.
		87.0	78.3	69.6	60.9	RSH-10	850.	incl.
12V	11 to 13V	3.6	3.24	2.88	2.52	RSB-12-OVP	$ 94.	incl.
		5.5	4.95	4.40	3.85	RSC-12-OVP	114.	incl.
		8.0	7.2	6.4	5.6	RSCC-12-OVP	139.	incl.
		11.0	9.9	8.8	7.70	RSD-12-OVP	189.	incl.
		16.0	14.4	12.8	11.2	RSE-12-OVP	235.	incl.
		23.0	20.7	18.4	16.1	RSEE-12	275.	$50.
		34.0	30.6	27.2	23.8	RSF-12	395.	60.
		56.0	50.4	44.3	39.2	RSG-12	495.	60.
		80.0	72.0	64.0	56.0	RSH-12	850.	incl.
15V	14 to 16V	3.0	2.7	2.4	2.10	RSB-15-OVP	$ 94.	incl.
		5.0	4.5	4.0	3.5	RSC-15-OVP	114.	incl.
		7.0	6.6	6.0	5.0	RSCC-15-OVP	139.	incl.
		10.0	9.3	8.7	5.8	RSD-15-OVP	189.	incl.
		15.0	13.5	12.0	9.0	RSE-15-OVP	235.	incl.
		21.0	20.0	17.5	14.0	RSEE-15	275.	$50.
		30.0	27.0	24.0	21.0	RSF-15	395.	60.
		50.0	46.5	39.5	31.0	RSG-15	495.	60.
		72.0	64.8	57.6	50.4	RSH-15	850.	incl.
18V	17 to 19V	2.6	2.34	2.08	1.82	RSB-18-OVP	$ 94.	incl.
		4.5	4.3	3.8	2.7	RSC-18-OVP	114.	incl.
		6.0	5.7	5.2	4.5	RSCC-18-OVP	139.	incl.
		9.0	8.4	7.8	5.7	RSD-18-OVP	189.	incl.
		14.0	12.5	11.0	8.9	RSE-18-OVP	235.	incl.
		18.0	16.5	13.5	11.5	RSEE-18	275.	$50.
		28.0	25.2	22.4	19.6	RSF-18	395.	60.
		42.0	30.0	24.5	18.5	RSG-18	495.	60.
		64.0	57.6	51.2	44.8	RSH-18	850.	incl.
20V	19 to 21V	2.4	2.16	1.92	1.68	RSB-20-OVP	$ 94.	incl.
		4.2	3.9	3.5	2.5	RSC-20-OVP	114.	incl.
		5.5	5.0	4.5	3.9	RSCC-20-OVP	139.	incl.
		8.0	7.5	7.0	5.2	RSD-20-OVP	189.	incl.
		13.0	11.5	10.5	9.1	RSE-20-OVP	235.	incl.
		17.0	15.0	13.5	11.0	RSEE-20	275.	$50.
		25.0	22.5	20.0	17.5	RSF-20	395.	60.
		39.0	35.0	31.0	24.0	RSG-20	495.	60.
		60.0	52.0	42.0	34.0	RSH-20	850.	incl.
24V	23 to 25V	2.0	1.8	1.6	1.4	RSB-24-OVP	$ 94.	incl.
		3.6	3.4	3.1	2.2	RSC-24-OVP	114.	incl.
		5.0	4.6	4.2	3.7	RSCC-24-OVP	139.	incl.
		7.5	7.0	6.4	5 3	RSD-24-OVP	189.	incl.
		12.0	11.0	10.0	8.5	RSE-14-OVP	235.	incl.
		15.0	13.5	12.0	10.5	RSEE-24	275.	$50.
		24.0	20.0	16.5	13.0	RSF-24	395.	60.
		36.0	29.5	24.0	18.0	RSG-24	495.	60.
		52.0	47.0	42.0	35.0	RSH-24	850.	incl.
28V	27 to 29V	1.8	1.62	1.44	1.26	RSB-28-OVP	$ 94.	incl.
		3.0	2.7	2.6	1.8	RSC-28-OVP	114.	incl.
		4.5	4.4	4.0	3.6	RSCC-28-OVP	139.	incl.
		6.5	6.0	5.5	5.0	RSD-28-OVP	189.	incl.
		11.0	10.0	8.9	7.8	RSE-28-OVP	235.	incl.
		14.0	12.5	11.0	9.3	RSEE-28	275.	$50.
		20.0	18.0	16.0	14.0	RSF-28	395.	60.
		33.0	30.0	25.0	19.0	RSG-28	495.	60.
		47.0	41.0	33.0	27.0	RSH-28	850.	incl.
36V	34.5 to 37.5V	1.3	1.17	1.04	.91	RSB-36-OVP	$ 94.	incl.
		2.3	2.1	1.9	1.5	RSC-36-OVP	114.	incl.
		3.5	3.4	3.2	2.8	RSCC-36-OVP	139.	incl.
		5.7	5.13	4.56	3.99	RSD-36-OVP	189.	incl.
		8.5	7.63	6.8	5.95	RSE-36-OVP	235.	incl.
		11.0	10.5	9.2	7.7	RSEE-36	275.	$50.
		15.0	12.6	11.5	8.6	RSF-36	395.	60.
		25.0	22.5	18.0	14.5	RSG-36	495.	60.
		40.0	32.0	28.0	20.0	RSH-36	850.	incl.
48V	46 to 50V	1.1	1.0	.94	.87	RSB-48-OVP	$ 94.	incl.
		1.8	1.6	1.5	1.1	RSC-48-OVP	114.	incl.
		3.0	2.9	2.6	2.5	RSCC-48-OVP	139.	incl.
		4.2	3.78	3.36	2.94	RSD-48-OVP	189.	incl.
		6.5	5.9	5.3	4.7	RSE-48-OVP	235.	incl.
		8.0	7.4	6.8	5.7	RSEE-48	275.	$50.
		12.0	11.0	9.0	7.2	RSF-48	395.	60.
		19.0	15.5	13.5	10.0	RSG-48	495.	60.
		28.0	25.2	22.4	19.6	RSH-48	850.	incl.

PVC-LVC II power supplies also offer these features:

- Voltage/Current Crossover
- Three (3) Range Voltmeter
- Three (3) Range Ammeter
- Mil-T-27A Transformer
- Remote Voltage or Resistance Programming
- Master Slave Series/Parallel
- Availability in Singles and Duals



SPECIFICATIONS:

Input: 105-130 Volts, 47 to 420 Hertz, single phase.

Static Current Regulation
(High Performance) **HP option**
Load: At constant input voltage, the current regulation in this High Performance mode is increased to 0.01% or 250 micro-amps by a jumper on rear barrier terminal board.

MODE OF OPERATION
Constant current and constant voltage levels may be preset with the maximum rating as listed in Table 1.

Ripple (Voltage Regulated Mode)
250 Microvolts rms from D-C to 10 Megahertz.

Ripple (Current Regulated Mode)
500 microamps rms.

TRANSIENT RESPONSE
For a no load to full load or a full load to no load step change, the output voltage will return to within 10 millivolts in less than 50 microseconds.

METERS
Three-range voltmeter and three-range ammeter are provided on the front panel.

POLARITY
The output may be floated up to 500 volts peak above ground. Either polarity may be grounded to chassis by means of terminals provided.

DUTY
Continuous at ambient temperatures from 0°C to 60°C.

Remote Sensing: Sensing terminals separate from the load terminals provide regulation against the voltage at the load rather than the voltage at the power supply output terminals. This eliminates the otherwise unavoidable load regulation due to the voltage drop in the wires connecting the supply to the load. This feature does not eliminate voltage excursions resulting from load transients through the load line impedance.

Remote Programming: Voltage Output: The output voltage may be controlled accurately from a remote resistance or voltage, across the "remote voltage programming" terminals in the rear of the power supply. Resistance sensitivity is 200 ohms/volt.

Current Output: The output current may be controlled accurately from a remote resistance connected across the "remote current programming" terminals.

Termination: Barrier-type terminal strips at the rear of the unit provide interface connection for output, remote sensing, remote programming, tracking, HP option, and grounding. Input line cord with three-prong, in-line safety plug is provided. Front panel binding posts for output and ground are provided in addition to the output terminals at the rear.

Parallel Operation: Two like units may operate in parallel to provide twice the rated current of a single unit. Master-slave operation with single output control is provided.

Tracking: Two or more units may be connected in series, parallel or with one common voltage point and controlled with a single output control and referenced to one supply's reference voltage. This connection requires the addition of tracking resistors.

OVERVOLTAGE PROTECTION OPTIONS
OVPA: Addition of an overvoltage protection circuit which will "Crowbar" the output terminals when a pre-set voltage level is exceeded. OVPA attaches to front of unit on existing output terminals. Overvoltage protection range is from approximately 6 volts to 10% above rated voltage of the supply.

OVPB: Same as OVPA option, except unit is mounted adjacent to rear terminal strips.

Protection: Load and power supply protection for any overload condition is provided by the current limiting inherent in the automatic crossover-constant current design. Protective fuse will interrupt input power in the event of internal failure.

Resolution: Continuously variable coarse and vernier output voltage adjust potentiometers provide the resolution indicated in Table 1.

MULTI-UNIT CROSS CONNECTION
Series operation: Two or more units may be operated in series to provide higher output voltage at rated current. Each unit functions independently.

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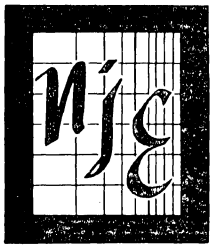

Rack adapters

NJE Model RP101 rack adapter to mount up to 4 PVC-LVC II or two 2 PVC-LVC II units in standard 19 inch wide rack panel 5¼ inches high.

NJE Model TRA-1 rack adapter economy model slide adapter for use with RP101. Adds 1¾ inch to height.

NJE Model CP101 cover plate. Order one or more, as required, to cover unused positions in rack adapters.

Watts	Model PVC	Model LVC II	Voltage	Current @ 60%	Resolution	Weight (Net)	Size (Inches)	Price PVC	Price LVC II
25	10-2	10-2	0-10V	0-2A	3 mv	11.5 lbs.	4¾"(H) 4"(W) 13"(D)	$148.	$124.
	20-1	20-1	0-20V	0-1A	6 mv			148.	124.
	50-0.5	50-0.5	0-50V	0-0.5A	15 mv			148.	124.
50	2PVC 10-2	2LVC II 10-2	0-10V Dual	0-2A Dual	3 mv	23 lbs.	4¾"(H) 8¼"(W) 13"(D)	$296.	$248.
			0-20V	0-2A					
			0-10V	0-4A					
	2PVC 20-1	2LVC II 20-1	0-20V Dual	0-1A Dual	6 mv			296.	248.
			0-40V	0-1A					
			0-20V	0-2A					
	2PVC 50-0.5	2LVC II 50-0.5	0-50V Dual	0-0.5A Dual	15 mv			296.	248.
			0-100V	0-0.5A					
			0-50V	0-1A					
	10-4	10-4	0-10V	0-4A	3 mv	16 lbs.	4¾"(H) 4"(W) 15½"(D)	$195.	$171.
	20-2	20-2	0-20V	0-2A	6 mv			195.	171.
	50-1	50-1	0-50V	0-1A	15 mv			195.	171.
100	2PVC 10-4	2LVC II 10-4	0-10V Dual	0-4A Dual	3 mv	32 lbs.	4¾"(H) 8¼"(W) 15½"(D)	$390.	$342.
			0-20V	0-4A					
			0-10V	0-8A					
	2PVC 20-2	2LVC II 20-2	0-20V Dual	0-2A Dual	6 mv			390.	342.
			0-40V	0-2A					
			0-20V	0-4A					
	2PVC 50-1	2LVC II 50-1	0-50V Dual	0-1A Dual	15 mv			390.	342.
			0-100V	0-1A					
			0-50V	0-2A					
	10-8	10-8	0-10V	0-8A	3 mv	35 lbs.	4¾"(H) 8¼"(W) 15½"(D)	$295.	—
	20-4	20-4	0-20V	0-4A	6 mv			295.	—
	50-2	50-2	0-50V	0-2A	15 mv			295.	—
200	2PVC 10-8	2LVC II 10-8	0-10V Dual	0-8A Dual	3 mv	72 lbs.	5¼"(H) 19"(W) 15½"(D)	$590.	—
			0-20V	0-8A					
			0-10V	0-16A					
	2PVC 20-4	2LVC II 20-4	0-20V Dual	0-4A Dual	6 mv			590.	—
			0-40V	0-4A					
			0-20V	0-8A					
	2PVC 50-2	2LVC II 50-2	0-50V Dual	0-2A Dual	15 mv			590.	—
			0-100V	0-2A					
			0-50V	0-4A					

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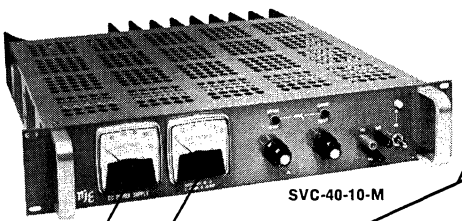
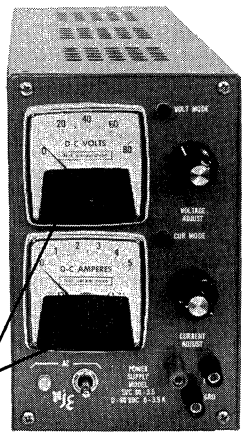
All Silicon–High Temperature voltage and/or current regulated DC power supplies

SVC Line

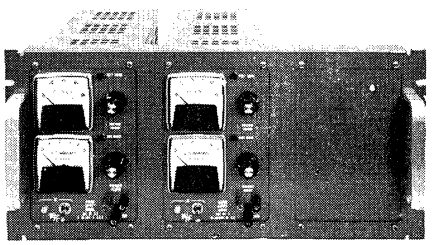


SVC-40-10-M



LAB-RAK
(SVC-60-3.5-M)

Meters provided with (-M) option



RP3 Rack Panel
Illustration of two Lab-Rak units mounted on an RP-3 Rack Adapter Panel with CP-1 cover plate.

The SVC line of power supplies provides the user with a double-barrelled utility — All-Silicon design plus the capability for operation in Voltage and/or Current Regulation mode. This represents the ultimate in flexibility of operation for today's laboratory requirements and sophisticated system use. Featuring full-range adjustability in Lab-Rak (Laboratory Bench Units, Rack Adaptable) or full rack construction, SVC Power Supplies are undoubtedly the last word in versatility and reliability.

TABLE 1 — TABULATED SPECIFICATIONS

Model Number	Output		Static Regulation				Resolution		Curr.† Prog. Sensit.	Dimension H x W x D	Price (1)
			Const. Volt		Const. Current		Voltage MV	Current MA			
	Volts	Amps	Load	Line	Load	Line					
SVC-20-7.5 (Lab-Rak)	0-20	0-7.5	*0.01% or 1mv	*0.01% or 1mv	1ma/V change in output	1ma	10	5	130	8 x 5 x 14	$ 375.
SVC-20-15	0-20	0-15	*0.01% or 1mv	*0.01% or 1mv	2ma/V change in output	2ma	10	10	65	3½ x 19 x 16⅝	490.
SVC-20-30	0-20	0-30	*0.01% or 1mv	*0.01% or 1mv	3ma/V change in output	3ma	10	20	30	5¼ x 19 x 16⅝	690.
SVC-40-5 (Lab-Rak)	0-40	0-5	*0.01% or 1mv	*0.01% or 1mv	0.2ma/V change in output	1ma	20	3	200	8 x 5 x 14	345.
SVC-40-10	0-40	0-10	*0.01% or 1mv	*0.01% or 1mv	0.5ma/V change in output	1ma	20	7	100	3½ x 19 x 16⅝	475.
SVC-40-20	0-40	0-20	*0.01% or 1mv	*0.01% or 1mv	1ma/V change in output	2ma	20	15	50	5¼ x 19 x 16⅝	670.
SVC-60-3.5 (Lab-Rak)	0-60	0-3.5	*0.01% or 1mv	*0.01% or 1mv	0.2ma/V change in output	0.5ma	30	2	280	8 x 5 x 14	365.
SVC-60-7	0-60	0-7	*0.01% or 1mv	*0.01% or 1mv	0.5ma/V change in output	1ma	30	5	140	3½ x 19 x 16⅝	595.
SVC-60-14	0-60	0-14	*0.01% or 1mv	*0.01% or 1mv	1ma/V change in output	2ma	30	10	70	5¼ x 19 x 16⅝	690.
SVC-125-1.6 (Lab-Rak)	0-125	0-1.6	*0.01% or 1mv	*0.01% or 1mv	0.1ma/V change in output	0.5ma	90	1	600	8 x 5 x 14	515.
SVC-125-3.2	0-125	0-3.2	*0.01% or 1mv	*0.01% or 1mv	0.2ma/V change in output	0.5ma	90	2	300	3½ x 19 x 16⅝	765.
SVC-125-6.5	0-125	0-6.5	*0.01% or 1mv	*0.01% or 1mv	0.5ma/V change in output	1ma	90	5	150	5¼ x 19 x 16⅝	1110.

* Whichever is greater.
† Approximate remote current programming sensitivity specified above is in ohms per ampere within the current range specified.
(1) All prices with meters (–m)

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Design Concept: All Silicon, Series, Regulator, SCR Buffer, Closed Loop Transistorized Amplifier.

SPECIFICATIONS:

INPUT: 105-125V, 55 to 65 cps, single phase.

OUTPUT VOLTAGE AND CURRENT: See Table 1.

STATIC REGULATION:

Load: At constant input voltage, the regulation is less than the figure indicated in Table 1 for a load change from half load to full load and is less than the figure indicated in Table 1 for a load change from half load to no load.

Line: At constant load, the regulation is less than the figure indicated in Table 1 for a line change from 115 to 105V and less than the figure indicated in Table 1 for a line change from 115 ot 125V.

RIPPLE: Constant Voltage Mode: 1 millivolt RMS maximum.
Constant Current Mode: 1 millivolt RMS maximum (To determine current ripple divide 1 mv RMS by load impedance).

TRANSIENT RESPONSE: For a ±10 volt step change in line voltage, within the limits of line voltage as specified above, the output voltage will remain in the regulated region. For a no load to full load or a full load to no load step change, the output voltage will return to within 20 millivolts of the regulated region in less than 20 microseconds except for models whose output currents are greater than 10 amperes in which case the output voltage will return to within 20 millivolts of the regulated region in less than 30 microseconds.

METERS: Basic models do not include meters. Two pin jacks are provided on the front panel to monitor the output voltage. For metered models see Optional Features, Suffix (-M).

POLARITY: The output may be "floated" up to 500V peak above ground. Either polarity may be grounded to chassis by means of terminals provided.

DUTY: • Lab-Rak and 3½" panel height models. Continuous full load at ambient temperature from 0°C to 60°C in still air, and up to 71°C when a minimum of 150 CFM (100 CFM for Lab-Rak units) of air-flow is provided. Operation above these temperature limits under these conditions is allowed provided the output current is derated linearly to zero at 85°C.

• 5¼" Panel Height Models. Continuous full load at ambient temperature from 0°C to 60°C in still air. Operation above this temperature is allowed provided the output current is derated linearly to zero at 85°C.

REMOTE SENSING: (For Constant Voltage Mode Only). Sensing terminals separate from the output terminals, provided sensing and load regulation against the voltage at the load rather than the voltage at the power supply output terminals. This eliminates the otherwise unavoidable load regulation due to the voltage drop in the wires connecting the supply ot the adjacent load.

REMOTE VOLTAGE PROGRAMMING: The output voltage maye be controlled accurately from a remote point if desired, by inserting a resistance across the REMOTE PROGRAM (VOLTAGE) terminals. The sensitivity of this circuit is approximately 125 ohms per volt within the voltage limits of Table 1, except for the 125 volt units in which the sensitivity is 160 ohms per volt.

REMOTE CURRENT PROGRAMMING: The output current may be controlled accurately from a remote point if desired, by inserting a resistance across the REMOTE PROGRAM-(CURRENT) terminals. The sensitivity of this circuit is indicated in Table 1.

DUALLING: Two or more units may be operated in series to provide higher voltage output at rated current. Units of the same voltage and current ratings may be operated in parallel.

TERMINATION: A barrier type terminal strip at the rear of the unit provides interface connection for input, output, remote sensing, remote programming, dualling and ground. Front panel binding posts for output termination in addition to the output terminals at the rear are provided.
Lab-Rak units are provided with a three wire input power cord and plug.

PROTECTION: Overload protection is provided by the MODE OF OPERATION as discussed below. Protective fuse will interrupt input power in the event of component failure. Short circuit protection 100% factory tested.

IMPROVED TRANSIENT: Improved transient response and dynamic characteristics at the sensing location may be achieved by removing terminal board jumpers and installing suitable capacitance at the load.

MODE OF OPERATION: Constant current and constant voltage levels may be preset within the maximum rated voltage and current levels specified in Table 1. Referring to the graph of Figure 1 on page 9, the intersection of the constant voltage and constant current operation lines, called the "Crossover Point", may be located anywhere within the output volt-ampere range of the unit. Regardless of the demands of the load, the output voltage and/or the output current will never exceed the limits preset by the output voltage and output current controls.

MODE INDICATION: The power supply's operating mode is indicated by a pair of front-panel signal lamps. One lamp is lighted during voltage regulated operation, the other during current regulated operation. Crossover from one mode to the other is signalled by the extinction of one lamp and the lighting of the other.

RESOLUTION:

- **Voltage Adjust:** Continuously variable coarse and vernier VOLTAGE ADJUST potentiometers on concentric shafts provide the resolution indicated in Table 1.
- **Current Adjust:** Continuously variable coarse and vernier CURRENT ADJUST potentiometers on concentric shafts provide the resolution indicated in Table 1.

AIRFLOW: Units with panel height of 3½" and ⅓ rack units do not have blowers and depend on conduction and convection for cooling. Units of 5¼" panel height have internal blowers to provide forced air cooling in addition to the conduction and convection cooling.

MOUNTING:

- 3½" and 5¼" panel height models are provided with standard 19" relay rack mounting notched per MIL STD 189.
- Lab-Rak units are designed for bench operation. Optional rack adapters 8¾" high x 19" wide for standard relay rack mounting notched per MIL STD 189 are available as follows:
  1) NJE model RP4 Rack Adapter to mount one Lab-Rak unit offset to the left, providing additional panel space for customer use.
  2) NJE model RP3 Rack Adapter to mount up to three Lab-Rak units. Unused openings can be covered with cover plate, Model CP-1. Order as required. (See Pix above.)

  Lab-Rak cabinets with blank front and rear panels may be purchased to provide housing for other circuit applications. List price found on page 26. NJE will be pleased to provide custom quotations for piercing and blanking of front and rear panel.

FINISH: Front panel finished in dark grey enamel equivalent to FED STD 595 chip #26132. Panel marking is white. Surfaces of external sheet metal are environmntally protected with yellow iridite or chromate plating. All other finishes are appropriate paint, plating, or chemical film as required.

INSPECTION: MIL-I-45208A.

DEVIATIONS: NJE Corporation invites requests for quotations on special requirements which can be accomplished by deviations of standard catalog units.

OPTIONAL FEATURES:

The following optional features are available on any given unit. Consult Field Representative for option prices not provided on price page 26.

Suffix (-OV): Addition of SCR crowbar overvoltage protection circuit. Upon actuation of the overvoltage trip circuit, the output voltage is clamped and reduced to a low value. The overvoltage trip point is factory preset 5% above the maximum rated supply voltage unless otherwise specified. The trip voltage point may be reset to any value above 10 volts by means of a simple internal adjustment fully described in the Instruction Manual.

Suffix (-KI): Enables operation at input frequency of 50 Hz. Nominal input voltages of 115, 208, 220, 230 or 240 V at 50 Hz can be provided. The power supply will be wired and tested with the specific Input Voltage as designated by the customer. However, simple internal tap changes allow for re-wiring to any of the available voltages.

Suffix (-B): Addition of bench adapter. (For 3½" and 5¼" high units.)

Suffix (-SF): Non-standard finish to front panel of unit. Where specifying (-SF) option customer must provide NJE the following information: Color to be used (preferable FED STD 595 chip number). Color to be used for marking. Process to be used if other than NJE standard finish process. Whether paint is to be supplied by customer or NJE.

Suffix (-LV) and/or (-LC): Control for VOLTAGE ADJUST (-LV) or CURRENT ADJUST (-LC) replaced by a single turn screwdriver adjust potentiometer with shaft-lock.

Suffix (-M): Addition of meters, ±2% full scale accuracy.

Suffix (-P): Addition of three wire power cord and plug on full rack units. (Power cord and plug is furnished as standard equipment on Lab-Rak units.)

Suffix (-TTV): Replacement of standard VOLTAGE ADJUST potentiometer by a ten-turn continuously variable potentiometer with a decade dial and lock providing an improved resolution of 0.02%.

Suffix (-TTC): Replacement of standard CURRENT ADJUST potentiometer by a ten-turn continuously variable potentiometer with a decade dial and lock providing an improved resolution of 0.025%.

Suffix (-TTVC): Replacement of both standard VOLTAGE & CURRENT ADJUST potentiometers by ten-turn continuously variable potentiometers with decade dial and lock. Resolution per suffix TTV and TTC above.

NOTE: Example of buildup of final model number for SVC-40-10 with meters and three wire power cord and plug is as follows:
SVC-40-10-M-P

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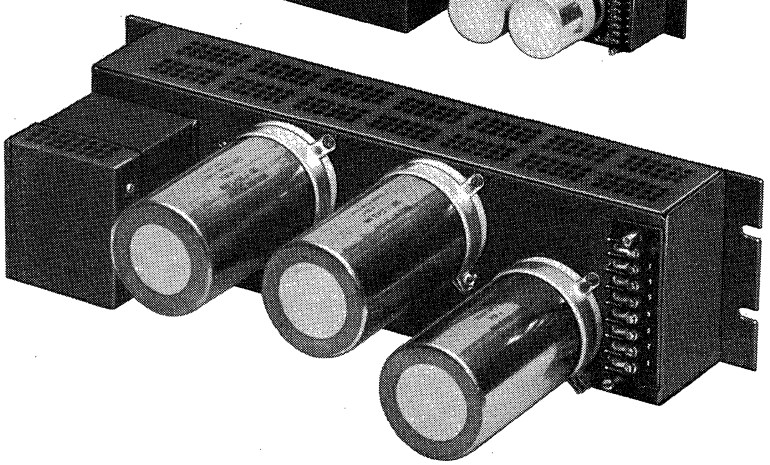
NORTH ELECTRIC COMPANY
Electronetics Division

CONSTANT VOLTAGE DC POWER SUPPLIES

Available from stock



NORTH'S CONSTANT VOLTAGE DC POWER SUPPLIES FEATURE:

- Multiple Input 115, 208, or 230 VAC.
- AC Line Regulation; Current Limiting and Isolation are inherent in North's ferroresonant transformer design.
- Reliable trouble-free circuitry and components.

For immediate service call 419/468-8100.
Ask for standard power product manager.

Electronetics Division/Galion, Ohio.
A subsidiary of United Utilities, Inc.

All units are designed for standard 19" rack mounting and can be mounted in three planes.

60 HERTZ MODEL NUMBER	DC OUTPUT		LOAD REGULATION		PANEL DIMENSIONS			PRICES*
	VOLT	AMP	50% to 100% Load	20% to 100% Load	Panel Height In Inches	Depth In Inches	Mounting Centers In Inches	
30 006 A11	6.0	11.0	7.0%	11.0%	3.50	7.25	3.00	$108.00
50 006 A16	6.0	16.5	7.0	10.0	5.25	8.75	2.25	119.00
30 012 A05	12.0	5.5	5.0	7.0	3.50	7.25	3.00	107.00
50 012 A11	12.0	11.0	5.0	8.0	5.25	7.25	2.25	125.00
30 018 A05	18.0	5.5	4.0	5.0	3.50	7.25	3.00	114.00
50 018 A11	18.0	11.0	4.0	5.0	5.25	7.25	2.25	151.00
50 024 A06	24.0	6.5	4.0	5.0	5.25	8.75	2.25	110.00
50 024 A11	24.0	11.0	3.0	5.0	5.25	7.75	2.25	130.00
70 024 A16	24.0	16.5	4.0	6.0	7.00	7.63	4.00	152.00
80 024 A27	24.0	27.5	4.0	6.0	8.75	9.50	5.75	196.00
50 028 A09	28.0	9.0	3.0	5.0	5.25	8.75	2.25	122.00
70 028 A16	28.0	16.5	3.0	5.0	7.00	7.63	4.00	155.00
50 048 A04	48.0	4.5	2.5	4.0	5.25	9.13	2.25	115.00
50 048 A11	48.0	11.0	2.0	3.0	5.25	9.13	2.25	162.00
80 048 A22	48.0	22.0	1.5	3.0	8.75	9.25	5.75	224.00
50 125 A02	125.0	2.2	1.5	2.5	5.25	7.25	2.25	130.00
50 150 A02	150.0	2.2	1.5	2.0	5.25	7.25	2.25	136.00
50 200 A01	200.0	1.1	2.0	3.5	5.25	7.25	2.25	115.00
50 250 A01	250.0	1.1	2.0	3.0	5.25	7.63	2.25	120.00

GENERAL SPECIFICATIONS

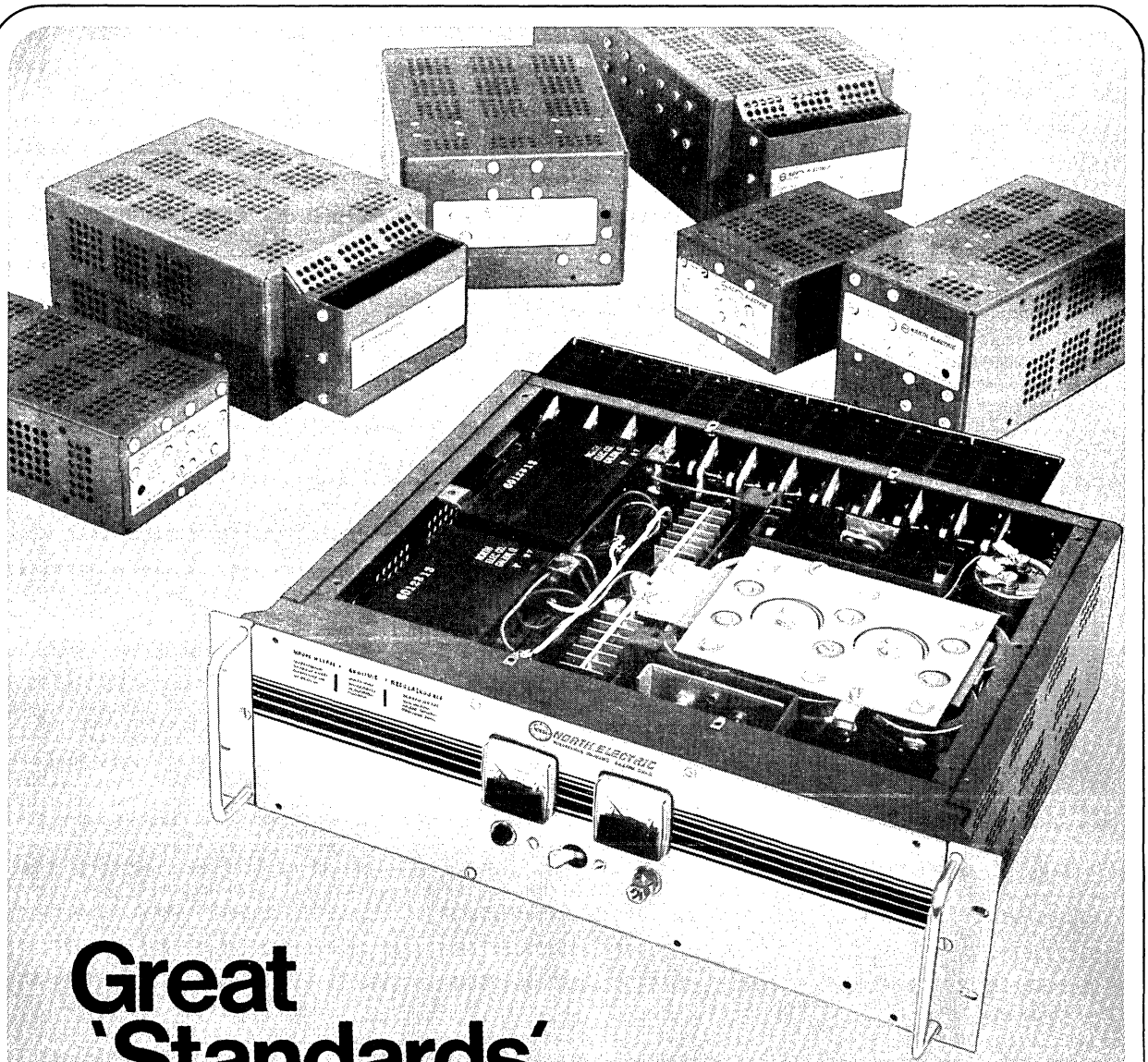
Regulation
Static load at 20% and 50% change -- see chart above.
Contact factory for additional information.
Static line regulation +1% (or less) for rated input ranges as follows:

Low	Nominal	High
100	115	130
181	208	235
200	230	260

Note: A simple jumper change will allow choice of three input voltages from one part number.

Ripple
1% maximum RMS @ rated load.
Efficiency
Typical efficiencies are between 70-80%. Greater efficiency is obtained from the higher output voltages.
Convection cooled
Above ratings for 50°C max. at rated current.

* All specifications and prices subject to change without notice.



Great 'Standards' by the Power Professionals

We set out to engineer standardized power modules with some pretty high standards to meet. Yours. We had two things going for us. Nearly four decades of *custom* power experience . . . and, the determination to make an off-the-shelf line that was not merely good . . . but great! It paid off.

North's standard power units offer you real cost economy plus the utmost in reliability. May we suggest you look over our catalog . . . then take your *own measure* with a test unit.

Call 419/468-8244 or TWX 419/468-4860.

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NORTH NEC ELECTRIC COMPANY

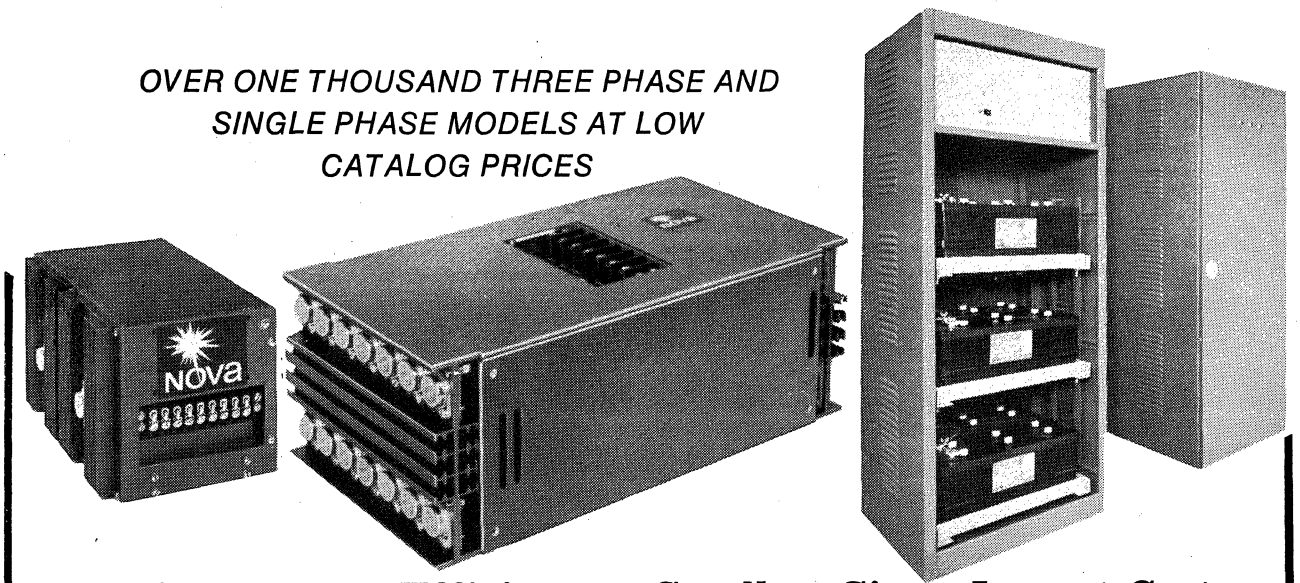
NSP-8

NOVAerters®

The Source!

INVERTERS, FREQUENCY CHANGERS, and EMERGENCY STANDBY POWER SYSTEMS

OVER ONE THOUSAND THREE PHASE AND SINGLE PHASE MODELS AT LOW CATALOG PRICES



80% Minimum Efficiency • Smallest Size • Lowest Cost
Low Distortion • Fastest Delivery

Typical specifications for all models

INPUT RANGES (VDC)
11-16, 11-32, 22-32, 42-54
105-150, 150-250, & 250-350 VDC

OUTPUT RATINGS (VA)
125, 250, 500, 1,000, 1,500
2,000, 3,000 Single Phase,
150, 375, 750, 1,000, 1,500, 3,000
4,500, 6,000, 9,000 Three Phase

OUTPUT FREQUENCIES
48 - 440 Hz continuously variable or 50, 60, 400 Hz fixed

OUTPUT VOLTAGE
10-130 VAC continuously variable

OUTPUT REGULATION
Less than ±1% for line and load

FREQUENCY REGULATION
Less than ±0.15% for line & load

OPERATING TEMPERATURE
—40°C to 71°C

EFFICIENCY
(Except 12V models) 80% Minimum

DISTORTION
3% to 6%

FREQUENCY CHANGER INPUTS
48 - 440 Hz, Single and Three Phase.
115, 230V

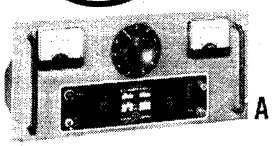
PHONE (201) NOva 1 - 3434

NOVA **ELECTRIC MANUFACTURING CO.**

A Subsidiary of NOVA Industries, Inc. 263 Hillside Ave., Nutley, New Jersey 07110

D. C. POWER SUPPLIES

Opad SINCE 1947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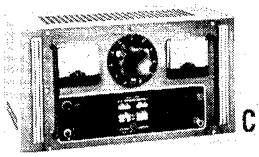
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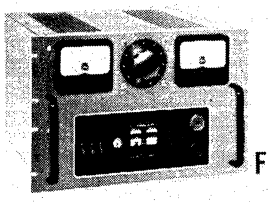
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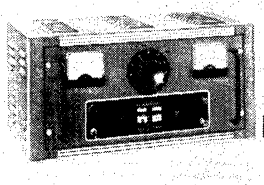
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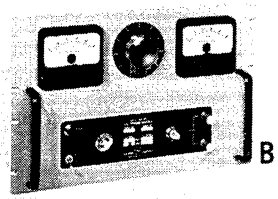
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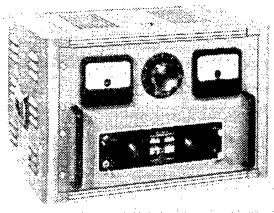
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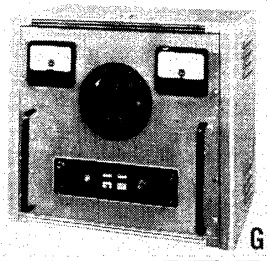
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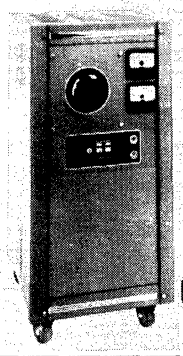

H

D.C. VOLTS	D.C. AMPS	MODEL	STYLE	MAX. RIPPLE NL to FL	DIMENSIONS H	X	W	X	D	FIG.	A.C. INPUT	WRITE FOR BULLETIN
0-32	0-5	KM75	RACK	100MV	8¾"	X	19"	X	9½"	A	115 VOLTS A.C. 60 Hz SINGLE PHASE	102A
	0-5	KM75B	BENCH	100MV	9"	X	17"	X	9"	C		
	0-10	KM81	RACK	100MV	8¾"	X	19"	X	9½"	A		
	0-10	KM81B	BENCH	100MV	9"	X	17"	X	9"	C		
	0-20	KM87	RACK	100MV	8¾"	X	19"	X	9½"	A		
	0-20	KM87B	BENCH	100MV	10½"	X	22"	X	12"	D		
	0-40	KM93	RACK	100MV	12¼"	X	19"	X	13"	B		
	0-40	KM93B	BENCH	100MV	14"	X	22"	X	15"	E		
	0-100	KM100	RACK	160MV	12¼"	X	19"	X	17¼"	F	208-230 VAC 60 Hz 3 PHASE*	104
	0-150	KM150	BENCH	160MV	19¼"	X	22"	X	18"	G		
0-60	0-10	KN5	RACK	100MV	10½"	X	19"	X	13½"	B	115 VOLTS A.C. 60 Hz SINGLE PHASE	106
	0-10	KN5B	BENCH	100MV	12¼"	X	22"	X	15"	E		
	0-20	KN10	RACK	100MV	12¼"	X	19"	X	13½"	B		
	0-20	KN10B	BENCH	100MV	14"	X	22"	X	15"	E		
0-125	0-5	RS20	RACK	1.25V	10½"	X	19"	X	13"	B	117 VOLTS A.C. 60 Hz SINGLE PHASE	204A
	0-5	RS20B	BENCH	1.25V	12¼"	X	22"	X	15"	E		
	0-10	RS30	RACK	1.25V	12¼"	X	19"	X	13"	B		
	0-10	RS30B	BENCH	1.25V	14"	X	22"	X	15"	E		
	0-20	RS40	RACK	1.25V	17½"	X	19"	X	13"	—		
	0-20	RS40B	BENCH	1.25V	19¼"	X	22"	X	15"	G		
	0-24	RS50	RACK	250MV	12¼"	X	19"	X	17¼"	F	208-230 VAC 60 Hz 3 PHASE*	205
	0-40	RS60	BENCH	250MV	19¼"	X	22"	X	18"	G		
	0-80	RS70	FLOOR	1.25V	48"	X	22"	X	18"	H		
	0-120	RS80	FLOOR	1.25V	48"	X	22"	X	24"	H		
0-250	0-5	RU60	RACK	2.5V	12¼"	X	19"	X	13½"	B	117 VOLTS A.C. 60 Hz SINGLE PHASE	206
	0-5	RU60B	BENCH	2.5V	14"	X	22"	X	15"	E		
	0-10	RU70	RACK	2.5V	17½"	X	19"	X	13½"	—		
	0-10	RU70B	BENCH	2.5V	19"	X	22"	X	15"	G		
	0-12	RU80	RACK	625MV	12¼"	X	19"	X	17¼"	F	208-230 VAC 60 Hz 3 PHASE*	207
	0-20	RU90	BENCH	625MV	19¼"	X	22"	X	18"	G		
	0-40	RU100	FLOOR	625MV	48"	X	22"	X	18"	H		
	0-60	RU150	FLOOR	625MV	48"	X	22"	X	24"	H		
0-500	0-5	RW80	RACK	500MV	12¼"	X	19"	X	17¼"	F	208-230 VAC 60 Hz 3 PHASE*	210
	0-10	RW90	BENCH	500MV	19¼"	X	22"	X	18"	G		
	0-20	RW100	FLOOR	500MV	48"	X	22"	X	18"	H		
	0-30	RW150	FLOOR	500MV	48"	X	22"	X	24"	H		
	0-40	RW200	FLOOR	500MV	52"	X	22"	X	24"	H		
0-1000	0-2.5	SX80	RACK	1V	12¼"	X	19"	X	17¼"	F	208-230 VAC 60 Hz 3 PHASE*	215
	0-5	SX90	BENCH	1V	19¼"	X	22"	X	18"	G		
	0-10	SX100	FLOOR	1V	48"	X	22"	X	18"	H		
	0-15	SX150	FLOOR	1V	48"	X	22"	X	24"	H		
	0-20	SX200	FLOOR	1V	52"	X	22"	X	24"	H		
0-1500	0-1.5	TY80	RACK	2.5%	12¼"	X	19"	X	17¼"	F	208-230 VAC 60 Hz 3 PHASE*	217
	0-3	TY90	BENCH	2.5%	19¼"	X	22"	X	18"	G		
	0-7	TY100	FLOOR	2.5%	48"	X	22"	X	18"	H		
	0-10	TY150	FLOOR	2.5%	48"	X	22"	X	24"	H		
	0-13	TY200	FLOOR	2.5%	52"	X	22"	X	24"	H		
0-2000	0-1.25	VZ80	RACK	2.5%	12¼"	X	19"	X	17¼"	F	208-230 VAC 60 Hz 3 PHASE*	219
	0-2.25	VZ90	BENCH	2.5%	19¼"	X	22"	X	18"	G		
	0-5	VZ100	FLOOR	2.5%	48"	X	22"	X	18"	H		
	0-7.5	VZ150	FLOOR	2.5%	48"	X	22"	X	24"	H		
	0-10	VZ200	FLOOR	2.5%	52"	X	22"	X	24"	H		

* Three-phase units incorporate the exclusive FAZEGUARD Sensor (Patented); a solid state circuit that trips the power supply circuit breaker if power fails on one or more of the three input phases.

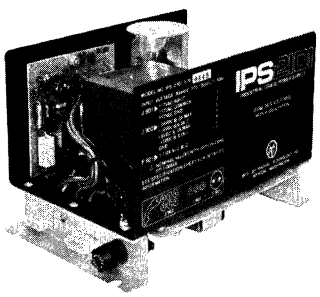
Opad

OPAD ELECTRIC COMPANY, INC.

43-12 WALKER STREET • NEW YORK, N. Y. 10013 Telephone: (212) WOrth 6-0380

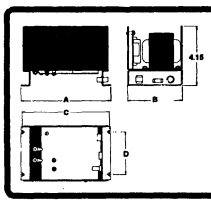
PACIFIC TECHNOLOGY INC. INDUSTRIAL / COMMERCIAL EQUIPMENT

Power supplies



IPS 2101 Dual 24V/5V reg. 2A

Industrial grade power supplies (IPS) suitable for OEM use.
Single, dual and adjustable voltage output features provide wide use flexibility. Added voltage outputs are available with the IPS5000 series, optional plug-in regulator cards. The IPS series power supplies all feature integrated circuit precision regulation, optional 5-volt crowbar protection and current limiting protection.



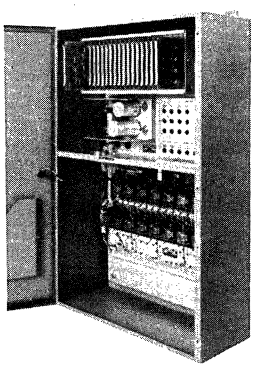
CASE SIZE	DIM A	DIM B	DIM C	DIM D
A	8.50	5.18	8.12	4.00
B	8.50	3.68	8.12	1.37
C	7.50	3.43	7.12	1.37

	MODEL NUMBER	DC OUTPUTS VOLTS	AMPS	REGULATOR CARD OPTION	SIZE	PRICE 1-9 UNITS	10-24 UNITS	25-49 UNITS	50-99 UNITS	100 UNITS	
SINGLE OUTPUT	IPS 1104	5V REG.	5A		B	$89.50	$81.50	$75.00	$70.25	$66.25	REGULATOR CARD CONNECTOR COST, ADDITIONAL $2.50 PER UNIT.
	IPS 1201	24V NON-REG.	3A		C	49.50	45.25	41.50	39.00	36.75	
	IPS 1101	24V REG.	3A	*****	A	92.75	84.50	77.75	72.85	68.75	
DUAL OUTPUT	IPS 2101	5V REG.	2A	*****	A	114.00	104.00	95.50	89.50	84.50	
		24V REG.	2A								
	IPS 2103	5V REG.	1A	*****	B	100.25	91.50	84.00	78.75	74.25	
		24V REG.	1A								CONTACT FACTORY FOR LARGER QUANTITY DISCOUNT OR FOR MIXED ITEM/QUANTITY DISCOUNT.
	IPS 2301	5V REG.	1A	*****	B	90.50	82.50	75.75	71.00	67.00	
		24V NON-REG.	1A								
ADJ. OUTPUT	IPS 1102	5V TO 15V REG.	1.5A/2A		C	80.00	73.00	67.00	62.75	59.25	
OPTIONAL REGULATOR CARDS	IPS 5004	5V TO 15V**	.5A			23.25	21.25	19.50	18.25	17.20	
	IPS 5002	5V TO 15V	.5A			28.00	25.50	23.25	22.00	20.60	
	IPS 5003	12V TO 15V	.3A			37.75	34.50	31.75	29.75	28.00	
		−12V TO −15V	.3A								

** FLOATING OUTPUT

Prices subject to change without notice

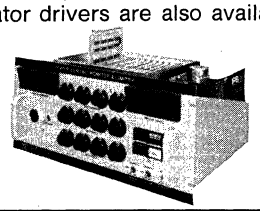
Industrial control equipment



Conveyor Memory System

Electronic control (memory).
Advanced, solid state electronic control for applications in sorting, grading, stacking and conveyor control systems operating at any speed with any package induction rate and of any length. Control functions related to these applications may include special logic, instrumentation interface, sequencing and custom process control.
Typical input devices include keyboards, sensing switches, photo devices, computers and stored data (i.e., punched cards or perforated tape). Multiple induction (input) stations may be used as required and items may be programmed to any number of destinations.

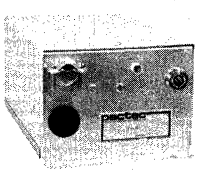
Power demand and limiting (PDM&L) equipment for maximum utilization and control of electrical power are also available.
This equipment, properly applied, results in reduced maximum demand (peak limiting), improved load factor (optimum efficiency) and decreased manpower. Special purpose readers and perforator drivers are also available.



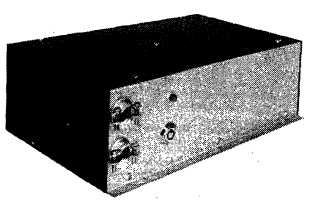
PDM&L MODEL 410

Audio alarm units

20 watt or 100 watt Audio Units. Tamper-resistant, high power, electronic Audio Alarm Units intended for security or industrial application. Equipment operates from 110-volt, 60-cycle ac line (24vac input option on 20 watt Audio Unit only) with permanent high capacity ni-cad battery backup. Provision for either solid state or relay contact input, alarm circuit drive power and a keylock switch facilitate use of this Unit as an independent alarm device or as part of a larger system.



20 watt Audio Unit, 114db at 10 feet, $108.00 basic unit. Options available.



100 watt Audio Unit, 120db at 10 feet, $198.00 basic unit. Options available.

Prices subject to change without notice

OEM development / manufacturing inquiries solicited.

Pacific Technology Inc. • 235 Airport Way • Renton, Washington • 98055
phone (206) 226-8350

Nickel - Cadmium
R E C H A R G E A B L E

Sealed Cells and Batteries

by POWER INCORPORATED

CAPACITIES UP TO 2000 AMPERE HOURS ON REQUEST

TYPICAL CYLINDRICAL CELLS
(FIG. A) 1.2 VOLTS PER CELL

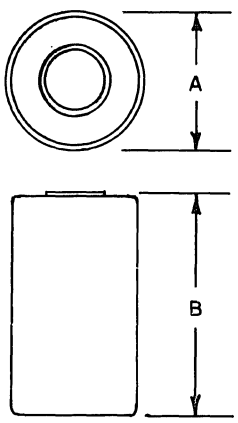


FIG. A

Type	Capacity mAH	Dimensions (in) A	Dimensions (in) B	Wt. oz.
170SC	170	0.625	0.600	0.4
250SC	250	0.542	1.209	0.6
500SC	500	0.554	1.920	1.0
600SC	600	0.625	1.920	1.0
750SC	750	1.020	0.910	1.1
1000SC	1000	1.000	1.280	1.1
1200SC	1200	.875	1.600	1.5
1800SC	1800	1.000	1.840	2.5
2000SC	2000	1.272	1.400	2.8
4000SC	4000	1.289	2.300	4.6
7000SC	7000	1.290	3.490	7.6
8000SC	8000	1.344	4.218	9.8

Oval cell also available (Fig. C) in 4000mAH, W-2.080 T-1.260 and H-1.656 Wt. .37 lbs.
All battery configurations available with pressure contact buttons or solder lug terminals.

All cylindrical and oval battery types feature a pressure safety device for security and reliability making them especially suited for cordless consumer and electronic products.

CUSTOM BATTERY PACKS

Cylindrical cells are incased in a rigid, high impact case. Case materials are highly dielectric to provide maximum cell insulation at minimum cost. The case is vented to each cell to provide cooling and long life. Packs are available to your specifications in any voltage.

TYPICAL BUTTON CELLS
(FIG. B) 1.2 VOLTS PER CELL

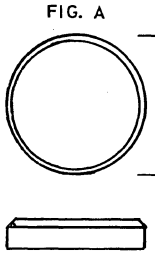


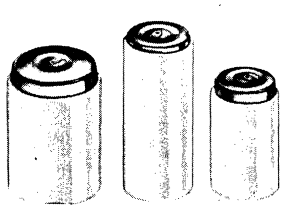
FIG. B

Type	Capacity mAH	Dimensions (in) C	Dimensions (in) D	Wt. oz.
20B	20	0.449	0.201	0.04
50B	50	0.606	0.230	0.09
100B	100	0.984	0.240	0.28
150B	150	0.984	0.260	0.30
180VBH*	180	0.984	0.290	0.39
225B	225	0.984	0.339	0.41
225BH*	225	0.984	0.347	0.44
250VBH*	250	1.340	0.210	0.58
400B	400	0.992	0.571	0.66
450B	450	1.689	0.299	1.10
500BH*	500	1.340	0.374	0.90
1000VBH*	1000	2.000	0.330	2.24
2000VBH*	2000	2.000	0.590	3.50
3000BH	3000	2.000	.976	5.00

Button cell batteries are constructed of sealed nickle cadmium button cells (see fig. B) to meet almost any application requirement. The compact size of button cells permits easy stacking to form multiple cell batteries of optimum power/volume ratio and space utilization. Completely sealed button cells are ideally suited for portable radios, flashlights, photoflash, alarms, and any low-drain, high capacity application.

*H denotes high rate discharge capability.

TYPICAL BUTTON CELL BATTERIES



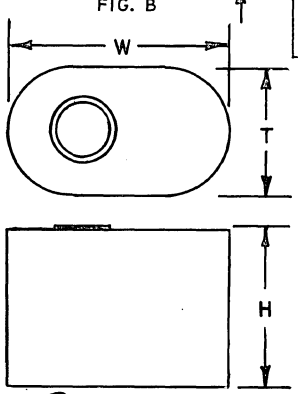
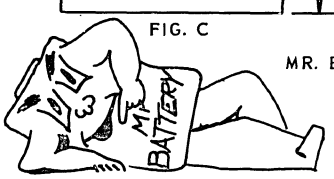


FIG. C

POWER INCORPORATED ALSO MARKETS:

- Emergency lighting units.
- Flashlight and lantern rechargeable batteries.
- Custom and prototype design battery packs built to your specifications.
- Battery chargers for all types of batteries.
- Batteries - **NICKLE CADMIUM - SILVER CADMIUM - SILVER ZINC - MERCURY - SEALED LEAD-ACID.**

INVESTIGATE direct current emergency power sources available in any regulated voltage or current, featuring automatic SCR solid state switchover to a self-contained battery. We have the answer to reliable economical D.C. power with automatic emergency back-up.



MR. BATTERY SAYS: ®

"We have over 10,000 cell and battery sizes in stock. If you don't see exactly what you are looking for here, let us know, chances are we'll be able to take care of your application immediately. We'd be happy to answer any questions. If we can't help you, no one can."

POWER INCORPORATED

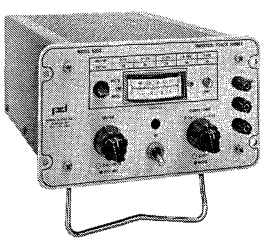
FOR COMPLETE SPECIFICATIONS, PRICE, AND DELIVERY, WRITE OR PHONE
POWER INC. ● MARKETING DIVISION ● 12809 Eagle Ridge Drive ● Burnsville, Minnesota 55378 ● (612) 890-1360 ●

power designs inc.

UNIPLY® A LABORATORY OF POWER SUPPLIES IN A SINGLE PACKAGE

• UNIPLY® is a regulator technique which functionally permits replacement of five regulated DC power supplies with a single instrument, providing features hitherto unavailable in conventional units. • Output voltage and current ranges cover a broad spectrum of laboratory requirements for both digital and analogue applications. • Ranging is transient-free and automatic with changes in load and the setting of voltage and current controls. Operation is completely electronic, without relays or manual switching. • For operation with low voltage digital circuits the automatic ranging feature may be restricted to 6 volts by means of a panel switch. In the 6 volts position the range of the panel voltmeter is automatically reduced to 6 volts full scale. • The RFI-free regulator system employs linear circuits only. No SCR's, switching transistors or high frequency techniques are utilized. • Power output capability of the supply increases with increasing AC line voltage over 105 volts. Useful regulated output at reduced levels is available down to a line voltage of 85 volts. • A flashing panel indicator signals inability of the supply to meet load demands in excess of control settings or the inability of the AC line voltage to support increased output levels. • The supply may be operated continuously into an overload or short circuit without damage. • Regulator efficiency is superior to conventional, wide voltage range, dissipative type systems.

0-7 V at 5 A; 0-15 V at 3 A; 0-25 V at 2 A; 0-60 V at 1 A

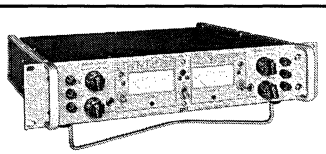


MODEL 6050A

$195.00
F.O.B. Westbury
New York

SPECIFICATIONS:

Input: 105-125 volts, 57-440 Hz, 100 watts nominal.
Line Regulation: 0.01% +1 millivolt.
Load Regulation: 0.01% +1 millivolt for load variation from 0-100% of rated output current.
Polarity: Either positive or negative output terminal may be operated at ground potential.
Ripple and Noise: Less than 1 millivolt peak-to-peak.
Source Impedance: < 0.005Ω at DC. 0.1 ohm to 20 KHz, 1.0 ohm to MHz.
Recovery Time: Less than 50 microseconds to return to within a 15 millivolt band of the original voltage for a step change in rated load of 10% to 100% (1 microsecond rise time).
Stability: < 0.02% +3 millivolts per 24 hours.
Operating Temperature: 0-50°C at full load. Storage: −20°C to +85°C.
Temperature Coefficient: < 0.02% per degree C.
Current Limiting: Concentric switch/potentiometer provides continuous adjustment in two ranges: 0-500 milliamperes, 0-5 amperes.
Metering: Front panel "edgewise" meter and a selector switch permits monitoring voltage or current with an accuracy of ±2% of full scale. Current range changes automatically with current limiter range switch.
Output Terminals: Front Panel: Three binding posts for positive, negative and ground.
Rear Panel: Seven terminal barrier strip for output voltage sensing and voltage programming.
Dimensions: 8⅜" wide x 4¾" high x 11⅞₆" deep.
Weight: 15½ lbs.
Overvoltage Crowbar: Built in overvoltage crowbar adjustable from 2.0 V to 70 V from the front panel.

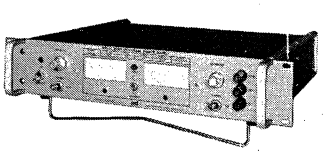


MODEL TW6050

$380.00
F.O.B. Westbury
New York

DUAL MODEL

The Model TW6050A comprises two independent model 6050A power sources in a single rack mounting instrument measuring only 3½" h x 16" d. Electrical characteristics of each unit are identical to the Model 6050 as described above. Each output may be operated independently, in series to provide up to 120 VDC at 0.5 A or in parallel to provide up to 7 V at 10 A.



MODEL 6150

$350.00
F.O.B. Westbury
New York

0-7 at 15 A; 0-15 V at 7.5 A; 0-25 V at 5 A; 0-50 V at 2.5 A; 0-60 V at 2.0 A

The Model 6150 is a higher powered version of the 6050A. Electrical characteristics are essentially the same as Model 6050A as described above. Two dual range 0-6/60 VDC and 0-1.5/15 ADC meters indicate both output voltage and current. The unit mounts in a 19" rack and measures 3½" h x 16" d.

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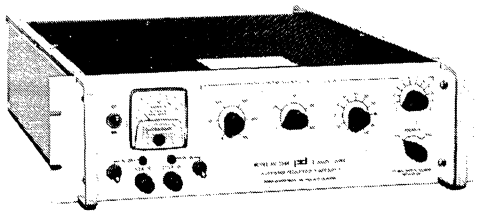
3381 Miranda Avenue, Palo Aito, Calif. 94302 / Tel: 415/321-6111 • TWX 910-373-1251

power designs inc.



HIGH VOLTAGE CALIBRATED POWER SOURCES

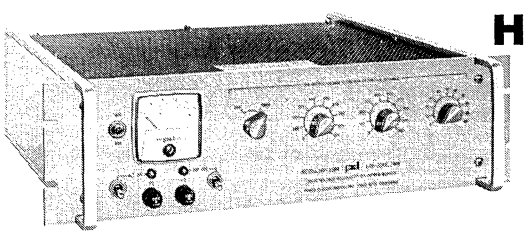
• High Stability—.005%/hr.; .02%/24 hrs. • All solid state on Model 3K10 • Low noise level • Superior performance and reliability • Self-restoring overload and short circuit protection with fault indicator • All silicon semiconductor amplifier with low TC zener reference. Vacuum tube "pass" element • Sealed transformers • 105-125 V, 50-400 Hertz input • 0.25% calibration accuracy • 10 MV resolution: 25 MV on Model 3K10* • 50 μS recovery time • Voltage and current metering • Field proven service • TC less than 50 PPM/°C

*ALL SOLID STATE

PARTIAL LIST OF AVAILABLE UNITS

MODEL	VOLTAGE	CURRENT MA	REGULATION LINE OR LOAD	RIPPLE Pk to Pk MV	SIZE PANEL HT.	† PRICE
2K10	1-2012	0-10	.002%+2mv	1.0	3½	$ 299
2K20	1-2012	0-20	.001%+2mv	1.0	3½	$ 325
1544	1-3012	0-20	.001%+2mv	1.0	5¼	$ 520
1547	1-3012	0-40	.001%+2mv	1.0	5¼	$ 575
1556B	10-6021	0-20	.001%+2mv	1.0	7	$ 625
1543A	10-10021	0-10	.001%+2mv	5.0	10½	$ 950
3K10B	10-3000	0-10	0.0025%+ 5mv	3	3.0	$ 390

WRITE FOR SPECIFICATION SHEETS †FOB WESTBURY



HIGH VOLTAGE CRT DISPLAY POWER SOURCES

ALL SOLID STATE / CORONA-FREE HIGH STABILITY / LOW NOISE OUTPUT ONLY 5¼" H x 19" W x 16" D

• Stability: .005%/hour • Regulation: 0.0025% line or load • Calibration Accuracy: 0.25% of output voltage • Temp. Coefficient 50 PPM/°C • 50 KV Corona-Free mating connector supplied • Environmental Isolation: All high voltage circuitry encapsulated in specially developed epoxy to effectively provide Corona-Free operation under adverse environmental conditions

Model	Output Voltage	Output Current	Ripple Pk to Pk	Polarity	Price
1584	1kv to 20kv	0-3ma	250 mv	Positive	$1875.00
1584R	1kv to 20kv	0-1ma	200 mv	Reversible	$2200.00
1590	1kv to 20kv	0-5ma	250 mv	Positive	$2050.00
1595	1kv to 20kv	0-5ma	250 mv	Negative	$2050.00
1579	10kv to 30kv	0-1ma	250 mv	Positive	$2250.00
1579R	10kv to 30kv	0-1ma	250 mv	Reversible	$2575.00

*FOB WESTBURY

HIGH VOLTAGE MODULAR POWER SUPPLIES

ALL SOLID STATE / LOW NOISE REMOTE CONTROLLED

• Remote resistance programming over complete range at low potentials (15 V max.) • Noise and ripple specified to 30 MHz • Regulation better than .0025% +5 MV for line or load variations • Stability and temperature coefficient are better than 50 PPM • New Nat'l Bureau Stds. approved safety output connector (SHV) • Overload, short-circuit and arc-proof • Built in servo loop for varying output voltage ±250 V with a 2.5 VDC signal (optional) • Voltage or digital programming options.

Model	Output Voltage	Output Current	Ripple & Noise Pk to Pk	Polarity	Price
UPMD-220N	10 v-2000 v	0-20 ma	10 mv	Negative	$350.00
UPMD-220P	10 v-2000 v	0-20 ma	10 mv	Positive	$365.00
UPMD-530N	10 v-3000 v	0-10 ma	5 mv	Negative	$380.00
UPMD-530P	10 v-3000 v	0-10 ma	5 mv	Positive	$395.00
UPMD-550N	10 v-5000 v	0-5 ma	5 mv	Negative	$435.00
UPMD-550P	10 v-5000 v	0-5 ma	5 mv	Positive	$450.00

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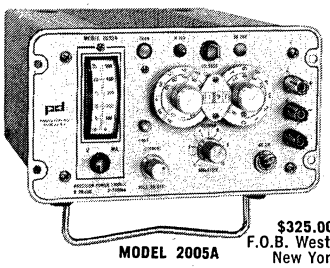


MODEL 2005A — **$325.00** F.O.B. Westbury New York

CALIBRATED PRECISION POWER SOURCES

0-20 VDC / 0-500 MA

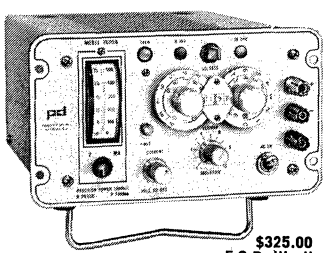
The Model 2005A is a calibrated precision power source designed to supply extremely stable DC output with low noise content. Compact and light, the Model 2005A is self-contained in a portable housing designed for bench or rack applications.

- Two dual concentric decade switches provide digital readout to five significant figures below 10 volts; to six significant figures above 10 volts. Last-place interpolation by a potentiometer with a 10μV resolution. A toggle switch provides an additional digit in the 10 to 20 volt range • Current limiting. Maximum output may be limited to any value below 500 mA with a front panel control, • Limit indicator lamp on the front panel flashes when the output of the supply is in the current-limited region

SPECIFICATIONS:

Output: 0 to 20 VDC continuously adjustable at 0 to 500 mA.
Input: 105 to 125 volts, 47 to 440 Hz, 40 watts nominal.
Regulation: Line or load: less than 0.0005% + 100 microvolts
Ripple & Noise: Less than 100 microvolts peak-to-peak
Stability: (8hr.): 0.001% + 100 microvolts
Source Impedance: 0.002 ohms at DC; 0.04 ohm at 20 KHz; 0.5 ohm at 1 MHz
Recovery Time: Less than 25 microseconds to return to within 100 microvolts of the set voltage, for a step change (1 microsecond rise time) of 80% of rated load. (20% minimum load.)
Temperature Coefficient: DC output voltage changes less than 0.001% or 50 microvolts (whichever is greater) per °C over the range 0°C to +45°C; less than 0.002% or 100 microvolts (whichever is greater) per °C from +45°C to +60°C.
Current Limiting: 0 to 500 mA continuously adjustable by a front panel control. Flashing lamp indicates overload or short circuit.
Remote Sensing: Two terminals on rear
Remote Programming: Rear panel terminals provide resistance programming at 1000 ohms per volt.
Metering: Front-panel volt-ammeter with an accuracy of ±2% of full scale.
Dimensions: 8⅜" x 4¾" x 8²⁷⁄₃₂".
Weight: 9 pounds.

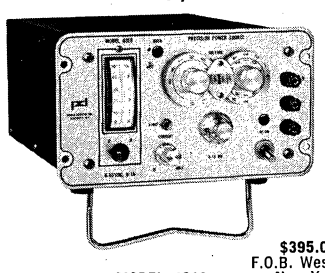
0-20 VDC / 0-2 A



MODEL 2020A — **$325.00** F.O.B. Westbury New York

- Two dual concentric decade switches provide digital readout to five significant figures below 10 volts; to six significant figures above 10 volts. Last-place interpolation by a potentiometer with a 10μV resolution. A toggle switch provides an additional digit in the 10 to 20 volt range • Current limiting. Maximum output may be limited to any value below 2 amps with a front panel control, • Limit indicator lamp on the front panel flashes when the output of the supply is in the current-limited region. Electrical characteristics similar to Model 2005A.

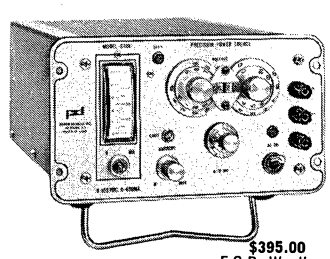
0-40 VDC / 0-1 A



MODEL 4010 — **$395.00** F.O.B. Westbury New York

- Four decade switches and 10-turn potentiometer provide digital readout to six significant figures • Sixth place interpolation with 10 microvolt resolution • Dial accuracy is 0.1% plus one millivolt up to one volt, 0.1% absolute from one to forty volts • Continuously adjustable output current limiter • Flashing indicator signals output short circuit, overload or current limiter operation • Self-restoring electronic overload and short circuit protection • Output voltage or current monitored by panel voltammeter with full scale accuracy of ±2% • Front and rear access output terminals • Separately fused line and load circuits • Bail-carrying handle tilts front panel for viewing ease. Electrical characteristics similar to Model 2005A.

0-100 VDC / 0-400 MA



$395.00 F.O.B. Westbury New York

- Four decade switches and 10-turn potentiometer provide digital readout to six significant figures • Sixth place interpolation with 10 microvolt resolution • Dial accuracy is 0.1% plus one millivolt up to one volt, 0.1% absolute from one to 100 volts • Continuously adjustable output current limiter • Flashing indicator signals output short circuit, overload or current limiter operation • Self-restoring electronic overload and short circuit protection • Output voltage or current monitored by panel voltammeter with full scale accuracy of ±2% • Front and rear access output terminals • Separately fused line and load circuits • Bail-carrying handle tilts front panel for viewing ease. Electrical characteristics similar to Model 2005A.

FEATURES

- All silicon semiconductor regulator system with new, low noise diff-amp input transistor and specially processed zener voltage reference • Advanced solid state circuitry • Exceptional stability through design simplicity • Critical components maintained at constant ambient in temperature controlled oven • Self-restoring electronic overload and short circuit protection with continuously adjustable current limiting control • Performance specifications based on anticipated ratings at end of five years of service • Built-in protection against turn-on or turn-off transients • 100 hour minimum pre-aging of power supply prior to test and calibration • Individual calibration data furnished with each unit

PARTIAL LIST OF AVAILABLE PRECISION POWER SOURCES

Model	Range Volts	Current Amps	Regulation Line/Load	Max. Ripple Pk to Pk	Stability	TC Per °C	Size	Special Features	† Price
2005A	0-20	0-0.5	.0005%	100μv	.001% +100μv/8hrs.	.001%	8⅜x4¾ x8²⁷⁄₃₂	4 decade readout with .1% accuracy. Continuous current limiting with panel push button setting. Remote programmable 1000Ω/v.	$325
2020A	0-20	0-2.0	100μv	100μv	.001% +100μv/8hrs.	.001%	8⅜x4¾ x11⅜	4 decade readout with 0.1% accuracy. Remote programmable 1000Ω/v.	$395
4010	0-40	0-1.0	.0005%	100μv	.001% +100μv/8hrs.	.001%	8⅜x4¾ x11⅜	Same as 2020A.	$395
C400	0-100	0-0.4	.001% +100μv	250μv	.001%	.001%	8⅜x4¾ x11⅜	4 decade readout with .1% accuracy. Continuous current limiting. Remote programmable 1000Ω/v.	$395

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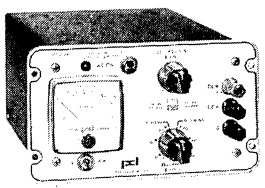
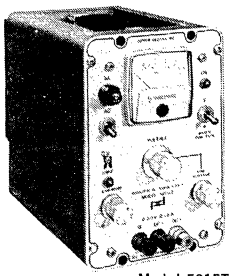
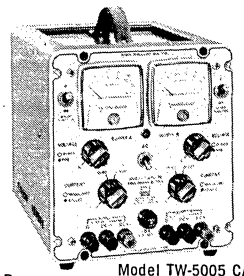
power designs inc.



Model 5005S CASE A
8⅜″W x 4¾″H x 9″D



Model 5015T CASE B
5¾″W x 8⅝″H x 10⅞″D



Model TW-5005 CASE C
7¾″W x 8⅝″H x 13½″D

LABORATORY DC POWER SOURCES

• Units feature remote sensing*; remote programming • front and rear output terminals • Continuously adjustable voltage and current limiting controls • Model 5015T, 1010T, 1210S and 3650S feature a current limit indicating monitor • Modular package construction suitable for rack mounting. Single or dual mounting in 19″ panel • Processed under Power Designs' "Predictable-Reliability" program for a 5-year MTBF. The program features: avalanche-controlled silicon rectifiers, stress-tested transistors, pre-aged zener references with extrapolated stability criteria based on 1/f noise changes, computer-grade capacitors, tin-oxide-film resistors, and components operated at 50% of manufacturers' published ratings. Units pre-aged under full-load conditions for a minimum of 50 hours.

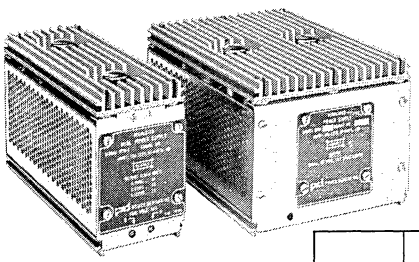
* Except Models 5005S and TW5005.

PARTIAL LIST OF AVAILABLE UNITS

MODEL	VOLTAGE	CURRENT AMPS	REGULATION LINE/LOAD	RIPPLE Pk to Pk MV	CASE	*PRICE
2015R	0-20	0-1.5	†0.03% or 5mv	0.45	A	175.00
5005S	0-50	0-0.5	0.005% + 1mv	1.00	A	149.50
5015T	0-50	0-1.5	†0.01% or 3mv	0.75	B	234.50
1010T	1-100	0-1.0	†0.05% or 15mv	1.50	C	339.50
1210S	0-12	0-10	0.01% + 2mv	1.50	C	329.00
TW5005 (Dual)	0-50, 0-0.5A each output 0-100 @ 0.5A Series Oper. 0-50 @ 1.0A Parallel Oper.		0.005% + 1mv	1.00	C	297.50
3650S	0-36	0-5.0	0.01% + 3mv	1.50	C	299.00

†whichever is greater

*FOB WESTBURY



REDULE® UNIVERSAL MODULAR POWER SUPPLIES

• Single or dual outputs with choice of several output voltage levels in one package • Multi-turn incremental voltage adjustment potentiometer • Parallel or series operation with any terminal at ground potential • Remote sensing • Remote programming • Self-restoring fold-back overload and short protection • Thermal overload cutout • 100% inspected "reliability controlled" silicon semiconductors • 50 hours power supply pre-aging prior to test • 50 μs recovery time • 105-125 V, 57-440 Hz input • Mounts in any plane, to any surface • No external heat sink required • Connector keying system prevents mating errors • Complete maintainability, reliability and workmanship to most military standards.

PARTIAL LIST OF AVAILABLE UNITS

MODEL	OUTPUT RATING	NUMBER OUTPUTS	REGULATION LINE/LOAD	MAX. RIPPLE PK TO PK	INPUT POWER @ NOM, LINE	†PRICE
UPM-6	24V @ 1½A, 27V @ 1¼A, 30V @ 1A	1	.01% + 2mv	1mv	90w	$139.50
UPM-11	0-16V @ 1A	2	.01% + 1mv	1mv	80w	199.00
UPM-16*	5, 6V @ 5A	1	.01% + 2mv	1mv	85w	169.00
UPM-22	16-30V @ ½A, 30-60V @ ¼A	2	.01% + 1mv	1mv	70w	199.00
UPM-33	0-16V @ 2A	1	.01% + 1mv	1mv	80w	147.50
UPM-44	16-30V @ 1A, 30-60V @ ½A	1	.01% + 1mv	1mv	70w	147.50
UPMD-6	3, 4, 5, 6V @ 10A	1	.01% + 2mv	1mv	150w	245.00
UPMD-6V	Same as UPMD-6 but with adjustable overvoltage protection					270.00
UPMD-10	24V @ 3A	1	.04% + 2mv	2mv	180w	180.00
UPMD-11B	±15V @ 1A (precision tracking)	2	100 μV	150 μv	85w	275.00
UPMD-15	15V DC @ 2A	2	.01% + 2mv	1mv	125w	265.00
UPMD-15V	Same as UPMD-15 with overvoltage crowbar protection					290.00
UPMD-X9	100V DC @ ¼A	2	.03% + 1mv	1mv	90w	260.00
UPMD-56A*	5, 6V @ 10A	1	.01% + 2mv	1mv	170w	225.00
UPMD-530†	50-3000V @ 10ma	1	.0025% + 5mv	10mv	60w	385.00
FPM-101	±15V @ 1A (precision tracking)	2	.01%	1mv	65w	164.00

*Includes built-in overvoltage crowbar protection.

†"N" Suffix for Neg. Output Polarity.
"P" Suffix for Pos. Output Polarity.

†FOB Westbury

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The UniPower Wide Range Series of Nine from POWER/MATE CORP. make slot supplies obsolete!

PMC

SPECIFICATIONS:

INPUT—105-125V, 47-420 CPS.

OUTPUT VOLTAGE—0-30 volts for all units except Uni-76 (0-34V); Uni-88 (0-34V); and UniTwin 164 (0-25V dual output).

OUTPUT VOLTAGE RANGE—Set in overlapping ranges by means of internal quick disconnect taps.

REGULATION—Uni-76 and Uni-88 better than ±0.005% + 1MV for line and load. All other units better than ±0.01% + 1MV for line and load.

RIPPLE—Less than 250 microvolts RMS.

RESPONSE TIME—Less than 20 microseconds.

TEMPERATURE COEFFICIENT—Better than 0.01%/°C.

LONG TERM STABILITY—Better than 0.025% for 8 hours.

OVERLOAD & SHORT CIRCUIT PROTECTION—Solid state short circuit and overload protected. Instantaneous recovery, and automatic reset. Unit cannot be damaged by prolonged short circuits or overloads.

POLARITY—May be either positive, negative or floating up to 300 volts.

AMBIENT OPERATING TEMPERATURE—Continuous duty from −20°C to +71°C ambient.

STORAGE TEMPERATURE— −55.C to +85°C.

OUTPUT CURRENT vs. TEMPERATURE—Unit is rated full output at 40°C ambient, and is derated for operation to 71°C. A modest amount of forced air cooling will permit full output at 71°C. Consult factory.

REMOTE-LOCAL SENSING—Provision is included to permit remote sensing of the output voltage directly at the load for improved over-all regulation. Unit may be connected for local sensing if desired.

REMOTE-LOCAL VOLTAGE ADJUST—Output voltage may be remotely adjusted, or internally adjusted with coarse and fine controls. Both are accessible through holes in the terminal end of the supply.

OUTPUT VOLTAGE vs. OUTPUT CURRENT FOR VARI-RATED UNI SERIES

MODEL	VOLTAGE																
	0-3	5	6	8	10	12	14	15	16	18	20	22	24	26	28	30	
UNI-76	0.5 amp throughout range																CURRENT
UNI-88	1.5 amps throughout range																
UNI-30C	4	4	4	4	4	3.75	3.6	3.5	3.4	3.25	3.0	2.9	2.75	2.5	2.5	2.1	
UNI-30D	6	6	6	5.6	5.2	5.0	4.7	4.5	4.3	4.2	4.1	3.7	3.5	3.4	3.3	3.1	
UNI-30E	12	12	11	10.5	9.5	9.3	8.5	8.0	7.7	7.5	7.0	6.5	6.0	5.7	5.5	5.2	
UNI-30F	15	15	15	14.2	12.8	12.0	11.5	11.0	10.0	9.9	9.4	8.9	8.7	8.5	8.0	7.6	
UNI-30G	24	22	21	20	18	17	16.5	16.0	15.5	15	14	13.5	13	12.5	12	11.5	
UNI-30H	34	32	31	29	25	23	22	21	20	19	17	16.5	16	15.5	15	14.3	

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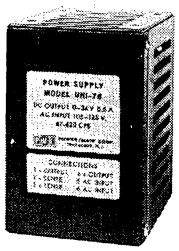
Nine versatile, regulated, adjustable voltage power supplies from **POWER/MATE!**

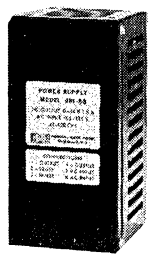


UNI-76

0-34 volts, 0.5 amp over entire voltage range. Regulation: Better than ±0.005% + 1 Mv for line and load.

$76.00

3 5/16"W x 3 7/8"H x 5 1/8"D
WEIGHT: Net 3¾ lbs., Shipping 4¾ lbs.



UNI-88

0-34 volts, 1.5 amps over entire voltage range. Regulation: Better than ±0.005% + 1 Mv for line and load.

$99.00

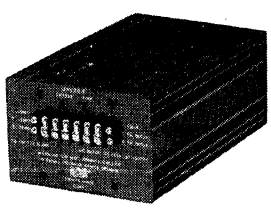
3 5/16"W x 3 7/8"H x 6 7/8"D
WEIGHT: Net 5¼ lbs., Shipping 6¾ lbs.

UniTwin-164

DUAL OUTPUT 0-25 volts, 0.75 amps over entire voltage range. Regulation: Better than ±0.005% + 1 Mv for line and load.

$164.00

3 5/16"W x 4 3/16"H x 6 7/8"D
WEIGHT: Net 5¾ lbs., Shipping 7½ lbs.

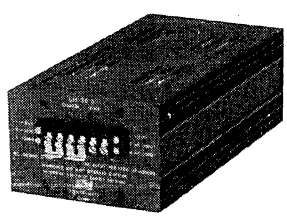


UNI-30C

0-30 volts, 4 amps. Regulation: Better than ±0.01% + 1 Mv for line and load.

$134.00

5 3/32"W x 3 5/16"H x 7 5/8"D
WEIGHT: Net 8¼ lbs., Shipping 10¼ lbs.

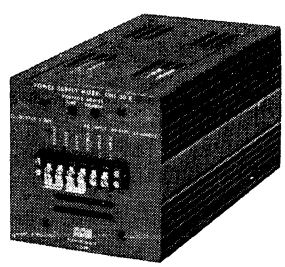


UNI-30D

0-30 volts, up to 6 amps (see chart). Regulation: ±0.01% + 1 Mv for line and load.

$151.00

5 3/32"W x 3 5/16"H x 9 3/8"D
WEIGHT: Net 11½ lbs., Shipping 14 lbs.

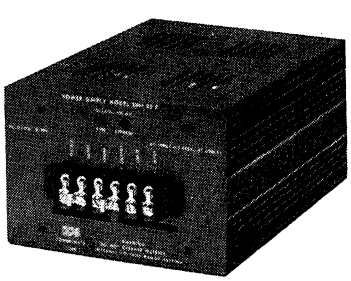


UNI-30E

0-30 volts, up to 12 amps (see chart). Regulation: ±0.01% + 1 Mv for line and load.

$174.00

5 3/32"W x 5 3/32"H x 9 3/8"D
WEIGHT: Net 15½ lbs., Shipping 19 lbs.

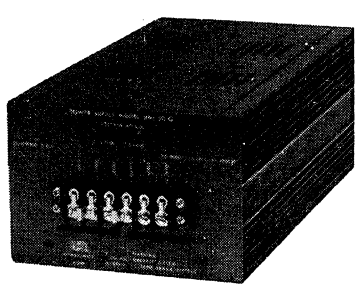


UNI-30F

0-30 volts, up to 15 amps (see chart). Regulation: ±0.01% + 1 Mv for line and load.

$205.00

7½"W x 5 3/32"H x 9 3/8"D
WEIGHT: Net 20¼ lbs., Shipping 24¼ lbs.

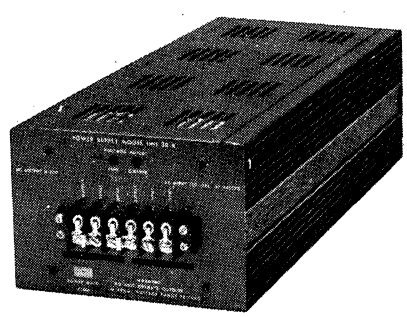


UNI-30G

0-30 volts, up to 24 amps (see chart). Regulation: ±0.01% + 1 Mv for line and load.

$265.00

7½"W x 5 3/32"H x 11 7/8"D
WEIGHT: Net 25¾ lbs., Shipping 30¼ lbs.



UNI-30H

0-30 volts, up to 34 amps (see chart). Regulation: ±0.01% + 1 Mv for line and load.

$315.00

7½"W x 5 3/32"H x 16½"D
WEIGHT: Net 34½ lbs., Shipping 39½ lbs.

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GENERAL SPECIFICATIONS

Voltage Input: 105-125VAC, 47-420cps
Current Output: Up to 34 amps
Voltage Output: 3 to 48 volts
Regulation: ± 0.01%,+1MV line and load
Ripple: Less than 250 microvolts
Response Time: Less than 20 microseconds
Temperature Coefficient: Better than 0.01%/°C.
Long Term Stability: Better than 0.025% for 8 hours.
Overload & Short-Circuit Protection: Solid state protection gives instantaneous recovery and automatic reset. Cannot be damaged by prolonged short-circuits or overloads.

Polarity: May be either positive, negative or floating up to 300 volts.
Ambient Operating Temperature: Continuous duty from −20°C to +71°C ambient.
Storage Temperature: −55°C to +85°C.
Output Current vs Temperature: Rated for full current output at temperatures between −20°C and +45°C. Linearly derated from +45°C as shown in charts below.
Remote or Local Sensing: Provision included for remote sensing of output voltage directly at the load, for improved overall regulation. Also may be connected for local sensing.
Remote or Local Voltage Adjust: Output voltage may be remotely adjusted, or internally adjusted with coarse and fine controls. Fine control is accessible through hole in terminal end of supply.

OEM SERIES A

3⅜"W x 3⅞"H x 5⅛"D
Net Wt.: 3¾ pounds
Shipping Wt.: 4¾ pounds
Price:
$79.00

MODEL	ADJUSTABLE VOLTAGE RANGE, ±0.5 volts	AMBIENT TEMPERATURE 45°C	50°C	60°C	71°C
OEM-3-A	3.0 ±.5 volts	1.25 amps	1.17	1.03	.88
OEM-3.6-A	3.6 ±.5 volts	1.25 amps	1.17	1.03	.88
OEM-4-A	4.0 ±.5 volts	1.25 amps	1.17	1.03	.88
OEM-4.5-A	4.5 ±.5 volts	1.25 amps	1.17	1.03	.88
OEM-5-A	5.0 ±.5 volts	1.25 amps	1.17	1.03	.88
OEM-6-A	6.0 ±.5 volts	1.25 amps	1.17	1.03	.88
OEM-8-A	8.0 ±.5 volts	1.25 amps	1.17	1.03	.88
OEM-10-A	10.0 ±.5 volts	1.25 amps	1.17	1.03	.88
OEM-12-A	12.0 ±.5 volts	1.25 amps	1.17	1.03	.88
OEM-15-A	15.0 ±.5 volts	1.25 amps	1.17	1.03	.88
OEM-18-A	18.0 ±.5 volts	1.00 amps	.94	.82	.70
OEM-20-A	20.0 ±.5 volts	.90 amps	.84	.74	.63
OEM-24-A	24.0 ±.5 volts	.80 amps	.75	.66	.56
OEM-28-A	28.0 ±.5 volts	.70 amps	.66	.58	.49
OEM-36-A	36.0 ±.5 volts	.60 amps	.56	.49	.42
OEM-48-A	48.0 ±.5 volts	.30 amps	.28	.25	.21

OEM SERIES C

5³⁄₃₂"W x 3⅜"H x 7⅝"D
Net Wt.: 8¼ pounds
Shipping Wt.: 10¼ pounds
Price:
$137.00

MODEL	ADJUSTABLE VOLTAGE RANGE, ±0.5 volts	AMBIENT TEMPERATURE 45°C	50°C	60°C	71°C
OEM-3-C	3.0 ±.5 volts	4.00 amps	3.7	3.3	2.8
OEM-3.6-C	3.6 ±.5 volts	4.00 amps	3.7	3.3	2.8
OEM-4-C	4.0 ±.5 volts	4.00 amps	3.7	3.3	2.8
OEM-4.5-C	4.5 ±.5 volts	4.00 amps	3.7	3.3	2.8
OEM-5-C	5.0 ±.5 volts	4.00 amps	3.7	3.3	2.8
OEM-6-C	6.0 ±.5 volts	4.00 amps	3.7	3.3	2.8
OEM-8-C	8.0 ±.5 volts	4.00 amps	3.7	3.3	2.8
OEM-10-C	10.0 ±.5 volts	4.00 amps	3.7	3.3	2.8
OEM-12-C	12.0 ±.5 volts	3.75 amps	3.5	3.1	2.6
OEM-15-C	15.0 ±.5 volts	3.50 amps	3.3	2.9	2.4
OEM-18-C	18.0 ±.5 volts	3.25 amps	3.0	2.6	2.2
OEM-20-C	20.0 ±.5 volts	3.00 amps	2.8	2.4	2.1
OEM-24-C	24.0 ±.5 volts	2.75 amps	2.6	2.2	1.9
OEM-28-C	28.0 ±.5 volts	2.50 amps	2.3	2.0	1.7
OEM-36-C	36.0 ±.5 volts	2.00 amps	1.9	1.6	1.4
OEM-48-C	48.0 ±.5 volts	1.25 amps	1.17	1.03	.88

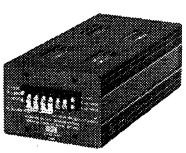
OEM SERIES B

3⅜"W x 3⅞"H x 6⅞"D
Net Wt.: 5¼ pounds
Shipping Wt.: 6¾ pounds
Price:
$102.00

MODEL	ADJUSTABLE VOLTAGE RANGE, ±0.5 volts	AMBIENT TEMPERATURE 45°C	50°C	60°C	71°C
OEM-3-B	3.0 ±.5 volts	2.50 amps	2.3	2.0	1.7
OEM-3.6-B	3.6 ±.5 volts	2.50 amps	2.3	2.0	1.7
OEM-4-B	4.0 ±.5 volts	2.50 amps	2.3	2.0	1.7
OEM-4.5-B	4.5 ±.5 volts	2.50 amps	2.3	2.0	1.7
OEM-5-B	5.0 ±.5 volts	2.50 amps	2.3	2.0	1.7
OEM-6-B	6.0 ±.5 volts	2.50 amps	2.3	2.0	1.7
OEM-8-B	8.0 ±.5 volts	2.50 amps	2.3	2.0	1.7
OEM-10-B	10.0 ±.5 volts	2.50 amps	2.3	2.0	1.7
OEM-12-B	12.0 ±.5 volts	2.50 amps	2.3	2.0	1.7
OEM-15-B	15.0 ±.5 volts	2.50 amps	2.3	2.0	1.7
OEM-18-B	18.0 ±.5 volts	2.25 amps	2.1	1.8	1.6
OEM-20-B	20.0 ±.5 volts	2.00 amps	1.9	1.6	1.4
OEM-24-B	24.0 ±.5 volts	1.90 amps	1.8	1.5	1.3
OEM-28-B	28.0 ±.5 volts	1.80 amps	1.7	1.4	1.2
OEM-36-B	36.0 ±.5 volts	1.20 amps	1.1	1.0	0.8
OEM-48-B	48.0 ±.5 volts	0.60 amps	.56	0.5	.42

OEM SERIES D

5³⁄₃₂"W x 3⅜"H x 9⅜"D
Net Wt.: 11½ pounds
Shipping Wt.: 14 pounds
Price:
$154.00



MODEL	ADJUSTABLE VOLTAGE RANGE, ±0.5 volts	AMBIENT TEMPERATURE 45°C	50°C	60°C	71°C
OEM-3-D	3.0 ±.5 volts	6.00 amps	5.6	4.9	4.2
OEM-3.6-D	3.6 ±.5 volts	6.00 amps	5.6	4.9	4.2
OEM-4-D	4.0 ±.5 volts	6.00 amps	5.6	4.9	4.2
OEM-4.5-D	4.5 ±.5 volts	6.00 amps	5.6	4.9	4.2
OEM-5-D	5.0 ±.5 volts	6.00 amps	5.6	4.9	4.2
OEM-6-D	6.0 ±.5 volts	6.00 amps	5.6	4.9	4.2
OEM-8-D	8.0 ±.5 volts	5.60 amps	5.3	4.6	3.9
OEM-10-D	10.0 ±.5 volts	5.20 amps	4.9	4.3	3.6
OEM-12-D	12.0 ±.5 volts	5.00 amps	4.7	4.1	3.5
OEM-15-D	15.0 ±.5 volts	4.50 amps	4.2	3.7	3.1
OEM-18-D	18.0 ±.5 volts	4.20 amps	3.9	3.4	2.9
OEM-20-D	20.0 ±.5 volts	4.10 amps	3.8	3.3	2.8
OEM-24-D	24.0 ±.5 volts	3.50 amps	3.3	2.9	2.4
OEM-28-D	28.0 ±.5 volts	3.30 amps	3.1	2.7	2.3
OEM-36-D	36.0 ±.5 volts	3.00 amps	2.8	2.4	2.1
OEM-48-D	48.0 ±.5 volts	2.00 amps	1.9	1.6	1.4

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HIGH PERFORMANCE AT NO EXTRA COST

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For maximum versatility, use POWER/MATE CORP.'s economical building block components. Predrilled, tapped holes expedite assembly into standard 19" racks.

Control Panels, module adapters, rack slides, overvoltage protectors, rack adapters and terminal strip adapters are all available from POWER/MATE.

MODEL OVP-2

Over-voltage Protection is provided by this self-contained, crowbar-type solid state unit. It is independent of the power supply or the type of failure. It is continuously adjustable between 3 to 60 volts and is rated for use with any power supply in the Uni or OEM Series with current outputs up to 34 amperes. Response time is between 3-6 microseconds. Dimensions are 1" x 2⅞" x 3⅜". Price: **$35.00**

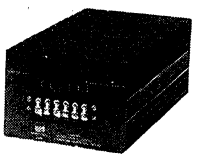
OEM SERIES E

5 3/32"W x 5 3/32"H x 9⅜"D
Net Wt.: 15½ pounds
Shipping Wt.: 19 pounds
Price:
$177.00

MODEL	ADJUSTABLE VOLTAGE RANGE, ±0.5 volts	AMBIENT TEMPERATURE 45°C	50°C	60°C	71°C
OEM-3-E	3.0 ±.5 volts	12.00 amps	11.3	9.9	8.4
OEM-3.6-E	3.6 ±.5 volts	12.00 amps	11.3	9.9	8.4
OEM-4-E	4.0 ±.5 volts	12.00 amps	11.3	9.9	8.4
OEM-4.5-E	4.5 ±.5 volts	12.00 amps	11.3	9.9	8.4
OEM-5-E	5.0 ±.5 volts	12.00 amps	11.3	9.9	8.4
OEM-6-E	6.0 ±.5 volts	11.00 amps	10.3	9.1	7.7
OEM-8-E	8.0 ±.5 volts	10.50 amps	9.9	8.6	7.3
OEM-10-E	10.0 ±.5 volts	9.50 amps	8.9	7.8	6.6
OEM-12-E	12.0 ±.5 volts	9.30 amps	8.7	7.7	6.5
OEM-15-E	15.0 ±.5 volts	8.00 amps	7.5	6.6	5.6
OEM-18-E	18.0 ±.5 volts	7.50 amps	7.0	6.2	5.2
OEM-20-E	20.0 ±.5 volts	7.00 amps	6.6	5.8	4.9
OEM-24-E	24.0 ±.5 volts	6.00 amps	5.6	4.9	4.2
OEM-28-E	28.0 ±.5 volts	5.50 amps	5.2	4.5	3.8
OEM-36-E	36.0 ±.5 volts	5.00 amps	4.7	4.1	3.5
OEM-48-E	48.0 ±.5 volts	3.00 amps	2.8	2.5	2.1

OEM SERIES G

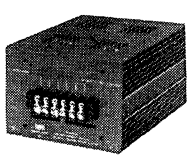
7½"W x 5 3/32"H x 11⅞"D
Net Wt.: 25¾ pounds
Shipping Wt.: 30¼ pounds
Price:
$268.00



MODEL	ADJUSTABLE VOLTAGE RANGE, ±0.5 volts	AMBIENT TEMPERATURE 45°C	50°C	60°C	71°C
OEM-3-G	3.0 ±.5 volts	24.00 amps	22.5	19.8	16.8
OEM-3.6-G	3.6 ±.5 volts	23.00 amps	21.6	19.0	16.1
OEM-4-G	4.0 ±.5 volts	23.00 amps	21.6	19.0	16.1
OEM-4.5-G	4.5 ±.5 volts	22.00 amps	20.7	18.2	15.4
OEM-5-G	5.0 ±.5 volts	22.00 amps	20.7	18.2	15.4
OEM-6-G	6.0 ±.5 volts	21.00 amps	19.8	17.4	14.7
OEM-8-G	8.0 ±.5 volts	20.00 amps	18.8	16.5	14.0
OEM-10-G	10.0 ±.5 volts	18.00 amps	16.9	14.8	12.6
OEM-12-G	12.0 ±.5 volts	17.00 amps	16.0	14.0	11.9
OEM-15-G	15.0 ±.5 volts	16.00 amps	15.1	13.2	11.2
OEM-18-G	18.0 ±.5 volts	15.00 amps	14.1	12.4	10.5
OEM-20-G	20.0 ±.5 volts	14.00 amps	13.2	11.5	9.8
OEM-24-G	24.0 ±.5 volts	13.00 amps	12.2	10.7	9.1
OEM-28 G	28.0 ±.5 volts	12.00 amps	11.3	9.9	8.4
OEM-36-G	36.0 ±.5 volts	10.00 amps	9.4	8.7	7.0
OEM-48-G	48.0 ±.5 volts	7.00 amps	6.6	5.8	4.9

OEM SERIES F

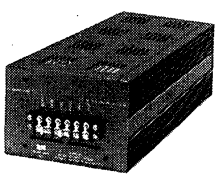
7½"W x 5 3/32"H x 9⅜"D
Net Wt.: 20¼ pounds
Shipping Wt.: 24¼ pounds
Price:
$208.00



MODEL	ADJUSTABLE VOLTAGE RANGE, ±0.5 volts	AMBIENT TEMPERATURE 45°C	50°C	60°C	71°C
OEM-3-F	3.0 ±.5 volts	15.00 amps	14.1	12.4	10.5
OEM-3.6-F	3.6 ±.5 volts	15.00 amps	14.1	12.4	10.5
OEM-4-F	4.0 ±.5 volts	15.00 amps	14.1	12.4	10.5
OEM-4.5-F	4.5 ±.5 volts	15.00 amps	14.1	12.4	10.5
OEM-5-F	5.0 ±.5 volts	15.00 amps	14.1	12.4	10.5
OEM-6-F	6.0 ±.5 volts	15.00 amps	14.1	12.4	10.5
OEM-8-F	8.0 ±.5 volts	14.20 amps	13.4	11.7	9.9
OEM-10-F	10.0 ±.5 volts	12.80 amps	12.0	10.6	8.9
OEM-12-F	12.0 ±.5 volts	12.00 amps	11.3	9.9	8.4
OEM-15-F	15.0 ±.5 volts	11.00 amps	10.3	9.1	7.7
OEM-18-F	18.0 ±.5 volts	9.90 amps	9.3	8.2	6.9
OEM-20-F	20.0 ±.5 volts	9.40 amps	8.8	7.7	6.5
OEM-24-F	24.0 ±.5 volts	8.70 amps	8.2	7.2	6.1
OEM-28-F	28.0 ±.5 volts	8.00 amps	7.4	6.6	5.6
OEM-36-F	36.0 ±.5 volts	7.40 amps	6.9	6.1	5.2
OEM-48-F	48.0 ±.5 volts	4.50 amps	4.2	3.7	3.15

OEM SERIES H

7½"W x 5 3/32"H x 16½"D
Net Wt.: 34½ pounds
Shipping Wt.: 39½ pounds
Price:
$318.00



MODEL	ADJUSTABLE VOLTAGE RANGE, ±0.5 volts	AMBIENT TEMPERATURE 45°C	50°C	60°C	71°C
OEM-3-H	3.0 ±.5 volts	34.00 amps	32.0	28.1	23.8
OEM-3.6-H	3.6 ±.5 volts	33.00 amps	31.0	27.3	23.1
OEM-4-H	4.0 ±.5 volts	33.00 amps	31.0	27.3	23.1
OEM-4.5-H	4.5 ±.5 volts	32.00 amps	30.1	26.5	22.4
OEM-5-H	5.0 ±.5 volts	32.00 amps	30.1	26.5	22.4
OEM-6-H	6.0 ±.5 volts	31.00 amps	29.2	25.6	21.7
OEM-8-H	8.0 ±.5 volts	29.00 amps	27.3	24.0	20.3
OEM-10-H	10.0 ±.5 volts	25.00 amps	23.5	20.7	17.5
OEM-12-H	12.0 ±.5 volts	23.00 amps	21.6	19.0	16.1
OEM-15-H	15.0 ±.5 volts	21.00 amps	19.8	17.4	14.7
OEM-18-H	18.0 ±.5 volts	19.00 amps	17.9	15.7	13.3
OEM-20-H	20.0 ±.5 volts	17.00 amps	16.0	14.0	11.9
OEM-24-H	24.0 ±.5 volts	16.00 amps	15.1	13.2	11.2
OEM-28-H	28.0 ±.5 volts	15.00 amps	14.1	12.4	10.8
OEM-36-H	36.0 ±.5 volts	12.00 amps	11.3	9.9	8.4
OEM-48-H	48.0 ±.5 volts	8.50 amps	8.0	7.0	5.9

PMC

POWER/MATE CORP.
514 S. River Street • Hackensack, N.J. 07601
Phone (201) 343-6294/TWX 710-990-5023

Searching? Should you not find the exact OEM supply you need, don't hesitate to call your PMC representative. The supply you want has probably been designed and is in our "design bank" waiting to be specified.

PMC **POWER/MATE CORP.**
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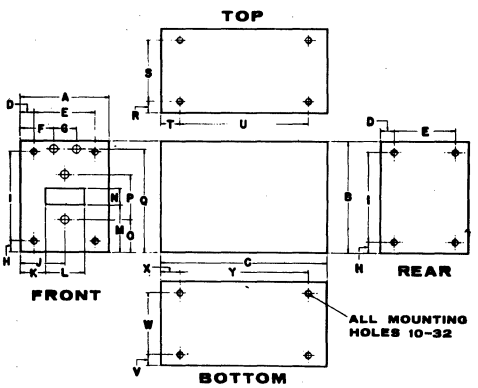
Phone: (201) 343-6294 TWX: (710) 990-5023

UNI, OEM, FR SERIES

CASE DIMENSIONS FOR UNI SERIES, OEM SERIES AND FR SERIES



Model	PT( )A FR( )A OEM( )A UNI-76	PT( )B FR( )B OEM( )B UNI-88	UNI-164	PT( )C FR( )C OEM( )C UNI-30C	PT( )D FR( )D OEM( )D UNI-30D	PT( )E FR( )E OEM( )E UNI-30E	PT( )F FR( )F OEM( )F UNI-30F	PT( )G FR( )G OEM( )G UNI-30G	PT( )H FR( )H OEM( )H UNI-30H
A	3 5/16	3 5/16	3 5/16	5 3/32	5 3/32	5 3/32	7 1/2	7 1/2	7 1/2
B	3 7/8	3 7/8	4 3/16	3 5/16	3 5/16	5 3/32	5 3/32	5 3/32	5 3/32
C	5 1/8	6 7/8	6 7/8	7 5/8	9 3/8	9 3/8	9 3/8	11 7/8	16 1/2
D	3/8	3/8	3/8	1 17/64	1 17/64	1 17/64	1 17/64	1 17/64	1 17/64
E	2 5/16	2 5/16	2 5/16	2 5/16	2 5/16	2 5/16	4 31/32	4 31/32	4 31/32
F	1 1/8	1 1/8		2 11/64	2 11/64	2 11/64	3 3/8	3 3/8	3 3/8
G	1 1/16	1 1/16		3/4	3/4	3/4	3/4	3/4	3/4
H	13/16	13/16	13/16	3/8	3/8	43/64	43/64	43/64	43/64
I	2 5/16	2 5/16	2 5/16	2 5/16	2 5/16	3 3/4	3 3/4	3 3/4	3 3/4
J			1 21/32						
K	13/64	13/64	25/64	1 3/32	1 3/32	1 3/32	1 5/64	1 5/64	1 5/64
L	2 29/32	2 29/32	2 17/32	2 29/32	2 29/32	2 29/32	4 11/32	4 11/32	4 11/32
M	1 9/32	1 9/32	1 1/2	1 9/16	1 9/16	2 3/32	1 9/16	1 9/16	1 9/16
N	29/32	29/32	1 3/8	7/8	7/8	7/8	1 5/16	1 5/16	1 5/16
O			1 1/16						
P			2 1/16						
Q	2 5/8	2 5/8		2 11/16	2 11/16	4 5/16	4 5/16	4 5/16	4 5/16
R	3/8	3/8	3/8						
S	2 5/16	2 5/16	2 5/16						
T	15/16	1 1/16	1 1/16						
U	3 1/4	4 3/4	4 3/4						
V				1/4	1/4	1/4	1/4	1/4	1/4
W				4 19/32	4 19/32	4 19/32	7	7	7
X				1 3/16	1 3/16	1 3/16	1 3/16	1 3/16	1 3/16
Y				5 1/4	7	7	7	9 1/2	14 1/8

HOW TO ORDER POWER/MATE OEM POWER SUPPLIES

To specify voltage and current, including those not listed, place the required voltage after OEM-, and the current after the case size A, B, etc. For example: OEM-34C-2.25 or OEM-5-HOV for over voltage.

AVAILABLE OPTIONS

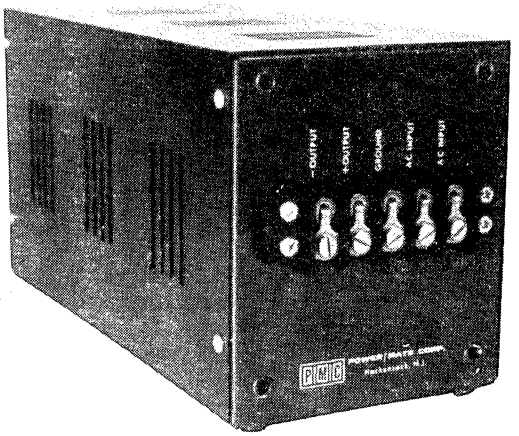
1. Built-in over-voltage protection at $30 per unit. Use suffix "OV."
2. Fungus proofing, with MIL-V-173 varnish, for all fungus nutrient components, at $10 per unit. Use suffix "FP."
3. AC input. All units are available with 208 VAC ±10% (use suffix "L") or 230 VAC ±10% (use suffix "LL") at no extra cost.
4. Dual AC input. All units are available with 208 VAC and 230 VAC (use suffix "Y," at $25 per unit).
5. Dual primary. All units are available with 230 VAC and 115 VAC (use suffix "X," at $25 per unit).

OTHER VOLTAGE/CURRENT COMBINATIONS AVAILABLE

It is always worthwhile to contact POWER/MATE, even if the exact power supply you need is not shown in this catalog. The supply you want has probably been designed and is in the PMC "design bank" waiting to be specified.

Pioneers of the UNI concept in power supplies

FPS Series FERRORESONANT REGULATED DC POWER SUPPLIES



FEATURES:

- High efficiency—70-90%
- Low cost
- High reliability—over 150,000 hours MTBF
- Short circuit proof
- High-quality components
- All silicon semiconductors
- Built-in limiting for over-voltage and over-current
- Operate in series parallel
- Compatible with standard PMC Power Supplies and Accessories

FPS Series units supply DC outputs from 5 to 48 volts, with currents to 25 amps. The inherent simplicity of design of these supplies greatly increases their reliability. Components are conservatively rated to further assure optimum performance. All FPS units may be used with the standard Power/Mate racks and metered accessories.

An extra low ripple version is offered in which the output ripple is reduced below that of standard FPS models. This is denoted by the suffix "F" after the model number (example: FPS 15-12F). The added filtering increases the unit length by four inches. Case size, FCF.

SPECIFICATIONS:

ACCURACY: ±2%, measured at 115 VAC, full load, 30°C. Initial cold output is 1% higher.

REGULATION LINE: ±1%, for ±15 volt AC line variation, at 25-100% load. For loads below 25%, line regulation is +1.5% output change.

REGULATION LOAD: Refer to specific model on chart at right.

STABILITY (8 hr.): 1% or 0.1V, whichever is greater.

TEMPERATURE COEFFICIENT: 0.05%/C°.

INPUT: 115 VAC-., ±15 VAC-., 60Hz ±5% single phase. Input frequency variations produce an approximate equal percentage output voltage change.

AMBIENT OPERATING TEMPERATURE: —20°C to +55°C.

STORAGE TEMPERATURE: —40°C to +85°C.

COOLING: Convection.

OUTPUT IMPEDANCE: 1 kHz-10 kHz: 0.05 ohms, 10 kHz-100 kHz: 0.05 ohms +0.5 microhenries.

TRANSIENT RESPONSE: (50-100% current) 50 milliseconds.

OVERLOAD PROTECTION: Current limiting transformer restricts short circuit current to safe value.

ISOLATION VOLTAGE: 600 volts to chassis.

SERIES/PARALLEL OPERATION: Identical models, can be paralleled for approximately double current (allow for 10% imbalance). Series operation to rated isolation.

ACCESSORIES: Various PMC rack adapters and accessories are available. (PMC AR-525 and related series of accessories.)

MODELS AND SPECIFICATIONS FPS SERIES

Model	DC Output Volts	DC Output Amps	Load Regulation Volt. Increase Full ½ Load	Load Regulation Volt. Increase Full ¼ Load	Ripple V. RMS	Net Weight Pounds	Case Size†	Price with Case	Price without Case
FPS 5-15	5	15	0.5	0.8	0.4	16	FC	$112	$100
FPS 5-15F	5*	15	0.7	1.2	0.04	22	FCF	165	155
FPS 5-25	5	25	0.5	0.8	0.4	18	FC	135	123
FPS 5-25F	5*	25	0.7	1.2	0.04	24	FCF	185	175
FPS 6-15	6	15	0.5	0.8	0.4	16	FC	112	100
FPS 6-15F	6*	15	0.7	1.2	0.04	22	FCF	165	155
FPS 6-25	6	25	0.5	0.8	0.4	18	FC	135	123
FPS 6-25F	6*	25	0.7	1.2	0.04	24	FCF	185	175
FPS 12-10	12	10	0.6	1.0	0.4	16	FC	112	100
FPS 12-10F	12*	10	0.9	1.4	0.02	22	FCF	165	155
FPS 12-15	12	15	0.6	1.0	0.4	18	FC	135	123
FPS 12-15F	12*	15	0.9	1.4	0.02	24	FCF	185	175
FPS 15-8	15	8	0.6	1.0	0.3	16	FC	112	100
FPS 15-8F	15*	8	0.9	1.4	0.02	22	FCF	165	155
FPS 15-12	15	12	0.6	1.0	0.3	18	FC	135	123
FPS 15-12F	15*	12	0.9	1.4	0.02	24	FCF	185	175
FPS 18-6.7	18	6.7	0.6	1.0	0.3	16	FC	112	100
FPS 18-6.7F	18*	6.7	0.9	1.5	0.01	22	FCF	165	155
FPS 18-10	18	10	0.6	1.0	0.3	18	FC	135	123
FPS 18-10F	18*	10	0.9	1.5	0.01	24	FCF	185	175
FPS 24-5	24	5	0.7	1.2	0.3	16	FC	112	100
FPS 24-5F	24*	5	1.2	2.0	0.005	22	FCF	165	155
FPS 24-8	24	8	0.7	1.2	0.3	18	FC	135	123
FPS 24-8F	24*	8	1.2	2.0	0.005	24	FCF	185	175
FPS 28-4.3	28	4.3	0.7	1.2	0.3	16	FC	112	100
FPS 28-4.3F	28*	4.3	1.3	2.1	0.05	22	FCF	165	155
FPS 28-7	28	7	0.7	1.2	0.4	18	FC	135	123
FPS 28-7F	28*	7	1.3	2.1	0.05	24	FCF	185	175
FPS 36-3.3	36	3.3	0.8	1.3	0.3	16	FC	112	100
FPS 36-3.3F	36*	3.3	1.5	2.4	0.005	22	FCF	165	155
FPS 36-5	36	5	0.8	1.3	0.4	18	FC	135	123
FPS 36-5F	36*	5	1.5	2.4	0.005	24	FCF	185	175
FPS 48-2.5	48	2.5	1.0	1.8	0.3	16	FC	112	100
FPS 48-2.5F	48*	2.5	1.7	2.9	0.003	22	FCF	165	155
FPS 48-4	48	4	1.0	1.8	0.3	18	FC	135	123
FPS 48-4F	48*	4	1.7	2.9	0.003	24	FCF	185	175

* Less 2% filter drop
† FC = 3¾W x 4²⁷⁄₃₂H x 10⅝D (inches)
FCF = 3¾W x 4²⁷⁄₃₂H x 14⅝D (inches)

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RACKS and ACCESSORIES

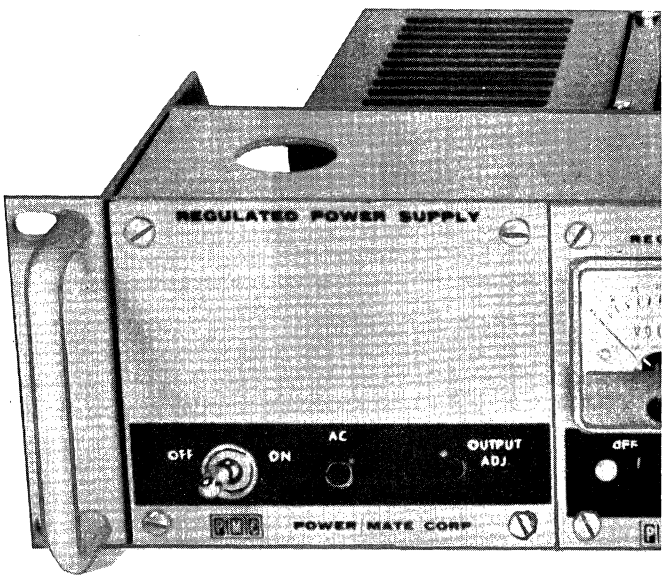
PRODUCT DIGEST

All PMC racks and accessories accommodate a variety of PMC modules in any configuration in a standard 19" rack, 3½" high or 5¼" high, with 5 different styles. All of the racks and panels are finished in durable baked gray enamel, with predrilled and tapped holes, ready for easy assembly.

THE PMC "BUILDING BLOCK" APPROACH

Because most PMC power supply modules are compatible with PMC racks, panels and other accessories, an infinite variety of combinations is possible to produce the exact requirements of the application. Assembly of a CUSTOM power supply, instead of specifying a "special order," gains the substantial benefits of lower cost and the use of industry proven and accepted PMC power supplies.

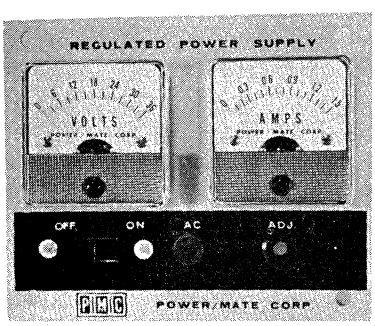
This approach also gives the engineer a new dimension in design freedom. He chooses from readily available, off-the-shelf, standard modules (at standard prices), and from matching off-the-shelf mounting racks, metered and non-metered control panels, in addition to the complete assortment of other accessories.



PANELS

HOW TO ORDER PANELS: Select desired voltmeter range and ammeter range from listing below. Insert voltmeter range selected in first bracket, followed by ammeter range. For example, a CPM-525-36-1.5 indicates a metered quarter rack panel with a 0-36 voltmeter and a 0-1.5 ammeter.

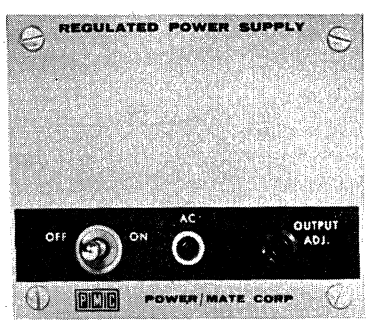
FOR USE WITH AR-35 RACK SERIES



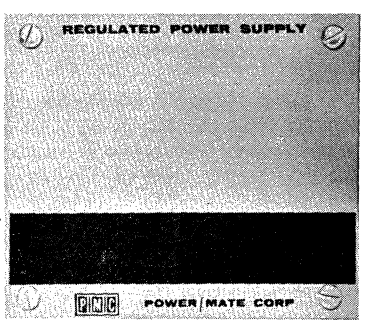
MODEL CPM-35-(....)-(....) Quarter rack metered control panel with voltmeter and ammeter, on-off switch, and AC indicator. Screwdriver output voltage adjust from front panel. On panel rear is input cable, AC fuse and output solder terminals.

VOLTMETERS: 0-10, 0-18, 0-36, 0-50, 0-150 volts

AMMETERS: 0-0.5, 0-1.5, 0-6, 0-15, 0-36 amps
Price $45.00



MODEL CP-35 Quarter rack control panel with same features as above, but without meters.
Price $25.00



BLANK PANELS for use in AR-35 series racks. For completing front panel after selection of desired control panels, or for use in adding your own controls or instrumentation.

MODEL P-35-4 ¼ rack size blank panel
Price $4.00

MODEL P-35-2 ½ rack size blank panel
PRICE $5.00

MODEL P-35-1 Full size blank panel
PRICE $7.50

Designers and manufacturers of quality power supplies

PMC **POWER/MATE CORP.**
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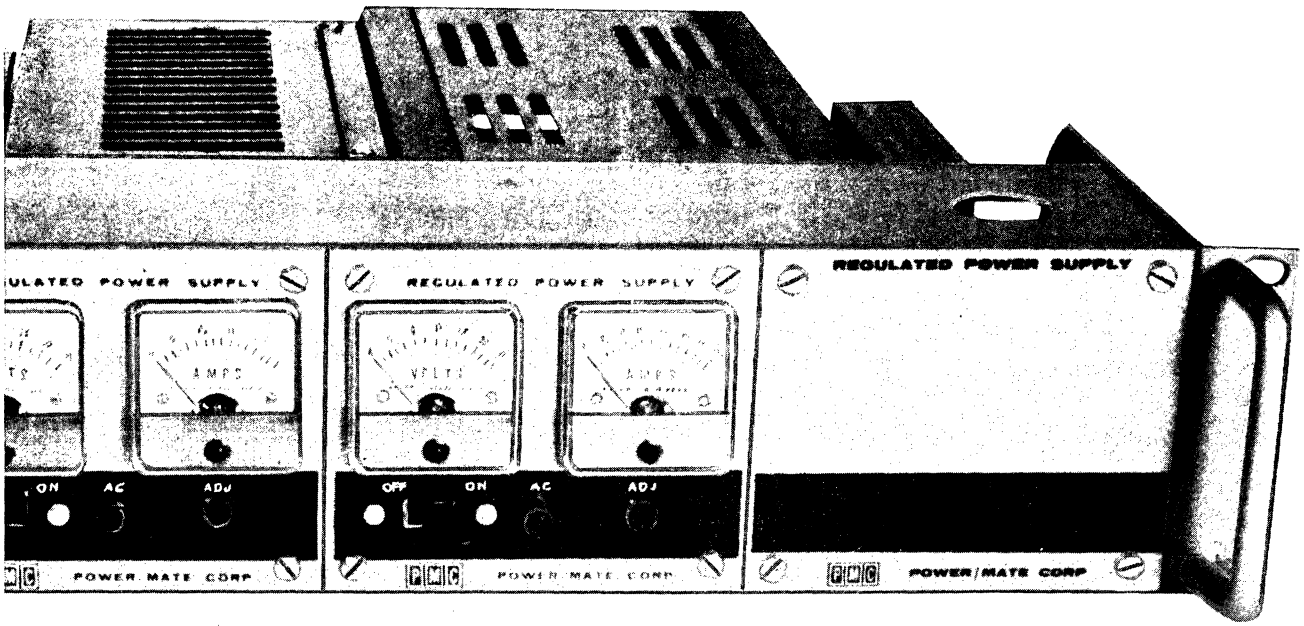
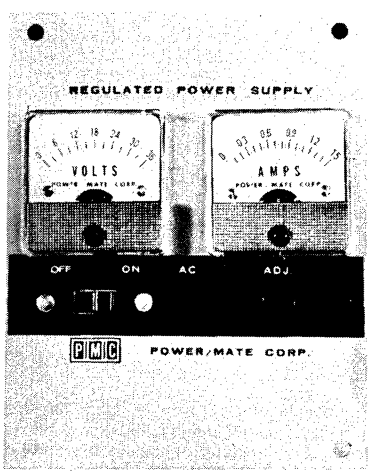
RACKS and ACCESSORIES



FOR USE WITH AR-525 RACK SERIES

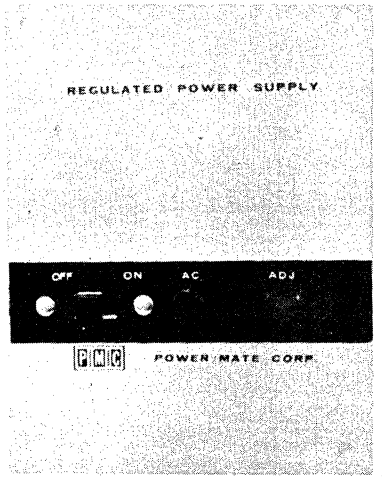


MODEL CPM-525-(....)-(....) Quarter rack metered control panel with voltmeter and ammeter, on-off switch, and AC indicator. Screwdriver output voltage adjust from front panel. On panel rear is input cable, AC fuse, and output solder terminals.

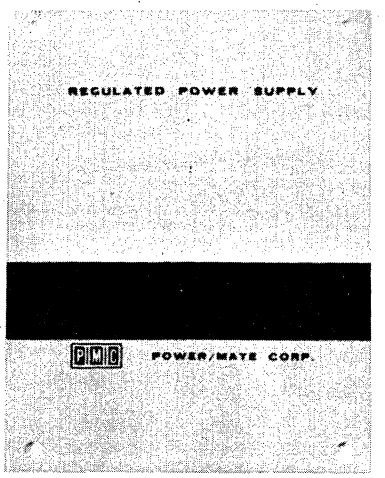
VOLTMETERS: 0-10, 0-18, 0-36, 0-50, 0-150 volts full scale

AMMETERS: 0-0.5, 0-1.5, 0-6, 0-15, 0-36 amps full scale

PRICE $45.00



MODEL CP-525 Quarter rack control panel with same features as above but with no meters.
Price $25.00



BLANK PANELS for use in AR-525 series racks. For filling spaces in front panel after selection of above control panels, or for use in adding your own controls or instrumentation.

MODEL P-525-4 ¼ rack size blank panel
Price $4.00

MODEL P-525-2 ½ rack size blank panel
Price $5.00

MODEL P-525-1 Full size blank panel
Price $7.50

Pioneers of the UNI concept in power supplies

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HOW TO SELECT RACKS TO FIT YOUR MODULES

1 Select the POWER/MATE power supply modules of either the UNI or OEM Series, which will satisfy the electrical requirements of your application.

2 From TABLE A, list the effective width and depth of each module selected. Arrange in a list so that the effective width can be readily added up.

3 To make the general applicable rack selection, compare the models selected in Step 1 with the module types shown for each type of rack from TABLE B.

4 Add up the effective width of the modules from Step 2. Also note the maximum effective depth of the modules.

5 Check the maximum effective depth of the modules against the depth shown in TABLE C. This will indicate if the maximum effective depth is within the capacity of the rack type selected.

6 Next, compare the total module width and the width dimensions in TABLE C for the selected rack type. This will determine if the total effective width of the power supplies required will fit within the rack.

If the total module width is larger than that of the rack selected, then two choices are available: a) use two racks, or b) place more than one similar case width power supply (See TABLE A) in tandem. For example, two B cases with an individual depth of 7⅝ can readily fit in the 19⁹⁄₁₆ depth of the AR525-21 rack.

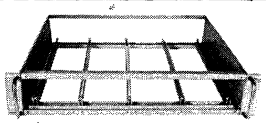
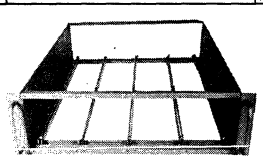
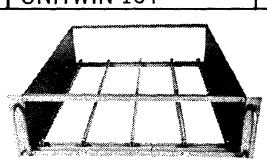
TABLE A

Case Size	Effective Module Width (Inches) When Used In AR35 Series	Effective Module Width (Inches) When Used In AR525 Series	Effective Module Depth (Includes ¾" for terminal strip and wiring)
A	3⅞	3⁵⁄₁₆	5⅞
B	3⅞	3⁵⁄₁₆	7⅝
C	5³⁄₃₂	5³⁄₃₂	8⅜
D	5³⁄₃₂	5³⁄₃₂	10⅛
E	5³⁄₃₂	5³⁄₃₂	10⅛
F	7½	7½	10⅛
G	7½	7½	12⅝
H	7½	7½	17¼

TABLE C

	Effective Internal Rack Width (Inches) Number of Modules to be Mounted Across Width 1	2	3	4	Effective Internal Rack Depth (Inches)
AR35	17	17	17	17	NOT APPLICABLE
AR35-14	16¼	15⅞	15½	15⅛	12¼
AR525	16¾	16¾	16¾	16¾	NOT APPLICABLE
AR525-14	16	15⅝	15¼	14⅞	12¼
AR525-21	16	15⅝	15¼	14⅞	19⁹⁄₁₆

TABLE B

Model	Racks For Use With	Panels For Use With
AR-35 **$40⁰⁰** W H D 19 x 3½ x 5¼	OEM (....)A UNI76 OEM (....)B UNI88 OEM (....)C UNI30C OEM (....)D UNI30D UNITWIN-164	P-35-1 P-35-2 P-35-4 CP35 CPM35-(....)-(....)*
		
AR-35-14 **$65⁰⁰** W H D 19 x 3½ x 14⅝	OEM (....)A UNI76 OEM (....)B UNI88 OEM (....)C UNI30C OEM (....)D UNI30D UNITWIN-164	P-35-1 P-35-2 P-35-4 CP35 CPM35-(....)-(....)*
AR-525 **$40⁰⁰** W H D 19 x 5¼ x 5⁵⁄₁₆	OEM (....)A** UNI-76** OEM (....)B** UNI-88** OEM (....)C** UNI30C** OEM (....)D** UNI30D** OEM (....)E UNI30E OEM (....)F UNI30F OEM (....)G UNI30G OEM (....)H UNI30H UNITWIN-164	P525-1 P525-2 P525-4 CP525 CPM525-(....)-(....)*
		
AR-525-14 **$65⁰⁰** W H D 19 x 5¼ x 14⅝	OEM (....)A** UNI-76** OEM (....)B** UNI-88** OEM (....)C UNI30C OEM (....)D UNI30D OEM (....)E UNI30E OEM (....)F UNI30F OEM (....)G UNI30G OEM (....)H UNI30H UNITWIN-164	P525-1 P525-2 P525-4 CP525 CPM525-(....)-(....)*
		
AR-525-21 **$75⁰⁰** W H D 19 x 5¼ x 21⅝	OEM (....)A** UNI-76** OEM (....)B** UNI-88** OEM (....)C UNI30C OEM (....)D UNI30D OEM (....)E UNI30E OEM (....)F UNI30F OEM (....)G UNI30G OEM (....)H UNI30H UNITWIN-164	P525-1 P525-2 P525-4 CP525 CPM525-(....)-(....)*

*See description of CPM panels for complete ordering data.
**These models to be used with adapter A-525-1.

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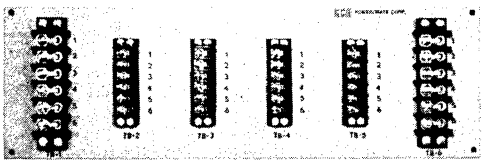
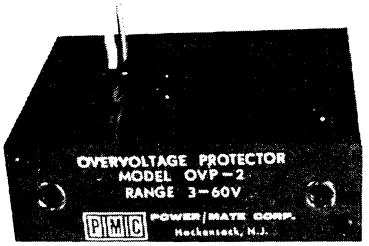
RACKS and ACCESSORIES

ACCESSORIES



REAR PANELS for use with AR-35 and AR-525 series accessory racks. Six terminal barrier strips are mounted on each panel for ease of input/output connection. Complete with mounted hardware and all terminals marked for ease of wiring.
Models RP-35-1 and RP-525-1 Price $20.00 each

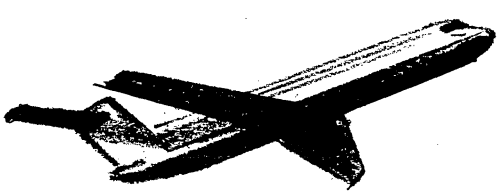


OVERVOLTAGE PROTECTOR for use on any POWER/MATE power supply up to 34 amps. Self contained crowbar type solid state unit. Independent of power supply or type of failure. Output adjustable to trip between 3 and 60 volts. Trips within 10 microseconds. Dimensions 2⅞ x 3⅜ x 1
Model OVP-2 Price $35.00

RACK SLIDE for use with all POWER/MATE CORP. racks. Feature quick disconnect and ball bearing action. Includes hardware for mounting.
Model CS-1 Price $45.00

ADAPTER for mounting type A, B, C and D cases in AR525 rack. Permits mounting 3½ inch height modules in 5¼ inch mounting space on AR525 rack. Permits complete intermixing of both 3½ and 5¼ inch supplies in this rack. Complete with hardware.
Model A525-1 Price $6.00 per pair

SAME DAY SHIPMENT



HOW TO ORDER ACCESSORIES:

Determine the quantity of each unit you will need and order them by the model numbers shown above. Notice that numbers ending in 35 represent the 3½ inch rack and those ending in 525 indicate the 5¼ inch rack.

PMC racks and accessores plus PMC's high quality power supplies give you the best possible combination of design freedom and proven reliability. If you have further questions, please contact either your local PMC Representative or POWER/MATE CORPORATION.

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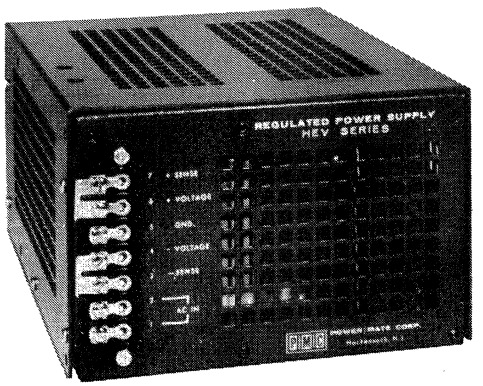
HIGH EFFICIENCY HEV AND HEW SERIES

FEATURES:

- High efficiency — greater than 50%
- All silicon semi-conductors
- Adjustable voltage ranges
- Up to 0.1% line or load regulation
- Remote sensing, remotely programmable
- Built-in overvoltage crowbar protection
- Thermally protected
- Solid state short circuit and overload protection
- Convection cooled — no blowers
- Series/parallel operation
- Five Year Warranty



DESCRIPTION

POWER/MATE's new HE high efficiency series, utilizing POWER/MATE's "SIMAG" circuitry (patent pending), a breakthrough in power supply design, are the result of a development program to provide a high efficiency series of power supplies for use with digital (TTL, ECL, TRL, DTL, and HTL) integrated circuits and MOS/LSI logic.

The new series operates at efficiencies greater than 50% and are offered in a wide range of voltages up to 150 VDC with current ratings up to 200 amps.

POWER/MATE's unique mechanical and electrical design allows the power supplies to be packaged in almost half the space required for equivalent conventional series power supplies.

Built-in overvoltage protection and self-restoring current limiting provide complete protection. Advanced electronic circuitry limits the output current on external loads, including short circuit providing protection for the load as well as the power supply. Remote sensing, remote programming and complete serviceability are additional features.

The HEV and HEW Series are backed by POWER/MATE's Five Year Warranty.

SPECIFICATIONS (HEV SERIES)

INPUT VOLTAGE: 105-132 VAC, 57-63 Hz.

OUTPUT VOLTAGE: Refer to applicable charts.

LINE REGULATION: ±0.1% +10 mv for line variations from 105-132 VAC.

LOAD REGULATION: ±0.1% +10 mv from no load to full load.

RIPPLE: 10 mv RMS max.

TEMPERATURE COEFFICIENT: .015% +0.5 mv/°C.

EFFICIENCY: Greater than 50%.

OPERATING AMBIENT TEMPERATURE: 0-71°C.

STORAGE TEMPERATURE: −55°C to +85°C.

REMOTE OR LOCAL SENSING: Provision included for remote sensing of the DC output voltage directly at the load.

OVERLOAD PROTECTION: Both thermal and adjustable electronic current limiting overload protection and circuit breaker on all models.

OVERVOLTAGE PROTECTION: "Built-in" continuously adjustable over voltage protection is standard on all models. Response time 5-10 microseconds.

NO OVERSHOOT ON TURN ON/OFF OR POWER FAILURE.

CONTROLS

DC OUTPUT CONTROL: Voltage adjustment over entire voltage range.

OVERVOLTAGE PROTECTOR CONTROL: Overvoltage adjustment covers entire operating range.

OVERVOLTAGE PROTECTION: Built-in, continuously adjustable overvoltage protection crowbars output when trip level is exceeded. Included on all models.

OVERLOAD PROTECTION: (Thermal) Thermostat — Automatic reset of thermostat on all models when overtemperature condition is eliminated.

OVERLOAD PROTECTION: (Electrical) External overload protection; fixed, automatic electronic current limiting circuit limits the output current upon external overloads, including short circuit, thereby providing protection for load as well as power supply. On H and K packages, ON-OFF circuit breaker must be manually reset.

MOUNTING: One surface with tapped mounting holes for G and H packages; package K is rack mounted.

INPUT CONNECTIONS: Heavy duty terminal block on rear of chassis.

OUTPUT CONNECTIONS: Two heavy-duty studs on rear of chassis.

OPTIONS: Package K models are available with mounted chassis slides. Add suffix "-CS" to the model number and $60 to the price. K case models are available with meters. For meters use suffix "M" and add $75 to the price.

5-YEAR WARRANTY

5 Year Warranty

To express our confidence in the skill and care with which our power supplies are designed and built — confidence based on an impressive 100,000 hour MTBF — we offer the POWER/MATE 5-Year Warranty.

MIL/SPEC PERFORMANCE

Independently tested to meet the environment of MIL-E-5272 and related specs. See MIL SPEC Section of this catalog.

PMC **POWER/MATE CORP.**
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HIGH EFFICIENCY HEV AND HEW SERIES

HEV SERIES

HEV "G" CASE

Model	Fixed Volt. Range VDC	Max. Amps. at Ambient of: 40°C	50°C	60°C	71°C	Price
HEV-G-3-P-3-OV	2.8-3.8	47	39	28	13	$319
HEV-G-4-OV	4±5%	44	39	28	13	319
HEV-G-4-P-5-OV	4.5±5%	41	38	28	12	319
HEV-G-5-OV	5±5%	37	34	28	13	319
HEV-G-6-OV	6±5%	33	30	27	18	319

HEV "H" CASE

Model	Fixed Volt. Range VDC	Max. Amps. at Ambient of: 40°C	50°C	60°C	71°C	Price
HEV-H-3-OV	3±5%	98	90	74	61	$479
HEV-H-3-P-6-OV	3.6±5%	92	85	70	57	479
HEV-H-4-OV	4±5%	87	82	70	54	479
HEV-H-4-P-5-OV	4.5±5%	81	77	70	52	479
HEV-H-5-OV	5±5%	74	70	65	45	479
HEV-H-6-OV	6±5%	64	61	56	40	479
HEV-H-10-OV	10±5%	41	39	36	25	400
HEV-H-12-OV	12±5%	34	32	30	21	400
HEV-H-15-OV	15±5%	28	26	24	18	400

HEV "K" CASE*

Model	Fixed Volt. Range VDC	Max. Amps. at Ambient of: 40°C	50°C	60°C	71°C	Price
HEV-K-3-OV	3±5%	170	160	150	135	$735
HEV-K-3-P-6-OV	3.6±5%	160	155	140	125	735
HEV-K-4-OV	4±5%	150	145	132	120	735
HEV-K-4-P-5-OV	4.5±5%	135	131	119	108	735
HEV-K-5-OV	5±5%	130	126	115	100	735
HEV-K-6-OV	6±5%	110	107	98	90	735
HEV-K-10-OV	10±5%	74	71	65	61	735
HEV-K-12-OV	12±5%	65	63	57	54	735
HEV-K-15-OV	15±5%	50	48	44	40	735

MECHANICAL DIMENSIONS

1. HEV-"G" Case 4 15/16 x 7½ x 11¾
2. HEV-"H" Case 4 15/16 x 7½ x 16½
3. HEV-"K" Case 5 3/16 x 19 x 16½

SPECIFICATIONS (HEW SERIES)

The specifications for the HEW Series are identical to those of the HEV Series except that:

OUTPUT VOLTAGE: Refer to applicable charts.

LINE REGULATION: 1.0% for line variations from 105-132 VAC.

LOAD REGULATION: 1%, for a 20% load to full load or full load to 20% load; or 1% full load to no load with a 20% pre-load throughout the voltage adjust range.

RIPPLE: 150 mv RMS or 1% of output voltage, whichever is greater.

OVERLOAD PROTECTION: (Electrical) External overload protection: fixed, automatic electronic current limiting circuit limits the output current upon external overloads, including short circuit, thereby providing protection for load as well as power supply. In addition, an automatic thermal reset switch is incorporated to sense overtemperature.

OVERVOLTAGE PROTECTION (OPTIONAL): Built-in continuously adjustable overvoltage protection crowbars output when trip level is exceeded. Optional on all models. Add suffix OV to model number and $50 to price.

HEW SERIES

HEW "F" CASE

Model	Fixed Volt. Range VDC	Max. Amps. at Ambient of: 40°C	50°C	60°C	71°C	Price
HEW-F-10	10±5%	27	25	23	17	$243
HEW-F-12	12±5%	26.5	20	13.7	8.8	243
HEW-F-15	15±5%	22.5	20	13.7	8.8	243
HEW-F-18	18±5%	19	18.3	13.7	8.8	243
HEW-F-20	20±5%	17.5	16.7	13.7	8.8	243
HEW-F-24	24±5%	14.7	14	13.2	8.8	243
HEW-F-28	28±5%	12.5	12	11.1	7.7	243
HEW-F-48	48±5%	7.6	7.3	6.8	6.2	243
HEW-F-60	60±5%	6.0	5.8	5.5	5.0	243
HEW-F-150	150±5%	2.4	2.3	2.1	2.0	243

HEW "G" CASE

Model	Fixed Volt. Range VDC	Max. Amps. at Ambient of: 40°C	50°C	60°C	71°C	Price
HEW-G-3-P-3	2.8-3.8	55	52	49	45	$260
HEW-G-4	4±5%	53	50	47	43	260
HEW-G-4-P-5	4.5±5%	49	46	43	40	260
HEW-G-5	5±5%	45	42	40	37	260
HEW-G-6	6±5%	39	37	35	32	260

HEW "H" CASE

Model	Fixed Volt. Range VDC	Max. Amps. at Ambient of: 40°C	50°C	60°C	71°C	Price
HEW-H-3	3±5%	120	113	98	80	$389
HEW-H-3-P-6	3.6±5%	113	108	98	77	389
HEW-H-4	4±5%	107	102	96	74	389
HEW-H-4-P-5	4.5±5%	99	95	89	70	389
HEW-H-5	5±5%	91	87	82	62	389
HEW-H-6	6±5%	78	75	70	54	389
HEW-H-10	10±5%	51	48	45	35	339
HEW-H-12	12±5%	42	40	37	28	339
HEW-H-15	15±5%	35	33	31	24	339
HEW-H-18	18±5%	33	32	30	23	339
HEW-H-20	20±5%	31	30	28	22	339
HEW-H-24	24±5%	26	25	23	17	339
HEW-H-28	28±5%	22	21	20	15	339
HEW-H-48	48±5%	13	13	12	9	339
HEW-H-60	48±5%	10	10	9.5	8	339
HEW-H-150	150±5%	4	4	4	3	339

HEW "K" CASE*

Model	Fixed Volt. Range VDC	Max. Amps. at Ambient of: 40°C	50°C	60°C	71°C	Price
HEW-K-3	3±5%	200	195	180	165	$663
HEW-K-3-P-6	3.6±5%	190	185	170	155	663
HEW-K-4	4±5%	180	175	162	148	663
HEW-K-4-P-5	4.5±5%	160	155	142	132	663
HEW-K-5	5±5%	150	146	135	123	663
HEW-K-6	6±5%	128	123	115	105	663
HEW-K-10	10±5%	88	85	79	72	663
HEW-K-12	12±5%	75	72	67	61	663
HEW-K-15	15±5%	60	57	53	49	663
HEW-K-18	18±5%	58	56	52	47	663
HEW-K-20	20±5%	53	51	47	43	663
HEW-K-24	24±5%	48	46	42	39	663
HEW-K-28	28±5%	39	37	34	32	663
HEW-K-48	48±5%	24	28	21	19	663
HEW-K-60	60±5%	19	18	17	15	663
HEW-K-150	150±5%	7.5	7	6.5	6	663

K Case models are available with meters. For meters use suffix "M" and add $75 to price shown.

K Case models are available with mounted chassis slides. Add suffix "-CS" to the model number and $60 to the price.

Pioneers of the UNI concept in power supplies

PMC **POWER/MATE CORP.**
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INTEGRATED CIRCUIT POWER SUPPLIES

PRODUCT DIGEST

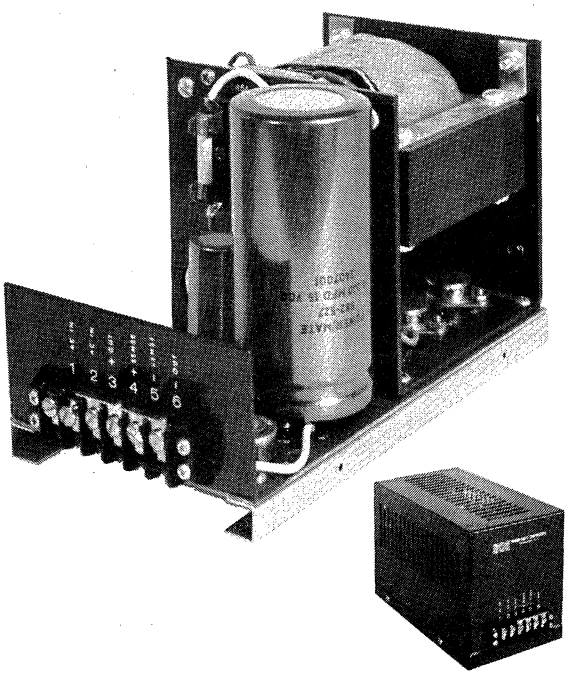
ICX Series power supplies, using IC regulators, are designed expressly for integrated circuit applications, with components industrially rated for long life. They provide adjustable voltage ranges, DC outputs of 3.6 to 16 volts and from 1.5 to 25 amperes, and regulation of ±0.1% line and load. These competitively priced units use an open-chassis construction for economy, providing all the essentials for high reliability with no unnecessary extras. For added flexibility, optional features are available.

The heart of the ICX Series power supplies is a custom-designed integrated circuit which includes: a reference source, a voltage regulator, and a current regulator to make each power supply completely short circuit and overload proof. A built-in adjustable SCR crowbar protects against overvoltage.

The ICX units are equipped for remote or local sensing, and they are remotely programmable.

They have two mounting surfaces, and the ICX Series may be used with PMC standard accessories (see pages 20-23).

The ICX power supplies, with top-quality components and all-silicon semiconductors, are backed by the same 5-Year Warranty given to all POWER/MATE CORP. power supplies.



SHOWN WITH COVER

SPECIFICATIONS

INPUT VOLTAGE: 105-125 VAC, 47-420 HZ.

OUTPUT VOLTAGE: SEE CHARTS.

LINE REGULATION: ±0.1% Max +1 MV.

LOAD REGULATION: ±0.1% Max from full load to no load.

TEMPERATURE COEFFICIENT: .01%/°C +1 MV.

RIPPLE: 1 MV (RMS) Max.

REMOTE OR LOCAL SENSING: Provision included for remote sensing of output voltage directly at the load.

OVERLOAD PROTECTION: Power supply cannot be damaged by current overloads.

OVERVOLTAGE PROTECTION: Internal crow-bar protects against excessive output voltage. Firing point is adjustable. Response time 2-5 micro-seconds.

TRANSIENT RESPONSE TIME: 20 micro-seconds.

OPERATING AMBIENT TEMPERATURE: 0-50°C.

POLARITY: May be either positive, negative or floating (up to 300 volts).

MECHANICAL DATA

ICX power supplies may be mounted on either of two surfaces.

They will operate in any position.

A baked enamel steel case is available. (See options below.)

Included with each power supply are 10-32 screws and studs for mounting.

Weights (lbs.): Series, A; Net, 2.5; Shipping, 3.5. Series, B; Net, 7.52; Shipping, 4.5. Series, C; Net, 8; Shipping, 12.

OPTIONS

1. A durable baked enamel steel cover is available at $10 per unit. Add suffix C to model number. (example ICX-8AC)

2. Improved regulation, 0.05%, available at $10 per unit. Add suffix R to model number. (example ICX-5CR)

3. Fungus proofing, with MIL-V-173 varnish, for all fungus nutrient components, at $10 per unit. Use suffix F. (example ICX-8AF)

4. AC Input. All units are available with 208 VAC ±10% (use suffix L) or 230 VAC ±10% (use suffix LL), at $15 per unit.

5. Dual AC primary 115/230 VAC permits operations at either AC input voltage. (use suffix X) at $15 per unit.

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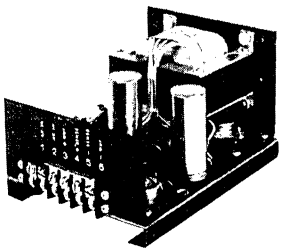
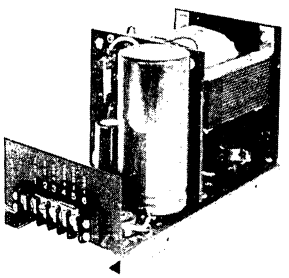
ICX SERIES

ICX SERIES A
$75.



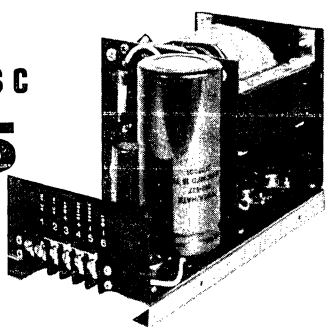
Model	DC Output Adjustable Voltage	Amperes	Price	Net Weight (lbs.)	Shipping Weight (lbs.)
ICX-5A	3.6 to 5.6	2	$75	2.5	3.5
ICX-6A	5 to 7	2	75	2.5	3.5
ICX-8A	7 to 9	2	75	2.5	3.5
ICX-10A	9 to 11	2	75	2.5	3.5
ICX-12A	11 to 13	1.5	75	2.5	3.5
ICX-15A	14 to 16	1.5	75	2.5	3.5
ICX-18A	17 to 19	1.2	75	2.5	3.5
ICA-24A	23 to 25	1.2	75	2.5	3.5

ICX SERIES B
$95.



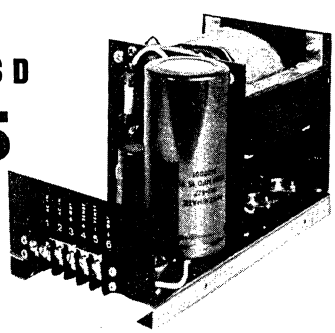
Model	DC Output Adjustable Voltage	Amperes	Price	Net Weight (lbs.)	Shipping Weight (lbs.)
ICX-5B	3.6 to 5.6	5	$95	7.25	9.5
ICX-6B	5 to 7	5	95	7.25	9.5
ICX-8B	7 to 9	5	95	7.25	9.5
ICX-10B	9 to 11	5	95	7.25	9.5
ICX-12B	11 to 13	5	95	7.25	9.5
ICX-15B	14 to 16	5	95	7.25	9.5
ICX-18B	17 to 19	4	95	7.25	9.5
ICX-24B	23 to 25	3	95	7.25	9.5

ICX SERIES C
$135



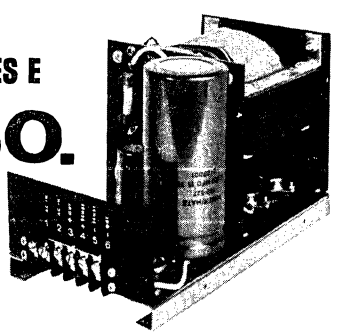
Model	DC Output Adjustable Voltage	Amperes	Price	Net Weight (lbs.)	Shipping Weight (lbs.)
ICX-5C	3.6 to 5.6	10	$135	8	12
ICX-6C	5 to 7	10	135	8	12
ICX-8C	7 to 9	10	135	8	12
ICX-10C	9 to 11	9	135	8	12
ICX-12C	11 to 13	8	135	8	12
ICX-15C	14 to 16	7	135	8	12
ICX-18C	17 to 19	6	135	8	12
ICX-24C	23 to 25	5	135	8	12

ICX SERIES D
$175



Model	DC Output Adjustable Voltage	Amperes	Price	Net Weight (lbs.)	Shipping Weight (lbs.)
ICX-5D	5	15	$175	16	20
ICX-6D	6	15	175	16	20
ICX-8D	8	15	175	16	20
ICX-10D	10	15	175	16	20
ICX-12D	12	14	175	16	20
ICX-15D	15	13	175	16	20
ICX-18D	18	12	175	16	20
ICX-24D	24	10	175	16	20

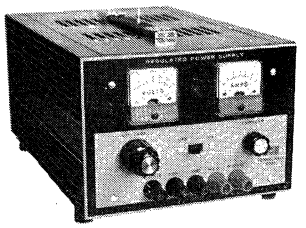
ICX SERIES E
$250.



Model	DC Output Adjustable Voltage	Amperes	Price	Net Weight (lbs.)	Shipping Weight (lbs.)
ICX-5E	5	25	$250	23	28
ICX-6E	6	25	250	23	28
ICX-8E	8	25	250	23	28
ICX-10E	10	20	250	23	28
ICX-12E	12	18	250	23	28
ICX-18E	18	16	250	23	28
ICX-24E	24	14	250	23	28

Pioneers of the UNI concept in power supplies

PMC BENCH PACS



23 different UniPower DC Laboratory Supplies, voltage & current regulated

FEATURES:

- High accuracy
- Regulation for **both** voltage and current
- Adjustable current limiting
- Five-way binding posts
- Concentric controls for coarse and fine voltage adjustment
- Constant voltage and/or constant current
- On/off switch
- AC indicator
- Easy-to-read dual meters
- Built-in short circuit protection
- Front panel remote sensing of output voltage (Models "E" thru "H")

You are sure to fill your lab and systems power supply needs with Power/Mate Corp.'s economical new Bench Pac Series. Twenty-three individual models cover from 0 to 60 volts and current up to 15 amps. The same field-proven designs and state-of-the-art solid-state silicon circuitry found in our widely accepted UniPower Series and OEM Series power supplies provide PMC Bench Pacs with maximum reliability. Thus, Bench Pacs carry Power/Mate's full five year warranty.

SPECIFICATIONS

INPUT: 105-125 Volts, 47-420 cps, single phase.

OUTPUT VOLTAGE AND CURRENT: See Respective Tables.

REGULATION:
Load: The regulation for load changes is less than .01% or 1 millivolt, whichever is greater from no load to full load.
Line: The regulation is less than 0.01% or 1 millivolt, whichever is greater, for a line change from 125V to 105V at constant load.

RIPPLE: Less than 250 microvolts.

TRANSIENT RESPONSE: For a ±10 Volt step change in line voltage or for a no load to full load, or a full load to no load step change, the output voltage will return to within 10 millivolts of the regulated region in less than 20 microseconds.

METERS: Voltmeter and ammeter, rated accurate to 2% of full scale value, are provided on the front panel.

POLARITY: The output may be "floated" up to 300V peak above ground. Either polarity may be grounded to chassis by means of terminals provided.

CONSTANT CURRENT/CONSTANT VOLTAGE: Constant current and constant voltage levels may be preset within the maximum rated voltage and current levels specified in appropriate tables. The intersection of the constant voltage and constant current operation lines called the "Crossover Point" may be located anywhere within the output volt-ampere range of the unit. Regardless of the demands of the load, the output voltage and/or the output current will never exceed the limits (1% or better) preset by the output voltage and output current controls.

CONTROLS
VOLTAGE: Continuously variable coarse and vernier DC OUTPUT ADJUST potentiometers on concentric shafts provide variable DC Output.
CURRENT: Continuously variable single turn potentiometer provides current limiting adjustment.

TEMPERATURE COEFFICIENT: Better than 0.01%/°C.

LONG TERM STABILITY: Better than 0.025% for 8 hours.

DUTY: Continuous at ambient temperatures from 0°C to 50°C. Operation above 50°C is allowed provided the output current is derated 20% for every 10°C rise above 50°C.

REMOTE SENSING: Sensing terminals, separate from the Output terminals, provide sensing and load regulation against the voltage at the load rather than the voltage at the power supply output terminals. This eliminates the otherwise unavoidable load regulation due to the voltage drop in the wires connecting the supply to the adjacent load.

REMOTE PROGRAMMING: The output voltage may be controlled accurately from a remote point if desired by inserting a resistance across the REMOTE PROGRAM terminals. The sensitivity of this circuit is approximately 100 ohms per volt.

PARALLELING: Two or more units may be operated in series to provide higher voltage output at rated current. Units of the same voltage and current ratings may be operated in parallel.

PROTECTION: Load and power supply protection for any overload condition is accomplished by an adjustable electronic current limiting circuit controlled by a front panel potentiometer.

MOUNTING: Unit is designed for bench operation. However Rack Adapters are available (see below).

AIRFLOW: All units are convection cooled and do not require internal blowers or depend on internal forced air cooling.

FINISH: Front panel is finished with dual tone grey and black baked enamel. All other finishes are appropriate paint, plating, or chemical film as required.

INSPECTION: MIL-Q-9858 Procedures.

ACCESSORIES

Bench Pacs can be rack mounted as required. Up to three Series "C," or two Series "D" power supplies will mount in a standard 19" rack, just 3½" high. Adapters available are: Model RK-118 for one or two Series "D." Price $22. Model RK-89 for one, two, or three Series "C." Price $22.

Consult factory for special systems configurations.

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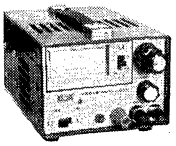
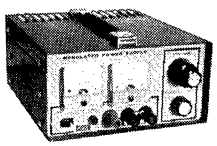
SAME DAY SHIPMENT

BENCH PACS PMC



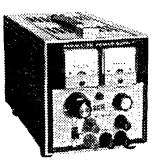
"SERIES C" BENCH PACS

Model	DC Output Volts	DC Output Amperes	Case Size Height	Case Size Width	Case Size Depth	Price	Shipping Weight
BP-8C	0-8	0-1.5	3⅜	5⅜	7¼	$ 89.00	6.5 lbs.
BP-18C	0-18	0-1.0	3⅜	5⅜	7¼	89.00	6.5 lbs.
BP-34C	0-34	0-.5	3⅜	5⅜	7¼	89.00	6.5 lbs.



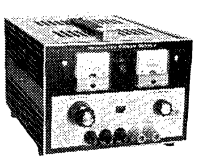
"SERIES D" BENCH PACS

Model	DC Output Volts	DC Output Amperes	Case Size Height	Case Size Width	Case Size Depth	Price	Shipping Weight
BP-8D	0-8	0-4	3⅜	6⅞	7¼	129.00	8.0 lbs.
BP-18D	0-18	0-2.5	3⅜	6⅞	7¼	129.00	8.0 lbs.
BP-34D	0-34	0-1.5	3⅜	6⅞	7¼	129.00	8.0 lbs.
BP-60D	0-60	0-.750	3⅜	6⅞	7¼	129.00	8.0 lbs.



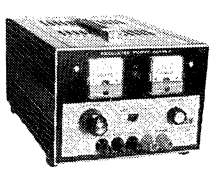
"SERIES E" BENCH PACS

Model	DC Output Volts	DC Output Amperes	Case Size Height	Case Size Width	Case Size Depth	Price	Shipping Weight
BP-8E	0-8	0-6.5	5 3/32	5 3/32	9⅜	225.00	20.0 lbs.
BP-18E	0-18	0-3.5	5 3/32	5 3/32	9⅜	225.00	20.0 lbs.
BP-34E	0-34	0-2.5	5 3/32	5 3/32	9⅜	225.00	20.0 lbs.
BP-60E	0-60	0-1.25	5 3/32	5 3/32	9⅜	225.00	20.0 lbs.



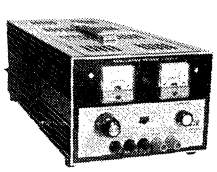
"SERIES F" BENCH PACS

Model	DC Output Volts	DC Output Amperes	Case Size Height	Case Size Width	Case Size Depth	Price	Shipping Weight
BP-8F	0-8	0-9	5 3/32	7½	9⅜	249.00	25.0 lbs.
BP-18F	0-18	0-5	5 3/32	7½	9⅜	249.00	25.0 lbs.
BP-34F	0-34	0-3.5	5 3/32	7½	9⅜	249.00	25.0 lbs.
BP-60F	0-60	0-1.75	5 3/32	7½	9⅜	249.00	25.0 lbs.



"SERIES G" BENCH PACS

Model	DC Output Volts	DC Output Amperes	Case Size Height	Case Size Width	Case Size Depth	Price	Shipping Weight
BP-8G	0-8	0-12	5 3/32	7½	11⅞	319.00	31.0 lbs.
BP-18G	0-18	0-6.5	5 3/32	7½	11⅞	319.00	31.0 lbs.
BP-34G	0-34	0-5	5 3/32	7½	11⅞	319.00	31.0 lbs.
BP-60G	0-60	0-2.5	5 3/32	7½	11⅞	319.00	31.0 lbs.



"SERIES H" BENCH PACS

Model	DC Output Volts	DC Output Amperes	Case Size Height	Case Size Width	Case Size Depth	Price	Shipping Weight
BP-8H	0-8	0-15	5 3/32	7½	16½	369.00	40.0 lbs.
BP-18H	0-18	0-9	5 3/32	7½	16½	369.00	40.0 lbs.
BP-34H	0-34	0-6.5	5 3/32	7½	16½	369.00	40.0 lbs.
BP-60H	0-60	0-3.25	5 3/32	7½	16½	369.00	40.0 lbs.

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Phone: (201) 343-6294 TWX: (710) 990-5023

MINI/MATE MINIATURE POWER SUPPLIES

PRODUCT DIGEST

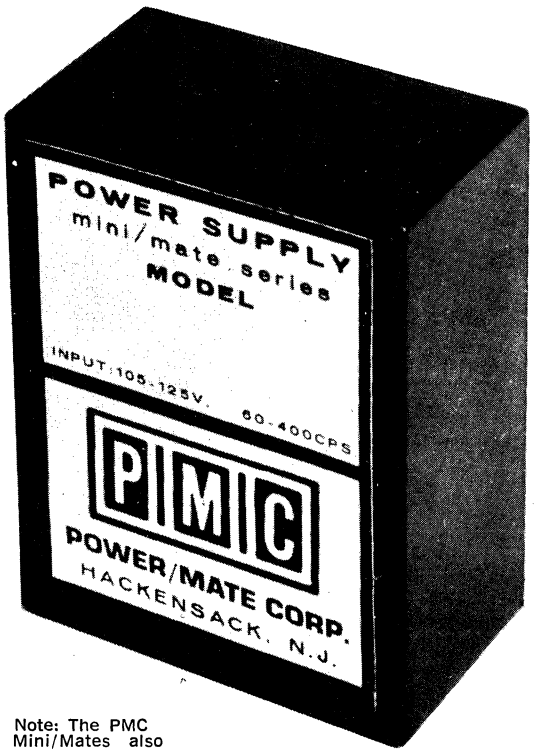
The POWER/MATE "Mini/Mate" Series regulated power supplies are a miniature series of DC power supplies which, in addition to their high performance qualities, are reliable, compact, rugged and moderate in price.

Common uses for the Mini/Mate Series are to power operational amplifiers, decimal displays, digital logic, signal conditioning and instrumentation.

The output voltage and current ranges of the Mini/Mate Series provide the user with a complete line of fixed DC power supplies. They are particularly appropriate for use in modern designs which use linear and digital integrated circuits. Common uses for the Mini/Mate Series are to power operational amplifiers, decimal displays, digital logic, signal conditioning and instrumentation.

The Mini/Mates are designed for use either singly or in pairs to provide a dual output capability. The customer may choose to use two singles rather than one dual. Two singles are not only smaller, but also less expensive. Also, the use of singles reduces spare parts costs by more than 50 per cent. For those who prefer dual output in one package, the Mini/Mate Series dual supplies contain two separate transformers and circuitry. Mini/Mates may be ordered either in encapsulated, octal plug-in or bench case configurations. Plus, the Mini/Mates are capable of withstanding substantial overloads for reasonable periods of time. Prolonged operation with the supply over-loaded is not recommended.

All models in the Mini/Mate Series undergo complete thermal and load cycle testing prior to shipment.



Note: The PMC Mini/Mates also provide a direct replacement for other manufacturers op-amp power supplies. Consult factory for other models not listed.

SAME DAY SHIPMENT

TRIM CONNECTION

The output voltage of each supply is factory set to within ±2% of the labeled value. The TRIM connection provides a means of externally (internally for the bench model supplies) adjusting the output voltage precisely to the labeled voltage.

The method of adjustment is to connect a resistance (20K ohms or larger) between the TRIM terminal and the positive (+) or negative (−) output terminal, depending on the desired direction of change. To lower the output voltage, the trim resistance is connected between the TRIM and (−) terminals. To raise the output voltage, the trim resistance is connected between the TRIM and (+) terminals.

Attempts to use the trim feature to set the output to a voltage other than the labeled value may result in the supply failing to meet its performance specifications.

WARRANTY FOR MINI/MATE

POWER/MATE's "Mini/Mate" Series power supplies are warranted against defects in materials and workmanship for a period of two (2) years from date of purchase from POWER/MATE.

SAME DAY SHIPMENT

Designers and manufacturers of quality power supplies

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MINI/MATE MINIATURE POWER SUPPLIES

DUAL OP-AMP SUPPLIES

Output Voltage		±10V				±12V				±15V				±15V				±18V				±24V			
Output Current		120 mA				100 mA				100 mA*				100 mA				65 mA				50 mA			
Load Regulation (NL-FL)		±0.02%				±0.02%				±0.02%				±0.02%				±0.02%				±0.02%			
Line Regulation (±10 VAC)		±0.02%				±0.02%				±0.02%				±0.02%				±0.02%				±0.02%			
Output Impedance		0.2Ω @ 10 KHz				0.2Ω @ 10 KHz				0.2Ω @ 10 KHz				0.2Ω @ 10 KHz				0.2Ω @ 10 KHz				0.2Ω @ 10 KHz			
Ripple and Noise		0.5 mV RMS				0.5 mV RMS				0.5 mV RMS				0.5 mV RMS				1.0 mV RMS				1.0 mV RMS			
Temperature Coefficient		0.02%/°C max.				0.02%/°C max.				0.02%/°C max.				0.02%/°C max.				0.02%/°C max.				0.02%/°C max.			
Operating Temp. Range		0°-70°C				0°-70°C				0°-70°C				0°-71°C				0°-70°C				0°-70°C			
Derate mA/°C above 55°C		6.0 mA				5.0 mA				5.0 mA				5.0 mA[1]				3.25 mA				2.5 mA			
Derate mA/°C below 15°C		1.2 mA				1.0 mA				1.0 mA				1.0 mA				0.65 mA				0.5 mA			
Storage Temp. Range		−25° to 85°C				−25° to 85°C				−25° to 85°C				−25° to 85°C				−25° to 85°C				−25° to 85°C			
Input Voltage		115 ± 10 VAC				115 ± 10 VAC				115 ± 10 VAC				115 ± 10 VAC[2]				115 ± 10 VAC				115 ± 10 VAC			
Input Frequency		60-400 Hz				60-400 Hz				60-400 Hz				50-400 Hz				60-400 Hz				60-400 Hz			
Model Number **Case Size**		**MD10C** **FIGURE 3**				**MD12C** **FIGURE 3**				**MD15C** **FIGURE 3**				**MD15D** **FIGURE 4**				**MD18C** **FIGURE 3**				**MD24C** **FIGURE 3**			
Prices for PC Mount Models	Qty.	1 4	5 14	15 49	50 149	1 4	5 14	15 49	50 149	1 4	5 14	15 49	50 149	1 4	5 14	15 49	50 149	1 4	5 14	15 49	50 149	1 4	5 14	15 49	50 149
	$	54.95	49.95	45.95	43.95	54.95	49.95	45.95	43.95	52.95	47.95	43.95	41.95	53.00	49.00	46.00	44.00	54.95	43.95	45.95	43.95	54.95	49.95	45.95	43.95
Model Number **Case Size**		MD10E FIGURE 5				MD12E FIGURE 5				MD15E FIGURE 5				See MD15E				MD18E FIGURE 5				MD24E FIGURE 5			
Prices for Octal Base Models	Qty.	1 4	5 14	15 49	50 149	1 4	5 14	15 49	50 149	1 4	5 14	15 49	50 149	FOR ± 15V				1 4	5 14	15 49	50 149	1 4	5 14	15 49	50 149
	$	71.95	65.95	59.75	57.95	71.95	65.95	59.95	57.95	67.95	61.95	55.95	53.95	OCTAL SUPPLY				71.95	65.95	59.95	57.95	71.95	65.95	59.95	57.95
Model Number **Case Size**		MD10F FIGURE 6				MD12F FIGURE 6				MD15F FIGURE 6				See MD15F				MD18F FIGURE 6				MD24F FIGURE 6			
Prices for Bench Models	Qty.	1 4	5 14	15 49	50 149	1 4	5 14	15 49	50 149	1 4	5 14	15 49	50 149	FOR ± 15V				1 4	5 14	15 49	50 149	1 4	5 14	15 49	50 149
	$	81.95	71.95	67.95	64.95	81.95	71.95	67.95	64.95	77.95	67.95	63.95	60.96	BENCH SUPPLY				81.95	71.95	67.95	64.95	81.95	71.95	67.95	64.95

LOGIC SUPPLIES

Output Voltage	3.6V	5V	6V
Output Current	250 mA	250 mA*	200 mA*
Load Regulation (NL-FL)	±0.05%	±0.05%	±0.05%
Line Regulation (±10 VAC)	±0.05%	±0.05%	±0.05%
Output Impedance	0.2Ω @ 10 KHz	0.2Ω @ 10 KHz	0.2Ω @ 10 KHz
Ripple and Noise	0.5 mV RMS	0.5 mV RMS	0.5 mV RMS
Temperature Coefficient	0.05%/°C max.	0.05%/°C max.	0.05%/°C max.
Operating Temp. Range	0°-70°C	0°-70°C	0°-70°C
Derate mA/°C above 55°C	12.5 mA	12.5 mA	10.0 mA
Derate mA/°C below 15°C	2.5 mA	2.5 mA	2.0 mA
Storage Temp. Range	−25° to 85°C	−25° to 85°C	−25° to 85°C
Input Voltage	115 ± 10 VAC	115 ± 10 VAC	115 ± 10 VAC
Input Frequency	60-400 Hz	60-400 Hz	60-400 Hz

DISPLAY SUPPLIES

170V	180V
10 mA*	10 mA*
±1.0%	±1.0%
±1.0%	±1.0%
5Ω @ 10 KHz	5Ω @ 10 KHz
15 mV RMS	15 mV RMS
0.2%/°C max.	0.2%/°C max.
0°-70°C	0°-70°C
0.5 mA	0.5 mA
0.1 mA	0.1 mA
−25° to 85°C	−25° to 85°C
115 ± 10 VAC	115 ± 10 VAC
60-400 Hz	60-400 Hz

continued on next page

3. Dual Octal Supplies may require either forced air cooling or heat sinks.

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MINI/MATE MINIATURE POWER SUPPLIES

LOGIC SUPPLIES (continued)

Model Number / Case Size		MM3.6B FIGURE 2				MM5B FIGURE 2				MM6B FIGURE 2				MM170B FIGURE 2				MM180B FIGURE 2			
Prices for PC MOUNT MODELS	Qty.	1 9	10 29	30 99	100 299	1 9	10 29	30 99	100 299	1 9	10 29	30 99	100 299	1 9	10 29	30 99	100 299	1 9	10 29	30 99	100 299
	$	39.95	34.95	32.95	31.95	39.95	34.95	32.95	31.95	39.95	34.95	32.95	31.95	41.95	36.95	34.95	32.95	41.95	36.95	34.95	32.95
Model Number / Case Size		MM3.6E FIGURE 5				MM5E FIGURE 5				MM6E FIGURE 5				MM170E FIGURE 5				MM180E FIGURE 5			
Prices for OCTAL BASE MODELS	Qty.	1 9	10 29	30 99	100 299	1 9	10 29	30 99	100 299	1 9	10 29	30 99	100 299	1 9	[illegible]	30 99	100 299	1 9	10 29	30 99	100 299
	$	43.95	37.95	35.95	33.95	43.95	37.95	35.95	33.95	43.95	37.95	35.95	33.95	47.95	41.95	39.95	37.95	47.95	41.95	39.95	37.95
Model Number / Case Size		MM3.6F FIGURE 6				MM5F FIGURE 6				MM6F FIGURE 6				MM170F FIGURE 6				MM180F FIGURE 6			
Prices for BENCH MODELS	Qty.	1 9	10 29	30 99	100 299	1 9	10 29	30 99	100 299	1 9	10 29	30 99	100 299	1 9	10 29	30 99	100 299	1 9	10 29	30 99	100 299
	$	46.95	39.95	37.95	35.95	46.95	39.95	37.95	35.95	46.95	39.95	37.95	35.95	49.95	42.95	40.95	38.95	49.95	42.95	40.95	38.95

*Higher current supplies available in other PMC models; write for complete catalog.

1. Model MD15D does not require derating until 60°C.
2. 230 VAC operation available for quantity requirements.

Specifications and Prices Subject to Change without Notice.

FAMOUS SINGLE GENERAL PURPOSE SUPPLIES

Output Voltage	10V	12V	15V	18V	20V	24V	28V
Output Current	120 mA	100 mA	100 mA*	65 mA	60 mA	50 mA	40 mA
Load Regulation (NL-FL)	±0.02%	±0.02%	±0.02%	±0.02%	±0.02%	±0.02%	±0.02%
Line Regulation (±10 VAC)	±0.02%	±0.02%	±0.02%	±0.02%	±0.02%	±0.02%	±0.02%
Output Impedance	0.2Ω @ 10 KHz	0.2Ω @ 10 KHz	0.2Ω @ 10 KHz	0.2Ω @ 10 KHz	0.2Ω @ 10 KHz	0.2Ω @ 10 KHz	0.2Ω @ 10 KHz
Ripple and Noise	0.5 mV RMS	0.5 mV RMS	0.5 mV RMS	1.0 mV RMS	1.0 mV RMS	1.0 mV RMS	1.0 mV RMS
Temperature Coefficient	0.02%/°C max.	0.02%/°C max.	0.02%/°C max.	0.02%/°C max.	0.02%/°C max.	0.02%/°C max.	0.02%/°C max.
Operating Temp. Range	0°-70°C	0°-70°C	0°-70°C	0°-70°C	0°-70°C	0°-70°C	0°-70°C
Derate mA/°C above 55°C	6.0 mA	5.0 mA	5.0 mA	3.25 mA	3.0 mA	2.5 mA	2.0 mA
Derate mA/°C below 15°C	1.2 mA	1.0 mA	1.0 mA	0.65 mA	0.6 mA	0.5 mA	0.4 mA
Storage Temp. Range	−25° to 85°C	−25° to 85°C	−25° to 85°C	−25° to 85°C	−25° to 85°C	−25° to 85°C	−25° to 85°C
Input Voltage	115 ± 10 VAC	115 ± 10 VAC	115 ± 10 VAC	115 ± 10 VAC	115 ± 10 VAC	115 ± 10 VAC	115 ± 10 VAC
Input Frequency	60-400 Hz	60-400 Hz	60-400 Hz	60-400 Hz	60-400 Hz	60-400 Hz	60-400 Hz
Model Number / Case Size	MM10A FIGURE 1	MM12A FIGURE 1	MM15A FIGURE 1	MM18A FIGURE 1	MM20A FIGURE 1	MM24A FIGURE 1	MM28A FIGURE 1
Prices for PC Mount Models — Qty.	1 9 / 10 29 / 30 99 / 100 299						
$	26.95 / 23.95 / 22.95 / 21.95	26.95 / 23.95 / 22.95 / 21.95	25.95 / 22.95 / 21.95 / 20.95	26.95 / 23.95 / 22.95 / 21.95	26.95 / 23.95 / 22.95 / 21.95	26.95 / 23.95 / 22.95 / 21.95	26.95 / 23.95 / 22.95 / 21.95
Model Number / Case Size	MM10E FIGURE 5	MM12E FIGURE 5	MM15E FIGURE 5	MM18E FIGURE 5	MM20E FIGURE 5	MM24E FIGURE 5	MM28E FIGURE 5
Prices for Octal Base Models — Qty.	1 9 / 10 29 / 30 99 / 100 299						
$	35.95 / 29.95 / 28.95 / 27.95	35.95 / 29.95 / 28.95 / 27.95	33.95 / 27.95 / 26.95 / 25.95	35.95 / 29.95 / 28.95 / 27.95	35.95 / 29.95 / 28.95 / 27.95	35.95 / 29.95 / 28.95 / 27.95	35.95 / 29.95 / 28.95 / 27.95
Model Number / Case Size	MM10F FIGURE 6	MM12F FIGURE 6	MM15F FIGURE 6	MM18F FIGURE 6	MM20F FIGURE 6	MM24F FIGURE 6	MM28F FIGURE 6
Prices for Bench Models — Qty.	1 9 / 10 29 / 30 99 / 100 299						
$	39.95 / 34.95 / 32.95 / 30.95	39.95 / 34.95 / 32.95 / 30.95	37.95 / 32.95 / 30.95 / 28.95	39.95 / 34.95 / 32.95 / 30.95	39.95 / 34.95 / 32.95 / 30.95	39.95 / 34.95 / 32.95 / 30.95	39.95 / 34.95 / 32.95 / 30.95

*Higher current supplies available in other PMC models; write for complete catalog.

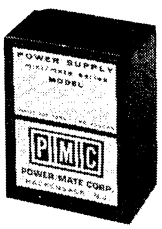
Specifications and Prices Subject to Change without Notice.

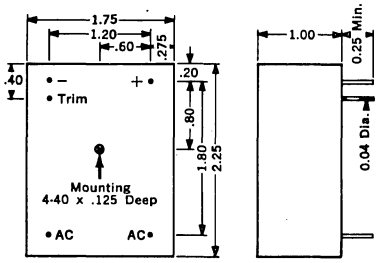
POWER/MATE CORP.
514 S. RIVER STREET, HACKENSACK, N. J. 07601
Phone: (201) 343-6294 TWX: (710) 990-5023

MINI/MATE MINIATURE POWER SUPPLIES

DIMENSIONAL DATA

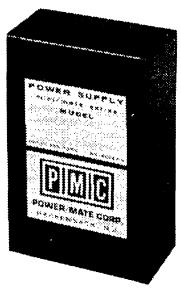
FIGURE 1 — "A" SIZE CASE

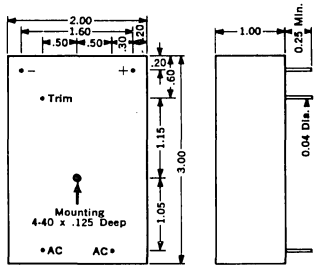




Bottom View Side View

FIGURE 2 — "B" SIZE CASE

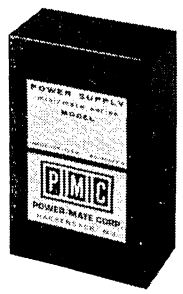


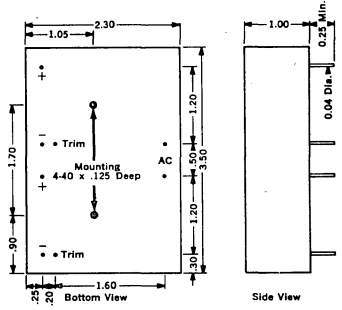


Bottom View Side View

(Top view for MM170B and MM180B)

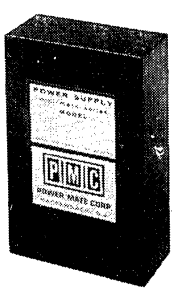
FIGURE 3 — "C" SIZE CASE

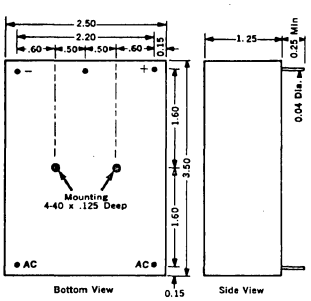




Bottom View Side View

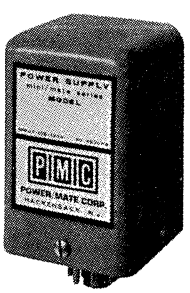
FIGURE 4 — "D" SIZE CASE

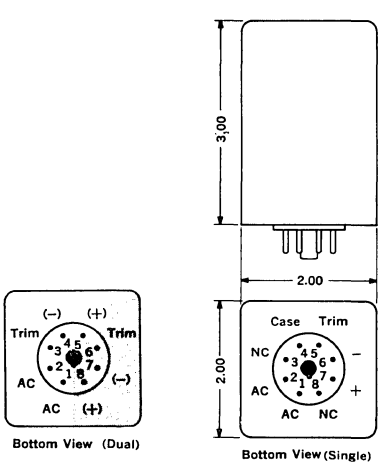




Bottom View Side View

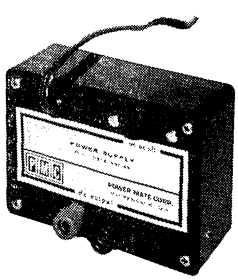
FIGURE 5 — "E" SIZE CASE

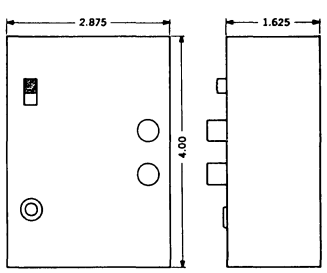




Bottom View (Dual) Bottom View (Single)

FIGURE 6 — "F" SIZE CASE





Top View Side View

Pioneers of the UNI concept in power supplies

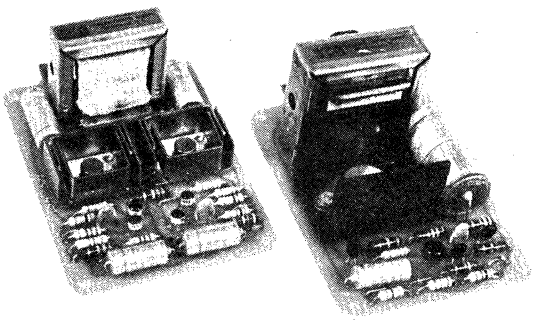
PMC **POWER/MATE CORP.**
514 S. RIVER STREET, HACKENSACK, N. J. 07601
Phone: (201) 343-6294 TWX: (710) 990-5023

CARD-PAC SERIES

PRODUCT DIGEST

The new CARD/PAC Series all-silicon P.C. board power supplies are among the most competitively priced power supplies in the industry and provide a compact, low-cost regulated DC voltage source. Using P.C. board construction for economy, these power supplies provide high performance in a unit compatible in packaging and price with the new generation lower cost integrated circuits, operational amplifiers, and digital function devices.

All components are high quality computer-rated for long life. The CARD/PAC Series cannot be damaged by prolonged short circuits or overloads. In addition, the CARD/PAC Series are backed by the same 5-year warranty given all POWER/MATE power supply products.



SAME DAY SHIPMENT

SPECIFICATIONS

VOLTAGE INPUT: 105-125 VAC, 50-440 CPS.

CURRENT OUTPUT: Up to 1 amp.

VOLTAGE OUTPUT: 3 to 50 volts.

LINE REGULATION: 0.01% or 1 mV (whichever is greater).

LOAD REGULATION: 0.05%.

RIPPLE: Less than 1 mV RMS max.

TEMPERATURE COEFFICIENT: Better than 0.02%/°C (typical).

OVERLOAD PROTECTION: Power supply cannot be damaged by current overloads.

POLARITY: May be either positive , negative or floating.

AMBIENT OPERATING TEMPERATURE: Continuous duty from −25°C to +71°C ambient.

STORAGE TEMPERATURE: −25°C to +85°C.

OUTPUT CURRENT VS. TEMPERATURE: Rated for full current output at temperatures between −25°C to +71°C.

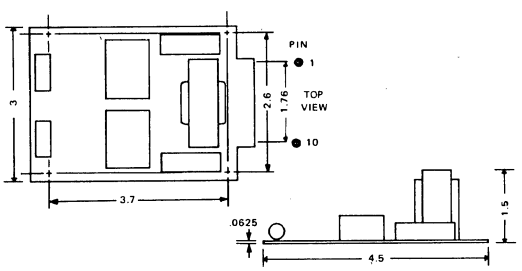
REMOTE OR LOCAL SENSING: Provision included for remote sensing of output voltage directly at the load, for improved overall regulation. Also may be connected for local sensing.

AVAILABLE OPTIONS

1. A durable baked enamel steel laboratory bench case is available at $25 per case. Add suffix C to model number (Example: CP-5JC).
2. Improved regulation, 0.01%, available at $5 per unit. Add suffix R to model number (Example: CP-9MR).
3. Ten-pin P.C. card connector. Order separately as CARD/PAC CONN at $1.00 ea.

MECHANICAL DATA

CARD/PAC "A": 3"W x 4.5"L x 2"H
CARD/PAC "B": 3"W x 4.5"L x 1.5"H



CARD/PAC A CONNECTIONS

PIN 1 Positive Sense — Connect Pin 1 to Pin 2
2 Positive VDC
3 AC Line
4, 5, 6 and 7 — No Connections
8 AC Line
9 Negative VDC — Connect Pin 9 to Pin 10
10 Negative Sense

TO OPERATE WITH REMOTE SENSING:

a. Connect Pin 2 to positive side of load.
b. Bring out a separate lead from Pin 1 to positive side of load.
c. Connect Pin 9 to negative side of load.
d. Bring out a separate lead from Pin 10 to negative side of load.

CARD/PAC B CONNECTIONS

PIN 1 Negative Sense
2 Negative VDC
3 AC Line
4 Negative Sense — Common
5 Output Common
6 Output Common
7 Positive Sense — Common
8 AC Line
9 Positive VDC
10 Positive Sense

NOTES:
A. Connect pin 1 with pin 2
B. Connect pins 4, 5, 6 and 7 together
C. Connect pin 9 with pin 10

TO OPERATE WITH REMOTE SENSING:

a. Connect pin 2 to negative side of load.
b. Bring out a separate lead from pin 1 to negative side of load.
c. Connect pin 5 or 6 to common point of load.
d. Bring out separate leads from pins 4 and 7 to common point of load.
e. Connect pin 9 to positive side of load.
f. Bring out a separate lead from pin 10 to positive side of load.

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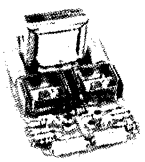
CARD-PAC SERIES

CARD/PAC "DUAL" SERIES 50



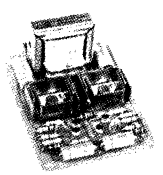
Model	DC Volts	Current (mA)	PAK Size	Price
DCP-6G	±6	50	B	$39.00
DCP-7G	±7	50	B	39.00
DCP-9G	±9	50	B	39.00
DCP-10G	±10	50	B	39.00
DCP-12G	±12	50	B	39.00
DCP-15G	±15	50	B	39.00
DCP-16G	±16	50	B	39.00
DCP-18G	±18	50	B	39.00
DCP-20G	±20	50	B	39.00
DCP-22G	±22	50	B	39.00
DCP-24G	±24	50	B	39.00
DCP-25G	±25	50	B	39.00
DCP-26G	±25	50	B	39.00
DCP-28G	±28	50	B	39.00
DCP-30G	±30	50	B	39.00

CARD/PAC "DUAL" SERIES 100

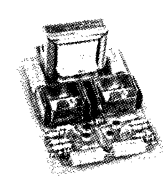
Model	DC Volts	Current (mA)	PAK Size	Price
DCP-6J	±6	100	B	$49.00
DCP-7J	±7	100	B	49.00
DCP-9K	±9	100	B	49.00
DCP-10K	±10	100	B	49.00
DCP-12K	±12	100	B	49.00
DCP-15K	±15	100	B	49.00
DCP-18H	±18	100	B	59.00
DCP-20H	±20	100	B	59.00
DCP-22H	±22	100	B	59.00
DCP-24H	±24	100	B	59.00
DCP-25H	±25	100	B	59.00
DCP-26H	±26	100	B	59.00
DCP-27H	±27	100	B	59.00
DCP-28H	±28	100	B	59.00
DCP-30H	±30	100	B	59.00

CARD/PAC "DUAL" SERIES 200

Model	DC Volts	Current (mA)	PAK Size	Price
DCP-6L	±6	200	B	$59.00
DCP-12M	±12	200	B	59.00
DCP-15M	±15	200	B	59.00



CARD/PAC "SINGLES" SERIES 50

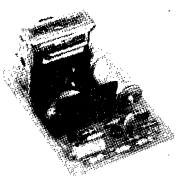


Model	DC Volts	Current (mA)	PAK Size	Price
CP-31G	31	50	B	$44.00
CP-32G	32	50	B	44.00
CP-33G	33	50	B	44.00
CP-34G	34	50	B	44.00
CP-35G	35	50	B	44.00
CP-36G	36	50	B	44.00
CP-37G	37	50	B	44.00
CP-38G	38	50	B	44.00
CP-39G	39	50	B	44.00
CP-40G	40	50	B	44.00
CP-41G	41	50	B	44.00
CP-42G	42	50	B	44.00
CP-43G	43	50	B	44.00
CP-44G	44	50	B	44.00
CP-45G	45	50	B	44.00
CP-46G	46	50	B	44.00
CP-47G	47	50	B	44.00
CP-48G	48	50	B	44.00
CP-49G	49	50	B	44.00
CP-50G	50	50	B	44.00

CARD/PAC "SINGLES" SERIES 100

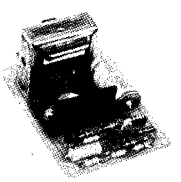
Model	DC Volts	Current (mA)	PAK Size	Price
CP-4J	4	100	A	$38.00
CP-5J	5	100	A	38.00
CP-6J	6	100	A	38.00
CP-7J	7	100	A	38.00
CP-8J	8	100	A	38.00
CP-9K	9	100	B	38.00
CP-10K	10	100	B	38.00
CP-11K	11	100	B	38.00
CP-12K	12	100	B	38.00
CP-13K	13	100	B	38.00
CP-14K	14	100	B	38.00
CP-15K	15	100	B	38.00

CARD/PAC "SINGLES" SERIES 200



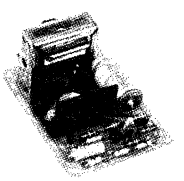
Model	DC Volts	Current (mA)	PAK Size	Price
CP-4L	4	200	A	$49.00
CP-5L	5	200	A	49.00
CP-6L	6	200	A	49.00
CP-7L	7	200	A	49.00
CP-8L	8	200	A	49.00
CP-9M	9	200	B	49.00
CP-10M	10	200	B	49.00
CP-11M	11	200	B	49.00
CP-12M	12	200	B	49.00
CP-13M	13	200	B	49.00
CP-14M	14	200	B	49.00
CP-15M	15	200	B	49.00

CARD/PAC "SINGLES" SERIES 300



Model	DC Volts	Current (mA)	PAK Size	Price
CP-16H	16	100	B	$49.00
CP-17H	17	100	B	49.00
CP-18H	18	100	B	49.00
CP-19H	19	100	B	49.00
CP-20H	20	100	B	49.00
CP-21H	21	100	B	49.00
CP-22H	22	100	B	49.00
CP-23H	23	100	B	49.00
CP-24H	24	100	B	49.00
CP-25H	25	100	B	49.00
CP-26H	26	100	B	49.00
CP-27H	27	100	B	49.00
CP-28H	28	100	B	49.00
CP-28H	29	100	B	49.00
CP-30H	30	100	B	49.00
CP-31H	31	100	B	49.00
CP-32H	32	100	B	49.00

CARD/PAC "SINGLES" SERIES 100



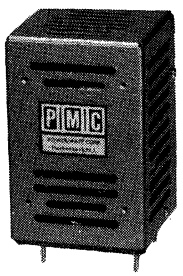
Model	DC Volts	Current (mA)	PAK Size	Price
CP-3.6X	3.6	1000	A	$49.00
CP-5X	5	1000	A	49.00

5 Year Warranty

SAME DAY SHIPMENT

RC & RD POWER SUPPLY MODULES

High performance/Meet MIL Specs



FEATURES:

- All silicon solid state circuitry • MIL T-27 Transformer • 85°C Capacitors
- 100,000 hours MTBF
- Short circuit proof
- And more! Check the regulation and current handling abilities.

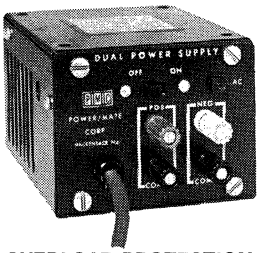
SPECIFICATIONS:

Input—105-125V AC, 47-420 CPS
Output—See Specific Model rating
Regulation—See Specific Model rating
Ripple—Less than 4MV RMS for RC
Less than 8 MV for RD
Operating Ambient Temperature— —20° to +71°C
Storage Temperature— —55° to +85°C
Output Adjustment—Internal pot
Cooling—None required within specified ambients
Polarity—May be either positive, negative or floating up to 300 Volts
Overload Protection—Solid state short circuit protected, auto-reset
Mechanical—Housing 3¼" x 3¼" x 5" with standard octal plug for input-output

RC SERIES, all models $65 RD Series, all models $55

Model No.	Output Volts	Output Amps	Regulation ±% Line	Load	Model No.	Output Volts	Output Amps	Regulation ±% Line	Load
RC-5	3-7	1.0	0.3	0.7	RD-5	3-7	1.0	0.6	1.4
RC-9	7-11	1.0	0.1	0.3	RD-9	7-11	1.0	0.2	0.6
RC-12	11-13	1.0	0.075	0.1	RD-12	11-13	1.0	0.15	0.2
RC-15	13-16	0.5	0.075	0.1	RD-15	13-16	0.5	0.15	0.2
RC-19	16-21	0.5	0.075	0.1	RD-19	16-21	0.5	0.15	0.2
RC-24	21-26	0.5	0.075	0.1	RD-24	21-26	0.5	0.15	0.2
RC-28	26-31	0.5	0.06	0.1	RD-28	26-31	0.5	0.12	0.2
RC-34	31-37	0.5	0.05	0.1	RD-34	31-37	0.5	0.1	0.2
RC-40	37-43	0.5	0.05	0.1	RD-40	37-43	0.5	0.1	0.2
RC-48	43-50	0.5	0.05	0.1	RD-48	43-50	0.5	0.1	0.2

POWERTWIN-99 TRACKING OP-AMP SUPPLY



ELECTRICAL SPECIFICATIONS:

INPUT—105-125 V AC 50-400 cps single phase.
OUTPUT VOLTAGE — 12.0-18.0 V DC, 0.400 amps (each output).
REGULATION— ±0.05%.
RIPPLE—1.0 MV rms (max.)
TEMPERATURE COEFFICIENT—Better than 0.01%/°C.
OVERLOAD PROTECTION—Unit will withstand direct short circuit across either output to common or across + to — output terminals for an indefinite period without damage to the supply.
OUTPUT CURRENT vs. TEMPERATURE—Each output is rated for 0.400 amperes at 50°C ambient and is derated linearly to 0.300 amps at 71°C.
WEIGHT—Net 3¾ pounds, Shipping 4¾ pounds.

MILITARY SPECIFICATIONS:

Designed to meet the environmental requirements of MIL-E-5272 and RFI requirements of MIL-I-6181.

Mean-Time-Between Failures—In excess of 100,000 hours per MIL HDBK 217.

MIL-T-27 TRANSFORMERS

ACCESSORIES:

The POWERTWIN-99 may be readily converted to a bench type dual output power supply for lab use simply by removing the front panel barrier strip assembly on the standard model and replacing it with the lab adapter front panel. The supply may also be converted back to the standard module type at any time. No soldering is required. The Lab Adapter kit comes complete with panel shown and four rubber mounting feet. Model number LD-1. Price $14.50.

An octal plug output also may be installed in place of the barrier strip. This is easily accomplished without soldering. Model number OP-1. Price $4.00.

RA & RB Series Power Modules

Regulation 0.05% or 0.5%
Voltages 0 to 400
Current Outputs to 25 Amps

All Silicon Semiconductors Throughout
All Units Rated For Continuous Duty at —20° To +71°C Ambient
Short Circuit Proof—May Be Shorted Indefinitely Without Damage
Automatic Overload And Short Circuit Recovery
No External Heat Sink Or Cooling Required Up To +71°C
MTBF—Over 100,000 Hours
All Components Accessible And Replaceable For Maintenance
Top Quality Components And Rugged Construction
All Power Supplies Subjected To Rigorous QC Inspections

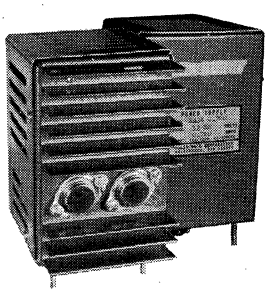
The RA and RB Series of modular power supplies provide regulated voltage outputs between 0 and 400 volts at output currents up to 25 amperes, at regulations of 0.05 or 0.5%, according to the model selected.

Silicon semiconductors are used exclusively in the power supply circuitry. This together with the internal heat sinking provided in the supply enables full load operation of the unit at ambient temperatures of 71°C without any additional cooling, heat sinking, and without derating.

The RA and RB Series power supplies are completely short circuit proof. The output may be short circuited indefinitely without damage. A unique circuit reduces the output current and voltage if the full load rating of the supply is exceeded. This not only protects the power supply, but serves to protect the load against further damage due to excessive current flow. The power supply automatically restores itself to normal operation after the short or overload is removed.

All components are accessible and replaceable in the field if required. All components are conservatively rated and are of the highest quality. For example, the electrolytic capacitors are 85°C types and the transformers are MIL-T-27 quality.

Connections at the connector permit either internal or remote adjustment of the output voltages. External connections also permit the remote sensing of the voltage directly at the load for improved overall load regulation on the RA Series.



SPECIFICATIONS:

Input—105-125V AC. 47-420 CPS.
Output—See Specific Model Listed
Regulation— ±0.05% or 2mv (whichever is greater) vs line and load for RA Series; ±0.5% vs line and load for RB Series
Ripple—Less than 0.002%, or 1mv RMS (whichever is greater) for RA Series; 0.01% or 5mv RMS for RB Series
Response Time—50 Microseconds
Operating Ambient Temperature— —20° to +71°C
Temperature Coefficient—0.015%/°C or 1.8mv, whichever is greater
Output Adjustment—Either internal or external as desired
Cooling—None required at specified ambients
Polarity—May be either positive, negative, or floating (up to 300 volts)
Overload Protection—Solid state short circuit and overload protected, instantaneous recovery and automatic reset
Mean Time Between Failures—100,000 hours typical, calculated according to MIL Handbook 217A
Military Specifications—Designed to meet the environmental requirements of MIL-E-5272, and RFI requirements of MIL-I-6181

POWER/MATE CORP.
514 S. River Street • Hackensack, N.J. 07601
Phone (201) 343-6294/TWX 710-990-5023

PMC

RA and RB Series Specifications

Output Voltage Adjust Range	Output Current (Amps)	Case Size	0.05% Regulation Price	0.05% Regulation Model No.	0.5% Regulation Price	0.5% Regulation Model No.
0-3	0.375	R	$115	RA2- 0.375	$110	RB2- 0.375
	0.750	R	120	RA2- 0.750	110	RB2- 0.750
	1.5	R	150	RA2- 1.5	140	RB2- 1.5
	3.0	RH	190	RA2- 3.0	180	RB2- 3.0
	6.0	TH	230	RA2- 6.0	220	RB2- 6.0
	12.0	2TH	325	RA2-12.0	315	RB2-12.0
	25.0	4TH	425	RA2-25.0	415	RB2-25.0
3-5	0.375	R	70	RA4- 0.375	60	RB4- 0.375
	0.750	R	85	RA4- 0.750	75	RB4- 0.750
	1.5	R	105	RA4- 1.5	95	RB4- 1.5
	3.0	RH	135	RA4- 3.0	125	RB4- 3.0
	6.0	TH	180	RA4- 6.0	165	RB4- 6.0
	12.0	2TH	255	RA4-12.0	240	RB4-12.0
	25.0	4TH	360	RA4-25.0	345	RB4-25.0
5-7	0.375	R	70	RA6- 0.375	60	RB6- 0.375
	0.750	R	85	RA6- 0.750	75	RB6- 0.750
	1.5	R	105	RA6- 1.5	95	RB6- 1.5
	3.0	RH	135	RA6- 3.0	125	RB6- 3.0
	6.0	TH	180	RA6- 6.0	165	RB6- 6.0
	12.0	2TH	275	RA6-12.0	260	RB6-12.0
	25.0	4TH	405	RA6-25.0	390	RB6-25.0
7-9	0.200	R	65	RA8- 0.200	60	RB8- 0.200
	0.375	R	80	RA8- 0.375	70	RB8- 0.375
	0.750	R	95	RA8- 0.750	85	RB8- 0.750
	1.5	R	105	RA8- 1.5	95	RB8- 1.5
	3.0	RH	135	RA8- 3.0	125	RB8- 3.0
	6.0	TH	190	RA8- 6.0	175	RB8- 6.0
	12.0	2TH	280	RA8-12.0	265	RB8-12.0
	25.0	4TH	415	RA8-25.0	400	RB8-25.0
9-11	0.200	R	65	RA10- 0.200	60	RB10- 0.200
	0.375	R	80	RA10- 0.375	70	RB10- 0.375
	0.750	R	95	RA10- 0.750	85	RB10- 0.750
	1.5	R	105	RA10- 1.5	95	RB10- 1.5
	3.0	RH	135	RA10- 3.0	125	RB10- 3.0
	6.0	TH	195	RA10- 6.0	180	RB10- 6.0
	12.0	2TH	290	RA10-12.0	275	RB10-12.0
	25.0	4TH	425	RA10-25.0	410	RB10-25.0
11-13	0.200	N	65	RA12- 0.200	60	RB12- 0.200
	0.375	N	85	RA12- 0.375	75	RB12- 0.375
	0.750	R	95	RA12- 0.750	85	RB12- 0.750
	1.5	R	115	RA12- 1.5	105	RB12- 1.5
	3.0	RH	135	RA12- 3.0	125	RB12- 3.0
	6.0	TH	200	RA12- 6.0	190	RB12- 6.0
	12.0	2TH	290	RA12-12.0	275	RB12-12.0
	25.0	4TH	440	RA12-25.0	425	RB12-25.0
13-15	0.100	N	65	RA14- 0.100	60	RB14- 0.100
	0.200	N	75	RA14- 0.200	65	RB14- 0.200
	0.375	N	85	RA14- 0.375	75	RB14- 0.375
	0.750	R	100	RA14- 0.750	90	RB14- 0.750
	1.5	R	125	RA14- 1.5	115	RB14- 1.5
	3.0	TH	165	RA14- 3.0	155	RB14- 3.0
	6.0	2TH	210	RA14- 6.0	195	RB14- 6.0
	12.0	3TH	295	RA14-12.0	280	RB14-12.0
	25.0	4TH	455	RA14-25.0	440	RB14-25.0
14-16	0.100	N	65	RA15- 0.100	60	RB15- 0.100
	0.200	N	75	RA15- 0.200	65	RB15- 0.200
	0.375	N	85	RA15- 0.375	75	RB15- 0.375
	0.750	R	100	RA15- 0.750	90	RB15- 0.750
	1.5	R	125	RA15- 1.5	115	RB15- 1.5
	3.0	TH	165	RA15- 3.0	145	RB15- 3.0
	6.0	2TH	210	RA15- 6.0	190	RB15- 6.0
	12.0	3TH	310	RA15-12.0	290	RB15-12.0
	25.0	5TH	455	RA15-25.0	440	RB15-25.0
15-17	0.100	N	65	RA16- 0.100	60	RB16- 0.100
	0.200	N	75	RA16- 0.200	65	RB16- 0.200
	0.375	N	85	RA16- 0.375	75	RB16- 0.375
	0.750	R	105	RA16- 0.750	95	RB16- 0.750
	1.5	R	125	RA16- 1.5	115	RB16- 1.5
	3.0	TH	170	RA16- 3.0	150	RB16- 3.0
	6.0	2TH	215	RA16- 6.0	200	RB16- 6.0
	12.0	3TH	325	RA16-12.0	310	RB16-12.0
	25.0	5TH	460	RA16-25.0	445	RB16-25.0
17-19	0.100	N	65	RA18- 0.100	60	RB18- 0.100
	0.200	N	75	RA18- 0.200	65	RB18- 0.200
	0.375	N	85	RA18- 0.375	75	RB18- 0.375
	0.750	R	105	RA18- 0.750	95	RB18- 0.750
	1.5	R	125	RA18- 1.5	115	RB18- 1.5
	3.0	TH	170	RA18- 3.0	150	RB18- 3.0
	6.0	2TH	230	RA18- 6.0	215	RB18- 6.0
	12.0	3TH	335	RA18-12.0	320	RB18-12.0
	25.0	5TH	460	RA18-25.0	445	RB18-25.0

Output Voltage Adjust Range	Output Current (Amps)	Case Size	0.05% Regulation Price	0.05% Regulation Model No.	0.5% Regulation Price	0.5% Regulation Model No.
19-22	0.100	N	$ 65	RA20- 0.100	$ 60	RB20- 0.100
	0.200	N	75	RA20- 0.200	65	RB20- 0.200
	0.375	N	85	RA20- 0.375	75	RB20- 0.375
	0.750	R	105	RA20- 0.750	95	RB20- 0.750
	1.5	R	125	RA20- 1.5	115	RB20- 1.5
	3.0	TH	170	RA20- 3.0	150	RB20- 3.0
	6.0	2TH	235	RA20- 6.0	220	RB20- 6.0
	12.0	3TH	340	RA20-12.0	325	RB20-12.0
	25.0	5TH	465	RA20-25.0	450	RB20-25.0
22-25	0.100	N	65	RA23- 0.100	60	RB23- 0.100
	0.200	N	75	RA23- 0.200	65	RB23- 0.200
	0.375	R	85	RA23- 0.375	75	RB23- 0.375
	0.750	R	110	RA23- 0.750	100	RB23- 0.750
	1.5	RH	130	RA23- 1.5	120	RB23- 1.5
	3.0	TH	175	RA23- 3.0	160	RB23- 3.0
	6.0	2TH	240	RA23- 6.0	225	RB23- 6.0
	12.0	3TH	345	RA23-12.0	330	RB23-12.0
	25.0	5TH	475	RA23-25.0	460	RB23-25.0
25-28	0.100	N	65	RA26- 0.100	60	RB26- 0.100
	0.200	R	75	RA26- 0.200	65	RB26- 0.200
	0.375	R	85	RA26- 0.375	75	RB26- 0.375
	0.750	R	110	RA26- 0.750	100	RB26- 0.750
	1.5	T	140	RA26- 1.5	130	RB26- 1.5
	3.0	TH	180	RA26- 3.0	165	RB26- 3.0
	6.0	2TH	255	RA26- 6.0	240	RB26- 6.0
	12.0	4TH	370	RA26-12.0	355	RB26-12.0
26.5-29.5	0.100	N	65	RA28- 0.100	60	RB28- 0.100
	0.200	R	80	RA28- 0.200	105	RB28- 0.200
	0.375	R	90	RA28- 0.375	70	RB28- 0.375
	0.750	R	115	RA28- 0.750	80	RB28- 0.750
	1.5	T	140	RA28- 1.5	130	RB28- 1.5
	3.0	TH	180	RA28- 3.0	170	RB28- 3.0
	6.0	2TH	255	RA28- 6.0	240	RB28- 6.0
	12.0	4TH	370	RA28-12.0	355	RB28-12.0
28-32	0.050	N	60	RA30- 0.050	60	RB30- 0.050
	0.100	N	70	RA30- 0.100	60	RB30- 0.100
	0.200	R	80	RA30- 0.200	70	RB30- 0.200
	0.375	R	90	RA30- 0.375	80	RB30- 0.375
	0.750	R	115	RA30- 0.750	105	RB30- 0.750
	1.5	T	140	RA30- 1.5	130	RB30- 1.5
	3.0	TH	185	RA30- 3.0	175	RB30- 3.0
	6.0	2TH	265	RA30- 6.0	250	RB30- 6.0
	12.0	4TH	380	RA30-12.0	365	RB30-12.0
32-36	0.050	N	60	RA34- 0.050	60	RB34- 0.050
	0.100	N	70	RA34- 0.100	60	RB34- 0.100
	0.200	R	85	RA34- 0.200	75	RB34- 0.200
	0.375	R	95	RA34- 0.375	85	RB34- 0.375
	0.750	R	115	RA34- 0.750	105	RB34- 0.750
	1.5	T	150	RA34- 1.5	140	RB34- 1.5
	3.0	TH	200	RA34- 3.0	190	RB34- 3.0
	6.0	2TH	285	RA34- 6.0	270	RB34- 6.0
	12.0	4TH	400	RA34-12.0	385	RB34-12.0
36-40	0.050	N	65	RA38- 0.050	60	RB38- 0.050
	0.100	N	75	RA38- 0.100	65	RB38- 0.100
	0.200	R	85	RA38- 0.200	75	RB38- 0.200
	0.375	R	100	RA38- 0.375	90	RB38- 0.375
	0.750	R	115	RA38- 0.750	105	RB38- 0.750
	1.5	T	160	RA38- 1.5	145	RB38- 1.5
	3.0	TH	215	RA38- 3.0	200	RB38- 3.0
	6.0	2TH	310	RA38- 6.0	295	RB38- 6.0
	12.0	4TH	450	RA38-12.0	435	RB38-12.0
40-45	0.050	N	70	RA42- 0.050	60	RB42- 0.050
	0.100	N	80	RA42- 0.100	70	RB42- 0.100
	0.200	R	90	RA42- 0.200	80	RB42- 0.200
	0.375	R	105	RA42- 0.375	95	RB42- 0.375
	0.750	T	120	RA42- 0.750	110	RB42- 0.750
	1.5	T	170	RA42- 1.5	160	RB42- 1.5
	3.0	TH	225	RA42- 3.0	210	RB42- 3.0
	6.0	2TH	315	RA42- 6.0	300	RB42- 6.0
	12.0	4TH	455	RA42-12.0	440	RB42-12.0
45-50	0.050	N	70	RA47- 0.050	60	RB47- 0.050
	0.100	N	80	RA47- 0.100	70	RB47- 0.100
	0.200	R	90	RA47- 0.200	80	RB47- 0.200
	0.375	R	105	RA47- 0.375	95	RB47- 0.375
	0.750	T	125	RA47- 0.750	115	RB47- 0.750
	1.5	T	170	RA47- 1.5	160	RB47- 1.5
	3.0	TH	230	RA47- 3.0	215	RB47- 3.0
	6.0	3TH	320	RA47- 6.0	305	RB47- 6.0
	12.0	5TH	465	RA47-12.0	450	RB47-12.0

PMC **POWER/MATE CORP.**
514 S. River Street • Hackensack, N.J. 07601
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FOR VOLTAGES FROM 50 TO 400. AND DUAL POWER SUPPLIES (SERIES DRA & DRB), SEND FOR THE COMPLETE PMC RA AND RB SERIES CATALOG.

NEW FROM POWERTEC

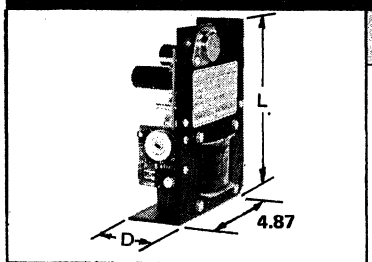
OEM SERIES
CR SERIES

- OUTSTANDING POWER/COST VALUES, AS LOW AS 40¢/WATT IN OEM, 30¢/WATT IN CR
- RUGGED, RELIABLE DESIGN & CONSTRUCTION.
- MAIN-FRAME, PERIPHERAL, & INSTRUMENT RATED.
- OPEN CASE/CHASSIS STRUCTURE PERMITS OPTIMUM PACKAGING.

OEM SERIES

SERIES REGULATED DC POWER SUPPLIES

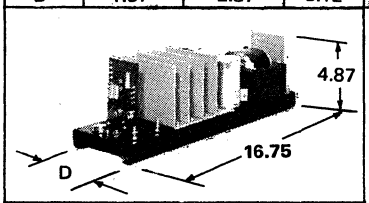
- VERY LOW COST
- CURRENT LIMIT/FOLDBACK
- OPEN CASE/CHASSIS CONSTRUCTION
- RATED TO 40°C, DERATE TO 71°C



CASE DIM.	MODULE SIZE 2B	2C	2D
L	4.00	5.75	9.00
D	1.87	2.87	3.12

UNIT PRICE	MODEL NUMBER	OUTPUT VOLTS	OUTPUT AMPS
$24.95	2B 5–3	5.0	3.0
	2B15–1.3	15.0	1.3
	2B24–1	24.0	1.0
$44.00	2C 5–6	5.0	6.0
	2C15–2.8	15.0	2.8
	2C24–2.3	24.0	2.3
$75.00	2D 5–12	5.0	12.0
	2D15– 6	15.0	6.0
	2D24– 5	24.0	5.0

OVERVOLTAGE PROTECTION AVAILABLE – ALL MODELS



CASE DIM.	MODULE SIZE 2E	2F	2G
D	4.87	10.0	15.4

UNIT PRICE	MODEL NUMBER	OUTPUT VOLTS	OUTPUT AMPS
$129.00	2E 5–25	5.0	25.0
	2E15–14	15.0	14.0
	2E24–11	24.0	11.0
$219.00	2F 5–50	5.0	50.0
	2F15–28	15.0	28.0
	2F24–22	24.0	22.0
$299.00	2G 5–75	5.0	75.0
	2G15–42	15.0	42.0
	2G24–33	24.0	33.0

OVERVOLTAGE PROTECTION AVAILABLE – ALL MODELS

SPECIFICATIONS

INPUT: 115 VAC ±10V 57-63Hz
OUTPUT: See chart, voltage adjustment range:

5 VDC	4.5 to 6.3 VDC
15 VDC	10.0 to 15.5 VDC
24 VDC	18.0 to 26.0 VDC

REGULATION: Line ±.25%, Load ±.25%
RIPPLE: 1mv RMS (5&15V), 3mv RMS (24V)
RESPONSE: 50 μsec typical
TEMPERATURE: 0°C to 40°C derate to 50% at 71°C
O.L. PROTECTION: Current limit/foldback.

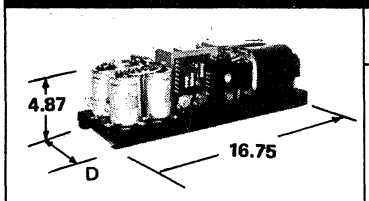
OPTIONAL OVER VOLTAGE PROTECTION – OVP

OVP	USE WITH	PRICE
OVP-1	B,C, & D	$ 8.00
OVP-2	E	$16.00
OVP-3	F & G	$29.00

CR SERIES

SCR REGULATED DC POWER SUPPLIES

- EXTREMELY LOW COST
- FULLY PROTECTED
- OPEN CHASSIS CONSTRUCTION
- RATED TO 40°C, DERATE TO 71°C



CASE DIM.	MODULE SIZE B	C
D	6.00	10.25

UNIT PRICE	MODEL NUMBER	OUTPUT VOLTS	OUTPUT AMPS
$129.00	10B300	5-25	12.0
		10-50	6.0
$187.00	10C600	5-25	24.0
		10-50	12.0

OPTIONAL RIPPLE REDUCTION AVAILABLE – ALL MODELS
Reduces ripple to 200mv/25v, 400mv/50v.

SPECIFICATIONS

INPUT: 115 VAC ±10%, 57-63Hz
OUTPUT: See chart for range
REGULATION: Line ±1%, Load ±1%
RIPPLE: 400mv/25V, 800mv/50V
TEMPERATURE: 0°C to 40°C, derate to 50% at 71°C
O.L. PROTECTION: Circuit breaker

OUTPUT RIPPLE REDUCTION – ORR

ORR	USE WITH	PRICE
ORR-1	B	$19.50
ORR-2	C	$29.50

POWERTEC

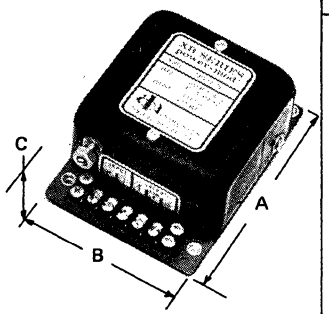
THE POWER HOUSE

9168 DESOTO AVENUE
CHATSWORTH, CALIFORNIA 91311
(213) 882-0004 TWX 910-494-2092

XR SERIES

MODULAR DC POWER SUPPLIES

- HIGH QUALITY
- SMALL SIZE
- INTERNAL OVP
- 71°C RATING



CASE SIZE	DIMENSIONS A	B	C	WT (LBS)
B	3.50	2.50	1.56	.75
C	5.88	3.25	1.90	1.5
D	6.25	4.00	2.25	2.5

DELIVERY: Stock to 7 days, typical, 30 days maximum, F.O.B. Chatsworth.

MODEL NUMBER	DC OUTPUT VOLTS	AMPS	REGULATION LINE	LOAD	CASE SIZE
3B5-35	5.0	.35	±0.3%	±0.3%	B
3C5-1-2	5.0	1.2	±0.3%	±0.3%	C
3D5-3-0	5.0	3.0	±0.3%	±0.3%	D
3B6-35	6.0	.35	±0.3%	±0.3%	B
3C6-1.0	6.0	1.0	±0.3%	±0.3%	C
3D6-2-5	6.0	2.5	±0.3%	±0.3%	D
3B10-2	10.0	.2	±0.1%	±0.1%	B
3C10-7	10.0	.7	±0.1%	±0.1%	C
3D10-1.5	10.0	1.5	±0.1%	±0.1%	D
3B12-.2	12.0	.2	±0.075%	±0.075%	B
3C12-.6	12.0	.6	±0.075%	±0.075%	C
3D12-1.5	12.0	1.5	±0.075%	±0.075%	D
3B15-.2	15.0	.2	±0.075%	±0.075%	B
3C15-.5	15.0	.5	±0.075%	±0.075%	C
3D15-1.2	15.0	1.2	±0.075%	±0.075%	D
3B18-.15	18.0	.15	±0.075%	±0.075%	B
3C18-.5	18.0	.5	±0.075%	±0.075%	C
3D18-1.0	18.0	1.0	±0.075%	±0.075%	D
3B24-.1	24.0	.1	±0.075%	±0.075%	B
3C24-.35	24.0	.35	±0.075%	±0.075%	C
3D24-.7	24.0	.7	±0.075%	±0.075%	D
3B28-.1	28.0	.1	±0.075%	±0.075%	B
3C28-.35	28.0	.35	±0.075%	±0.075%	C
3D28-.7	28.0	.7	±0.075%	±0.075%	D
DUAL OUTPUT UNITS					
3C10D-.3	10.0	.30	±0.075%	±0.075%	C
3D10D-.6	10.0	.60	±0.075%	±0.075%	D
3C12D-.3	12.0	.30	±0.075%	±0.075%	C
3D12D-.6	12.0	.60	±0.075%	±0.075%	D
3C15D-.25	15.0	.25	±0.075%	±0.075%	C
3D15D-.5	15.0	.50	±0.075%	±0.075%	D
FULLY ADJUSTABLE UNITS (OVP NOT AVAILABLE)					
3C18-.25-V	0-18	.25	±0.075+5MV.	±0.075+5MV.	C
3D18.5-V	0-18	.50	±0.075+5MV.	±0.075+5MV.	D
3C36-.13-V	0-36	.13	±0.075+5MV.	±0.075+5MV.	C
3D-36-.25-V	0-36	.25	±0.075+5MV.	±0.075+5MV.	D
NIXIE POWER SUPPLIES (NOT ADJUSTABLE, OVP NOT AVAILABLE)					
3B180-.01	180	.01	±3%	±3%	B
3C180-.02	180	.02	±3%	±3%	C

PRICING ON STANDARD STOCK ITEMS

CASE SIZE	BASIC UNIT	WITH OVP
B	$34	$41.50
C	42	52.00
D	49	59.00
C DUAL	61	76.00
D DUAL	69	84.00
C ADJ.	47	NOT AVAIL.
D ADJ.	57	

SPECIFICATIONS

INPUT: 115 VAC ± 10%; 57 - 440 Hz derate 10% 57 - 47 Hz.

OUTPUT: See chart. Voltage adjustable ± 3%.

REGULATION: See chart. 50% load, 10% line.

RIPPLE: Typical 1 MV RMS, 3 MV P-P, MAX. 5MV P-P

RESPONSE: 20 - 50 μsec typical ½ - FL.

TEMPERATURE: Full load 0°C to + 71°C. Storage −55°C to + 85°C.

T.C.: ± 0.01%°C Max.

STABILITY: ± 0.1% for 8 hours after warmup.

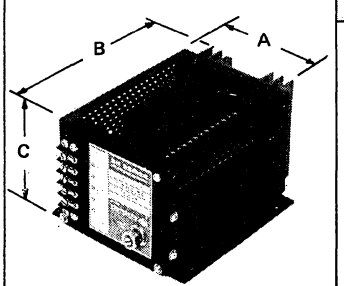
OV. PROTECTION: Optional 120% ± 5%.

OL. PROTECTION: Current limit foldback.

SR SERIES

MODULAR DC POWER SUPPLIES

- HIGH QUALITY
- SMALL SIZE
- INTERNAL OVP
- 55°C RATING



CASE SIZE	DIMENSIONS A	B	C	WT. (LBS.)
E	4.13	6.50	3.63	5.25
F	4.88	6.19	5.00	7.5
G	4.88	11.31	5.00	13.5
H	13.88	8.00	5.00	22.0

DELIVERY: Stock to 7 days, typical, 30 days maximum, F.O.B. Chatsworth.

MODEL NUMBER	DC OUTPUT VOLTS	AMPS	REGULATION LINE	LOAD	CASE SIZE
3E5-5	5.0	5.0	±0.3%	±0.3%	E
3F5-10	5.0	10.0	±0.3%	±0.3%	F
3G5-20	5.0	20.0	±0.3%	±0.3%	G
3H5-35	5.0	35.0	±0.3%	±0.3%	H
3E6-4.6	6.0	4.6	±0.3%	±0.3%	E
3F6-9.0	6.0	9.0	±0.3%	±0.3%	F
3G6-18	6.0	18.0	±0.3%	±0.3%	G
3H6-35	6.0	35.0	±0.3%	±0.3%	H
3E10-3.0	10.0	3.0	±0.1%	±0.1%	E
3F10-6.0	10.0	6.0	±0.1%	±0.1%	F
3G10-12	10.0	12.0	±0.1%	±0.1%	G
3H10-24	10.0	24.0	±0.1%	±0.1%	H
3E12-2.5	12.0	2.5	±0.075%	±0.075%	E
3F12-5.0	12.0	5.0	±0.075%	±0.075%	F
3G12-10.0	12.0	10.0	±0.075%	±0.075%	G
3H12-20.0	12.0	20.0	±0.075%	±0.075%	H
3E15-2.2	15.0	2.2	±0.075%	±0.075%	E
3F15-4.4	15.0	4.4	±0.075%	±0.075%	F
3G15-8.8	15.0	8.8	±0.075%	±0.075%	G
3H15-17.6	15.0	17.6	±0.075%	±0.075%	H
3E18-2.0	18.0	2.0	±0.075%	±0.075%	E
3F18-4.0	18.0	4.0	±0.075%	±0.075%	F
3G18-8.0	18.0	8.0	±0.075%	±0.075%	G
3H18-16.0	18.0	16.0	±0.075%	±0.075%	H
3E24-1.5	24.0	1.5	±0.075%	±0.075%	E
3F24-3.0	24.0	3.0	±0.075%	±0.075%	F
3G24-6.0	24.0	6.0	±0.075%	±0.075%	G
3H24-12.0	24.0	12.0	±0.075%	±0.075%	H
3E28-1.4	28.0	1.4	±0.075%	±0.075%	E
3F28-2.8	28.0	2.8	±0.075%	±0.075%	F
3G28-5.6	28.0	5.6	±0.075%	±0.075%	G
3H28-11.2	28.0	11.2	±0.075%	±0.075%	H

PRICING ON STANDARD STOCK ITEMS

CASE SIZE	BASIC UNIT	WITH OVP
E	$ 89	$108
F	119	138
G	169	191
H	249	279

SPECIFICATIONS

INPUT: 115 VAC ± 10%; 57 - 440 Hz (derate 10% 47 Hz.

OUTPUT: See chart. Voltage adjustable ± 3%.

REGULATION: See chart. 50% load 10% line.

RIPPLE: Typical 1 MV RMS, 3 MV P-P; MAX. 5MV P-P

RESPONSE: 20 - 50 μsec typical for half load to full load.

TEMPERATURE: Full load 0°C to + 55°C. Derate 50% @ 71°C. Storage −55°C to + 85°C.

T.C. ±0.01%°C Max.

STABILITY: ± 0.1% for 8 hours after warmup.

OV. PROTECTION: Optional @ 120% ± 5%.

OL. PROTECTION: Current limit foldback.

REMOTE SENSE: G and H case sizes.

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THE POWER HOUSE
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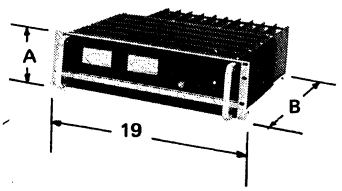
RM SERIES

RACK MOUNT DC POWER SUPPLIES

- HIGH EFFICIENCY
- INTEGRATED CIRCUITRY
- 2 MS STORAGE TIME
- CONVECTION COOLED TO 55°C



CASE SIZE	DIMENSIONS A	B	WT (LBS)
C	3.5	15.0	45.0
D	5.25	18.5	75.0

DELIVERY: Stock to 7 days, typical, 30 days maximum, F.O.B. Chatsworth.

MODEL NUMBER	DC OUTPUT VOLTS	AMPS
4C5-50	5	50
4D5-100	5	100
4C6-43	6	43
4D6-88	6	88
4C7-5-37	7.5	37
4D7.5-73	7.5	73
4C8-36	8	36
4D8-69	8	69
4C12-27	12	27
4D12-49	12	49
4C15-23	15	23
4D15-40	15	40
4C18-20	18	20
4D18-34	18	34
4C24-17	24	17
4D24-26	24	26
4C28-15	28	15
4D28-24	28	24

PRICING ON STANDARD STOCK ITEMS

CASE SIZE	BASIC UNIT	WITH METER OPTION
C	$465.00	$495.00
D	$765.00	$795.00

SPECIFICATIONS

INPUT: 115 VAC ± 10%; 57 - 440 Hz (derate 10% 57 - 47 Hz.

OUTPUT: See chart. Voltage adjustable ± 5%.

LINE REGULATION: ± 0.1%, 10% line.

LOAD REGULATION: ± 0.1%, 50% load change.

RIPPLE: 3 MV P-P, .03% of rated output MV P-P.

RESPONSE: 20 - 50 μsec 25% load change.

T.C.: ± 0.01%°C Max.

STABILITY: ± 0.1% eight hours.

TEMPERATURE: Full load 0°C to + 55°C. Derate 50% at 71°C. Storage −55°C to + 85°C.

O.V. PROTECTION: All units 120% ± 5%.

O.L. PROTECTION: Current limit foldback.

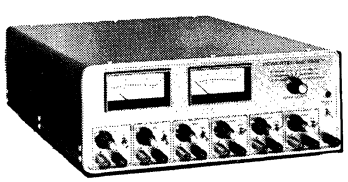
REMOTE SENSE: Standard.

LAB SERIES

LABORATORY DC POWER SUPPLIES

- SMALL SIZE & WEIGHT
- LOW COST
- SINGLE & MULTI-OUTPUTS
- R & D PRECISION

6B SERIES



6D SERIES

DELIVERY: Stock to 7 days, typical, 30 days maximum, F.O.B. Chatsworth.

MODEL	VDC	AMPS	REGULATION LINE	REGULATION LOAD	RIPPLE	PRICE
SINGLE OUTPUT LAB SUPPLY						
6B1000	0-6V	15A	±.01%	±.01%	1 MVRMS	**$185.00**
6B1001	0-18V	6A	±.01%	±.01%	1 MVRMS	
6B1002	0-36V	3A	±.01%	±.01%	1 MVRMS	
THREE OUTPUT LAB POWER SUPPLY						
6C3000	0-5V	5A	±.05%	±.05%	1 MVRMS	**$335.00**
	0-36V	1A	±.05%	±.05%	1 MVRMS	
	0-36V	1A	±.05%	±.05%	1 MVRMS	
SIX OUTPUT LAB POWER SUPPLY						
6D6000	0-6V	5A	±.15%	±.15%	1 MVRMS	**$495.00**
	0-18V	2A	±.05%	±.05%	1 MVRMS	
	0-18V	2A	±.05%	±.05%	1 MVRMS	
	0-36V	1A	±.05%	±.05%	1 MVRMS	
	0-36V	1A	±.05%	±.05%	1 MVRMS	
	0-200V	.040A	±.05%	±.05%	5 MVRMS	

INPUT: 115 VAC ± 10% 57 to 63 Hz 1ø

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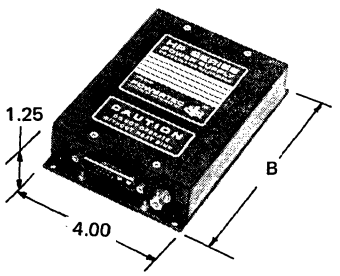
HP SERIES

AIRBORNE DC POWER SUPPLIES

- FLAT PACK DESIGN
- UP TO 5 WATTS/IN^3
- 100% MIL COMPONENTS
- 400 Hz 3ø INPUT



CASE SIZE	DIMENSION A	B	C	WT (LBS)
7B	4.00	6.00	1.25	1.8
7C	4.00	7.50	1.25	2.5
7D	6.00	9.00	1.7	5.3
7E	6.00	12.00	1.8	10.0
7F	6.50	14.00	2.25	14.5

DELIVERY: Stock to 7 days, typical, 30 days maximum, F.O.B. Chatsworth.

MODEL NUMBER	DC OUTPUT VOLTS	AMPS	REGULATION LINE	LOAD	CASE SIZE
7B5-7.5	5.0	7.5	±0.15%	±0.15%	B
7C5-15	5.0	15.0	±0.15%	±0.15%	C
7D5-30	5.0	30.0	±0.15%	±0.15%	D
7E5-60	5.0	60.0	±0.15%	±0.15%	E
7F5-120	5.0	120.0	±0.15%	±0.15%	F
7B6-6	6.0	6.0	±0.10%	±0.05%	B
7C6-13	6.0	13.0	±0.10%	±0.05%	C
7D6-26	6.0	16.0	±0.10%	±0.05%	D
7E6-52	6.0	52.0	±0.10%	±0.05%	E
7F6-105	6.0	105.0	±0.10%	±0.05%	F
7B12-3.7	12.0	3.7	±0.05%	±0.05%	B
7C12-8	12.0	8.0	±0.05%	±0.05%	C
7D12-16	12.0	16.0	±0.05%	±0.05%	D
7E12-32	12.0	32.0	±0.05%	±0.05%	E
7F12-64	12.0	64.0	±0.05%	±0.05%	F
7B15-3.1	15.0	3.1	±0.03%	±0.03%	B
7C15-7	15.0	7.0	±0.03%	±0.03%	C
7D15-14	15.0	14.0	±0.03%	±0.03%	D
7E15-28	15.0	28.0	±0.03%	±0.03%	E
7F15-56	15.0	56.0	±0.03%	±0.03%	F
7B24-2.0	24.0	2.0	±0.03%	±0.03%	B
7C24-5	24.0	5.0	±0.03%	±0.03%	C
7D24-10	24.0	10.0	±0.03%	±0.03%	D
7E24-20	24.0	20.0	±0.03%	±0.03%	E
7F24-40	24.0	40.0	±0.03%	±0.03%	F
7B28-1.7	28.0	1.7	±0.03%	±0.03%	B
7C28-4.2	28.0	4.2	±0.03%	±0.03%	C
7D28-8.5	28.0	8.5	±0.03%	±0.03%	D
7E28-17	28.0	17.0	±0.03%	±0.03%	E
7F28-34	28.0	34.0	±0.03%	±0.03%	F

PRICING ON STANDARD STOCK ITEMS CASE SIZE	PRICE
7B	$430
7C	$514
7D	$593
7E	$750
7F	$900

INPUT: 115 VAC ± 10% L-N 3ø 400 Hz ± 5%.

OUTPUT: See chart. Voltage adjustable ± 5%.

REGULATION: See chart. 50% load 10% line.

RIPPLE: Typical 3 MV P-P, max. 10 MV P-P.

RESPONSE: 50 μsec max. 1/3 load change.

PROGRAMMING: ± 5% standard.

REMOTE SENSING: standard.

STABILITY: ± 0.1% for 8 hours after warmup.

TEMPERATURE: Full load −55°C to + 80°C base plate temp. Storage −62°C to + 125°C.

T.C.: ± 0.01%°C max.

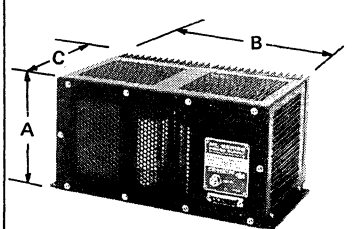
O.V. PROTECTION: Standard 120% ± 5%.

O.L. PROTECTION: Current limit foldback.

ML SERIES

MILITARIZED DC POWER SUPPLIES

- MIL-E-16400, MIL-T-21200, MIL-E-4158
- FULL RATING TO 71°C
- 100% MIL COMPONENTS
- MIL DOCUMENTATION AVAILABLE



CASE SIZE	DIMENSIONS A	B	C	WT (LBS)
B	5.15	4.00	7.62	6.5
C	5.62	4.62	8.85	11.75
D	6.03	7.62	9.15	16.75
E	6.90	13.00	8.65	26.25

DELIVERY: Stock to 7 days, typical, 30 days maximum, F.O.B. Chatsworth.

MODEL NUMBER	DC OUTPUT VOLTS	AMPS	CASE SIZE
5B5-2.5	5.0	2.5	B
5C5-5.0	5.0	5.0	C
5D5-10.0	5.0	10.0	D
5E5-20.0	5.0	20.0	E
5B6-2.3	6.0	2.3	B
5C6-4.6	6.0	4.6	C
5D6-9.2	6.0	9.2	D
5E6-18.4	6.0	18.4	E
5B10-1.7	10.0	1.7	B
5C10-3.5	10.0	3.5	C
5D10-7.0	10.0	7.0	D
5E10-14	10.0	14.0	E
5B12-1.6	12.0	1.6	B
5C12-3.2	12.0	3.2	C
5D12-6.4	12.0	6.4	D
5E12-12.8	12.0	12.8	E
5B15-1.3	15.0	1.3	B
5C15-2.7	15.0	2.7	C
5D15-5.4	15.0	5.4	D
5E15-10.8	15.0	10.8	E
5B18-1.2	18.0	1.2	B
5C18-2.4	18.0	2.4	C
5D18-4.8	18.0	4.8	D
5E18-9.6	18.0	9.6	E
5B24-.95	24.0	.95	B
5C24-1.9	24.0	1.9	C
5D24-3.8	24.0	3.8	D
5E24-7.6	24.0	7.6	E
5B28-.85	28.0	.85	B
5C28-1.7	28.0	1.7	C
5D28-3.4	28.0	3.4	D
5E28-6.8	28.0	6.8	E

PRICING ON STANDARD STOCK ITEMS CASE SIZE	STANDARD UNIT (NO OPTION)	HIGH PERFORMANCE UNIT (OPTION A)
B	$229	$264
C	$259	$294
D	$299	$334
E	$379	$414

SPECIFICATIONS

INPUT: 115 VAC ± 10%; 57-440 Hz derate 10% 57 - 47 Hz; 126.5 VAC to 132 VAC.

OUTPUT: See chart. Voltage adjustable ± 3%.

LINE REGULATION: ± .05% standard ± .00075% high performance 10% line.

LOAD REGULATION: ± .05% standard ± .00075% high performance 50% load.

RIPPLE: .01% + 1 MV standard 500 μV P-P high performance.

RESPONSE: 50 μsec ½ - FL.

STABILITY: ± .05% standard ± .002% high performance 8 hr. after warmup.

T.C.: ± .01%/°C standard ± .002%/°C high performance

O.V. PROTECTION: All units 120% ± 5%.

REMOTE SENSE: All units

O.L. PROTECTION: Current limit foldback.

SHIELDING: Transformer shield primary to secondary grounded.

STORAGE TEMPERATURE: −62°C to + 85°C.

OPERATING TEMPERATURE: 0°C to + 71°C.

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THE POWER HOUSE

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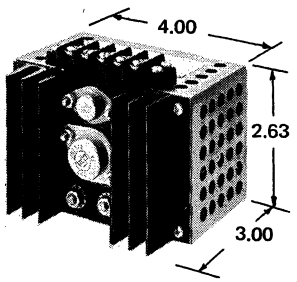
FC SERIES

MINIATURE DC POWER SUPPLIES

- COMPACT 1 WATT/IN^3
- LIGHT WEIGHT 1.5 LBS.
- HIGH QUALITY
- RFI PROTECTED



DIMENSIONS
4" x 3" x 2 5/8"
(INCLUDING HEATSINK)

MOUNTING
6-32 TAPPED INSERTS
ON 3.5" x 1.375" CENTERS

DELIVERY: Stock to 7 days, typical, 30 days maximum, F.O.B. Chatsworth.

MODEL NUMBER	DC OUTPUT		REGULATION		MAX. RIPPLE RMS
	VOLTS	AMPS	LINE	LOAD	
9D3-6	3.0	6.0	±.05%	±.1%	2.5 MV
9D3.5-5.7	3.5	5.7	±.05%	±.1%	2.5 MV
9D4-5.5	4.0	5.5	±.05%	±.1%	2.5 MV
9D4.5-5.2	4.5	5.2	±.05%	±.1%	2.5 MV
9D5-5	5.0	5.0	±.05%	±.1%	2.5 MV
9D5.5-4.6	5.5	4.6	±.05%	±.1%	2.5 MV
9D6-4.3	6.0	4.3	±.05%	±.1%	2.5 MV
9D7.5-3.5	7.5	3.5	±.05%	±.1%	2.5 MV
9D8-3.3	8.0	3.3	±.05%	±.1%	5.0 MV
9D9-3	9.0	3.0	±.05%	±.1%	5.0 MV
9D10-2.8	10.0	2.8	±.05%	±.1%	5.0 MV
9D12-2.3	12.0	2.3	±.05%	±.1%	5.0 MV
9D15-1.9	15.0	1.9	±.05%	±.1%	5.0 MV
9D18-1.6	18.0	1.6	±.05%	±.1%	10.0 MV
9D20-1.4	20.0	1.4	±.05%	±.1%	10.0 MV
9D24-1.2	24.0	1.2	±.05%	±.1%	10.0 MV
9D25-1.1	25.0	1.1	±.05%	±.1%	10.0 MV
9D26-1.1	26.0	1.1	±.05%	±.1%	10.0 MV
9D28-1	28.0	1.0	±.05%	±.1%	10.0 MV
9D30-1	30.0	1.0	±.05%	±.1%	10.0 MV

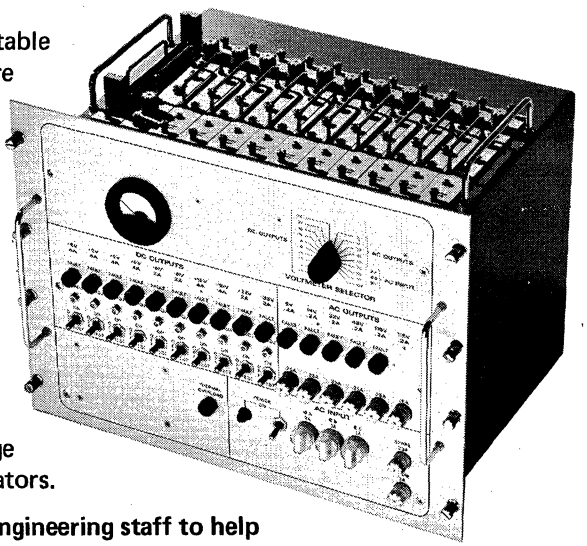
PRICING ON STANDARD STOCK ITEMS	
BASIC UNIT	WITH OVP
$179.50	$194.50

SPECIFICATIONS

INPUT: 115 VAC ± 10%, 47 - 440 Hz.
OUTPUT: See Chart. Voltage adjustable ± 5%.
REGULATION: See chart. 50% load 10% line.
RIPPLE: See chart.
RESPONSE: 25 μsec typical 50% load change.
TEMPERATURE: Full load 0°C to + 55°C. Derate to zero at + 75°C. Forced air (15 CFM) full load to + 80°C.
T.C.: ± .0075%°C Max.
STABILITY: ± .075% for 8 hours after warmup.
RFI: Filters on input and output.
O.V. PROTECTION: Optional @ 120% ± 5%.
O.L. PROTECTION: Current limit foldback.

CUSTOM
POWER SUPPLIES
MODEL 8D 164 FULLY MILITARIZED
COMPUTER-CONTROLLED POWER SUPPLY

Model 8D164 is a CUSTOM design used in an air transportable shelter in the Air Force 407L Program. Semiconductors are per **MIL-S-19500,** other components in accordance with **ANA-400.** Full documentation has been produced in compliance with Air Force **375L** series data configuration controls; drawings per **MIL-D-1000, category E, Class 2;** technical manual per **MIL-T-9941;** maintainability analysis per **MIL-HDBK-472;** reliability calculations per **MIL-HDBK-217A.** Features include ten precision regulated DC supplies, 5 AC outputs, Each DC supply is a completely removable and repairable module with adjustable current compensation, and each has a computer programmed high speed output. Complete protection package includes OVP, reverse voltage protection, current limit, overtemperature and fault indicators.



Powertec has a capable experienced engineering staff to help solve your custom power supply problems.

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THE POWER HOUSE

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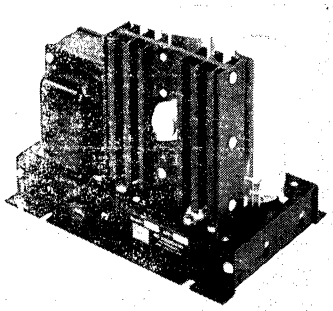
High Performance System Power Supplies for Digital I.C. Systems Series 600

FEATURES

- Excellent Transient Response
- Low Line and Load Regulation
- Adjustable Voltage
- Current Limit Short Circuit Protection
- High Speed Crow Bar Overvoltage Protection
- Convection Cooled



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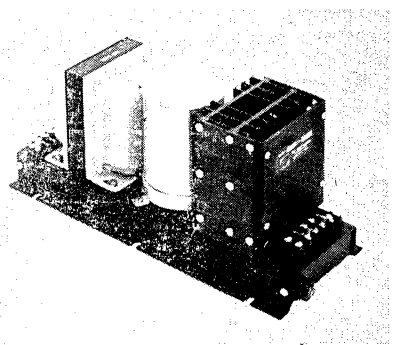

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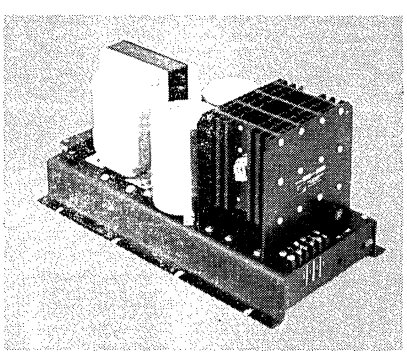

625

SPECIFICATIONS

DC Output

4.5 to 5.5 volts adj. 7 to 25 amps.

Input

105 to 125 VAC, 45 to 440 Hz

Regulation

±0.1% for ±10% change in input voltage less than 0.1% for zero to full load change

Ripple and Noise

Less than 1 mvpp

Transient response

125 mv for 30 μsec for change of half-load to full-load current or vice versa. 250 mv for 30 μsec for change of no-load to full-load current or vice versa.

Power Supply Protection

Current limited at 120% of rated load: short circuit proof

Cooling

By convection, no forced air required

Operating Temperature

—25° to +55°C, to +70°C at 80% current

Load Protection

Optional fast response crow bar, will not exceed trip point voltage for transients with rise times slower than 0.2 volt/μsec Will not exceed static trip point volts for more than 200 nanoseconds for step function over-voltage

Remote Sensing

Sensing terminals provided to enable specific regulation directly at load

Stability

Output voltage changes less than 0.05% over a 24 hour period after warm up

Temperature Coefficient

Output voltage changes less than 0.05%/°C over —25° to +55°C ambient

Output Impedance

See regulation and transient response specifications

Controls

Built in potentiometer adjusts output volage ±10% with resolution of 15 mv

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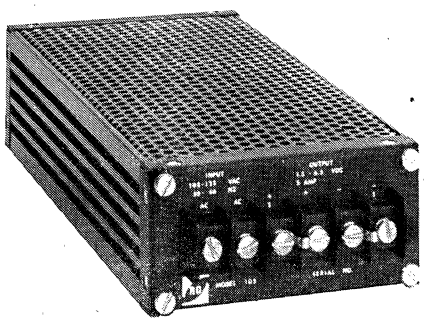
Model	Volts	Amps	Price	Crow Bar Option	Size
607	5±0.5	7.0	$125.00	$18	5" x 5.8" x 7.6"
612	5±0.5	12	139.00	18	5" x 5.8" x 13.2"
625	5±0.5	25	204.00	18	7.5" x 8" x 15"

Low Profile - Low Cost High Efficiency System Power Supplies Series 100



FEATURES

- Up to 5 Amps Out
- 1¾" Panel mount
- Short and Overload Proof
- Crow Bar Included
- Excellent Transient response
- Low Cost

DESCRIPTION

The RO series 100 combines high efficiency switching techniques to realize small size and high volume production techniques for low cost. The 100 series are high quality, high reliability units with excellent operating specifications. All of the quality features and specification of higher priced units are contained in this series. Form factor allows for mounting on a 1¾" or 3½" rack panels. No additional heat sinking is required to obtain full output.

COMMON SPECIFICATIONS

INPUT
105 to 125 VAC, 50 to 70 Hz

Power Supply Protection
Current limit provides continuous short circuit and overload protection

Load Protection
Crowbar: set at 7 ±0.2V on model 105; tracks 2.5 ±0.5V above output on model 106

Transient Response
No turn on or off overshoot
20 mv max. change for 40% load change in model 105, recovery in 20 microseconds
20 mv max. change for 50% load change in model 106, recovery in 20 microseconds

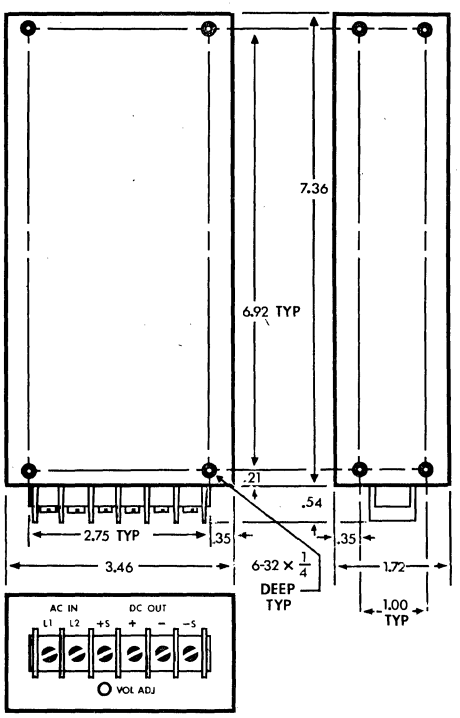
Temperature Stability
Better than .03% / °C

Remote Sensing
Remote sensing connection standard

Cooling
Max. mounting base temperature for full output is 75°C.
For no (air conduction) cooling, max. ambient temperature is 25°C for full output. Derate linearly to 60% of current @ 60°C and no cooling.

Operating Temperature
—20°C to +75°C (see above cooling spec.)

Weight
4½ lbs.



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Model	Volts	Current	Ripple P-P	Regulation		Price	
				±10% line	O-F.L.	1-24	25 up
105	1.5 to 6 VDC adj.	5A	<5mv	<±1mv	<12mv	$79.00	$77.00
106	6 to 30 VDC adj.	1.5A	<6mv	<±2mv	< 8mv	99.00	89.00

Miniature Power Converters

Digital I.C. and Analog Circuits

Series 200

COMMON SPECIFICATIONS

Input
105 to 130 VAC. 50 to 1000 Hz or 160 VDC ±10%

Protection
All outputs current limited, continuous overload and short circuit proof. 5 volts outputs have self recovering overvoltage protection set at 6.8 to 7 volts.

Temperature Stability
Better than 0.01%/°C

Cooling
Maximum mounting base temperature for full output is 85°C. For no (air or conductive) cooling, max. ambient temperature of 30°C for full output. Derate linearly to 60% power at 60°C ambient and no cooling.

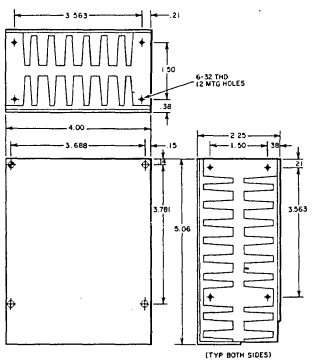
Operating Temperature
—20°C to +85°C

Weight
Approx. 2.5 pounds

Remote Sensing
On most outputs.

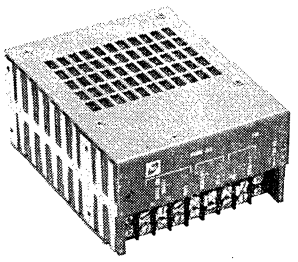
Mounting
Mounting available on 3 sides by 4, #6-32 tapped inserts

Size
5 1/16"x4"x2 1/4", 45 cubic inches



FEATURES

- 55 Watts in 45 Cubic Inches
- 5 1/16" x 4" x 2 1/4", weighs 2.5 lbs.
- Multiple Outputs
- High Efficiency
- Fully Protected
- 20 KHz operation, no audible noise
- RFI Filtered
- 110VAC Input



Model	DC Out-Volts, DC	Amps	Regulation		Ripple & Noise	Price 1-99
			Load*	Line ±10%		
210	3.5 to 5.5 adj.	10A	0.1% or 5 mv	±0.1%	25 mv p-p	$225.00
211	(A) 4.5 to 5.5 adj. (B) 24	5A 1A	0.2% 0.2%	±0.1% ±0.05%	25 mv p-p 25 mv p-p	$265.00
213	(A) 4.5 to 5.5 adj. (B) ±15	5A 400 ma each side	0.2% 0.1%	±0.1% ±0.05%	25 mv p-p 20 mv p-p	$325.00
250	12 to 15 adj.	4A	0.2%	±0.05%	50 mv p-p	$245.00
251	24 to 28 adj.	2A	0.2%	±0.05%	50 mv p-p	$245.00

*LOAD REGULATION is from 0.5 A to F.L. on all 5 volt outputs, 0 to F.L. on all other outputs, from 0 to 0.5A on 5 volt output regulation is better than 1%.

Analog and Memory Applications

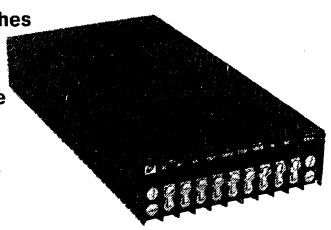
Model 301

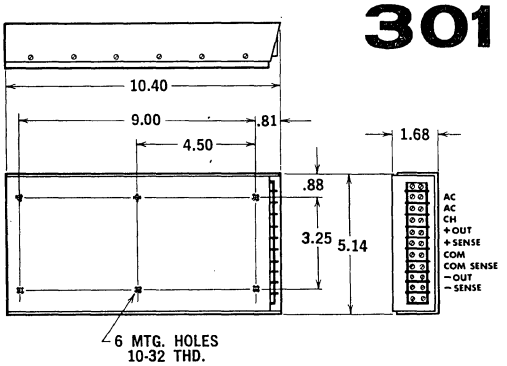
DESCRIPTION

The RO 300 series is designed specifically for analog and memory circuit application. In this single unit, there is a large choice of output voltages, dual and single, at full output power. This amazing flexibility is coupled with RO's high efficiency circuitry utilizing 20 KHz techniques, resulting in extremely small size. These units supplement the RO 200 series for digital applications.

FEATURES

- 90 watts in 94 cubic inches
- Dual Outputs
- High Efficiency Circuit
- Fast Transient Response
- Current Limited, Short Circuit Proof
- Multiple Output Choices
- Completely FRI Filtered
- 115 VAC Input





SPECIFICATIONS

DC Outputs
*A. ±12 to ±15 VDC @ 3A each side or B. 12 to 15 VDC @ 6A or C. 24 to 30 VDC @ 3A
*All outputs available by choice of connection. When using both plus and minus outputs at same time, any combination of 6 amps can be taken from both polarities.

Input
105 to 130 VAC, 50 to 1000 Hz (Also 115 to 170 VDC)

Efficiency
65% typical at ±15 VDC at ±3 amps output

Regulation
±0.01% for ±10% change in line 0.1% zero to full load, + and — tracking

Ripple and Noise
Less than 500 microvolts RMS Less than 10 millivolts peak to peak

Transient Response
For no load to full load switching, recovery is less than 20 microseconds, and peak excursions are less than 200 mv typical

Protection
Power supply is protected against continuous overload and short circuit conditions, by electronic current limit circuitry.

Temperature Stability
Better than .015%/°C

Cooling
Unit will provide full output with **no** (air or conductive) cooling up to an ambient of 30°C.
Full output is obtainable if base plate is maintained at 75°C.

Operating Temperature
—20° to +75°C (see above cooling spec.)

Size
5.26"x10.6"x1.69" (94 cubic inches)

Mounting
Mounting on 5"x10" surface with 6 threaded inserts, size 10-32

Weight
3 lbs.

Price $395.00

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CALIFORNIA 94025

New Low Cost Quality OEM Plug In Modules Series 500

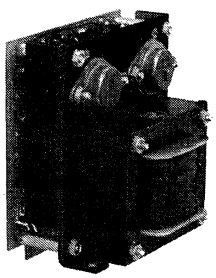
DESCRIPTION

These units contain high quality features such as

- All Teflon Lead Wire
- G-10 Board Material
- M-6 Magnetic Material
- Epoxy Impregnated Transformers
- Computer Grade Semi Conductors and Capacitors

FEATURES

- **Single & Dual Outputs**
- **Current Limit Protection**
- **Overvoltage on 5 Volt Units**
- **All System Voltages**
- **Adjust Pots Included**
- **Plug In Flexibility**



COMMON SPECIFICATIONS

Input

105-125 VAC, 50 to 400 Hz

Temperature

0 to 55°C; Derate to 70% Power @ 70°C

P.S. Protection

Current Limited, Short Circuit Proof

Load Protection

Crowbar Included for Model 517, Available on Models 518 and 519 for $8.00 additional

Controls

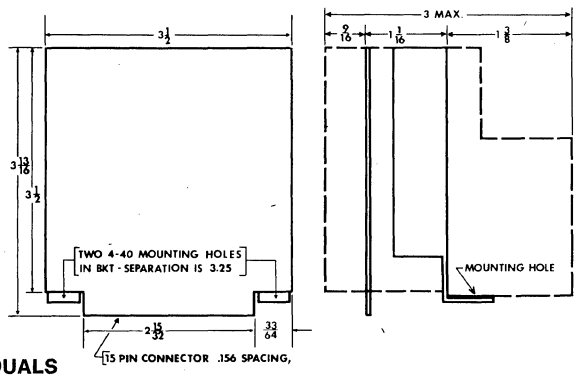
Voltage adjust pots included, duals have single adjust for both + and — output

Tracking

All duals are tracking units

Connector

Standard 15 pin, 0.156' spacing P.C. connector, single sided



DUALS

Model	Volts	Current	Ripple p-p	Regulation Line ±10%	Regulation Load 0 - FL	Stability % / °C & 24 hours	Wt. lbs.	Price
506	±12 to ±24	150 ma	< 2 mv	0.03%	0.15%	0.02%	2.0	$95.00
513	±21 to ±28	300 ma	<10 mv	0.1%	0.3%	0.03%	2.8	76.00
514	±12 to ±15	500 ma	< 1 mv	0.02%	0.02%	0.01%	2.8	89.00
515	±24	60 ma	<10 mv	0.2%	0.2%	0.2%	1.8	49.00

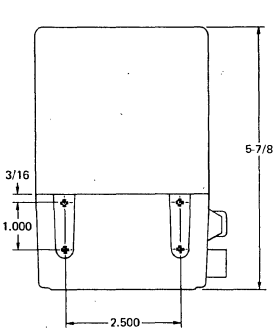
SINGLES

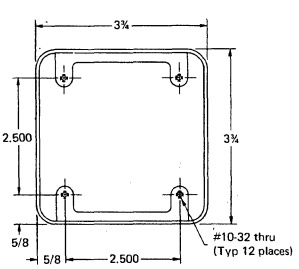
516	150-200 v adj.	40 ma	0.2v	0.5%	1.0%	0.05%	2.5	$85.00
517*	5±0.5	2.5 A	< 5 mv	0.03%	0.2%	0.03%	2.8	59.00
518	12 to 15	1.0 A	< 5 mv	0.02%	0.1%	0.03%	2.8	59.00
519	24 to 28	0.5 A	<10 mv	0.02%	0.2%	0.03%	2.8	59.00

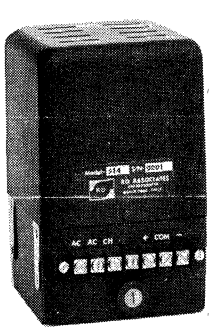
*Includes overvoltage crowbar

ORDER ABOVE UNITS 506 THROUGH 519 WITH CASE, ILLUSTRATED BELOW, $25.00 ADDITIONAL.

OPTIONAL MOUNTING AVAILABLE FOR ALL UNITS
Universal mounting, barrier strip output, input fuse included.







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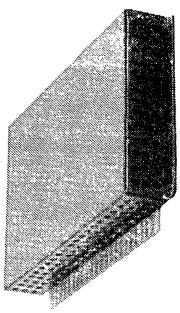
MENLO PARK
CALIFORNIA · 94025

Thin Line P.C. Card Power Supplies

"Smallest size for 7.5 Watt Output"

FEATURES

- Repairable
- 5 VDC to ±15 VDC
- Up to 1 amp.
- 0.65" Above P.C. Board
- Excellent Performance Specs
- Fully Protected
- Low Cost
- Adjustable Voltage Included
- Plug In Compatability With More Expensive Units



DESCRIPTION

The RO Associates P.C. series is designed for powering small systems with convenient plug in flexibility. The extremely low profile allows a minimum number of card slots to be sacrificed for a power supply. The small size is available due to utilization of advanced switching techniques. RFI is completely filtered out. Connector is standard 22 pin with 0.156" spacing.

COMMON SPECIFICATIONS

Input

105 to 125 VAC, 50Hz to 1KHz

Temperature Range

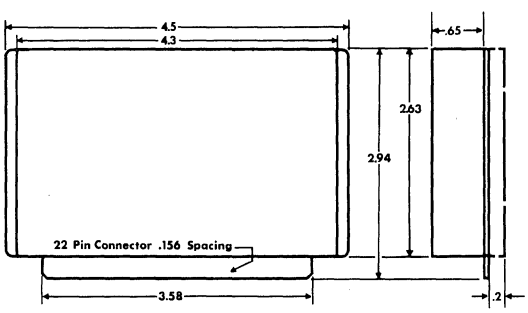
0 to 50°C, see cooling spec.

Cooling

Unit will provide full output with no cooling up to 40°C ambient, or case temperature maintained at 85°C Derate to 70% power @ 50°C ambient and no cooling

Temperature Coefficient

±0.03% / °C



Model	Volts	Current	Regulation		Ripple & Noise	Price 1-24
			±10% Line	O-F.L		
PCD-15-250	±15*	±250 ma	±.01%	0.03%	±.03%	$119.00
PC-5-1	5	1000 ma	±.01%	0.1%	±0.1%	99.00

* ±15 adj. to ±12 @ 200 ma

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MENLO PARK
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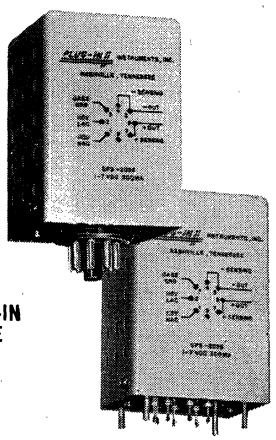
COMPARE...

Unequaled for low cost, accurate, dependable performance under widely varying load and environmental conditions, Plug-In Instruments' power supplies are ideally suited for all commercial, ground support and industrial applications where precise dc power is required for electronic equipment and instrument systems.

DESIGN FEATURES

- Adjustable Voltages: 1 to 28 vdc
- Current Ranges: 0 - 75 to 0 - 800 madc
- Excellent Regulation as Noted
- 0.1 ohm Output Impedance
- 105 to 125 vac 50 to 400 cps Power Required
- Transistorized — Repairable
- Electronic Overload Protection on Series "D" and "E"

REGULATED DC POWER SUPPLIES



PLUG-IN STYLE

SOLDER HEADER STYLE

- **SIZE A:** 2½" H x 1 7/16" W x 1 7/16" D
  All silicon design
- **SIZE B:** 3" H x 2" W x 2" D
  Germanium design
  Amb. temp.: 30 to 120 °F
- **SIZE D:** 3⅛" H x 2¼" W x 2⅛" D
  All silicon design
  Amb. temp.: 20 to 130°F
- **SIZE E:** 3 15/16" H x 2¼" W x 2⅛" D
  All silicon design
  Amb. temp.: 20 to 130°F

Model	DC Output Rating Volts	Curr. (ma)	Regulation Line	(mv dc) Load	Ripple (mv rms)	Temp. Coeff. (%/°F)	Size	Mounting	Price (1-9 Qty.)
PS-2077-P	9-13	0-50	3	6	1.5	0.02	A	Plug-In	$51.00
PS-2078-P	13-17	0-40	3	6	1.5	0.02	A	Plug-In	51.00
PS-2014-P	10	0-175	6	12	1	0.03	B	Plug-In	53.00
PS-2017-P	9	0-175	4	9	1	0.03	B	Plug-In	$53.00
PS-2010-P	12	0-175	6	12	1	0.03	B	Plug-In	53.00
PS-2018-P	15	0-125	6	12	1	0.03	B	Plug-In	53.00
PS-2019-P	18	0-100	7	14	1	0.025	B	Plug-In	53.00
PS-2047-P	20	0-100	6	12	1	0.025	B	Plug-In	53.00
PS-2020-P	22.5	0-90	4	12	1	0.025	B	Plug-In	53.00
PS-2011-P	24	0-90	5	12	1	0.025	B	Plug-In	53.00
PS-2021-P	28	0-80	6	14	1	0.025	B	Plug-In	53.00
NARROW ADJUSTMENT RANGE									
PS-2055-P PS-2055-S	1-6.5	0-300	15	5	1.5	0.03	D D	Plug-In Solder-Header	$70.50 72.50
PS-2056-P PS-2056-S	5-9	0-250	15	5	1.5	0.03	D D	Plug-In Solder-Header	70.50 72.50
PS-2057-P PS-2057-S	9-13	0-200	2	5	0.5	0.025	D D	Plug-In Solder-Header	63.50 65.50
PS-2058-P PS-2058-S	13-17	0-175	2	5	0.5	0.02	D D	Plug-In Solder-Header	63.50 65.50
PS-2052-P PS-2052-S	9-13	0-200	2	5	0.5	0.01	D D	Plug-In Solder-Header	76.00 77.00
PS-2062-P PS-2062-S	1-6.5	0-600 0-800	15	10	1.5	0.03	E E	Plug-In Solder-Header	75.00 77.00
PS-2072-P PS-2072-S	21-25	0-175 0-225	4	6	0.5	0.02	E E	Plug-In Solder-Header	71.00 72.00
WIDE ADJUSTMENT RANGE									
PS-2110-P PS-2110-S	10-20	0-200	15	15	1	0.02	E E	Plug-In Solder-Header	$72.00 73.00
PS-2111-P PS-2111-S	20-30	0-175	15	15	1	0.02	E E	Plug-In Solder-Heater	72.00 73.00
DUAL VOLTAGE OUTPUT									
PS-2073D-P PS-2073D-S	±12	0-75	3	6	1	0.025	D D	Plug-In Solder-Header	$86.50 87.50
PS-2074D-P PS-2074D-S	±15	0-65	5	6	1	0.02	D D	Plug-In Solder-Header	86.50 87.50
PS-2121-P PS-2121-S	±15	0-150	5	10	1.5	0.020	E E	Plug-In Solder-Header	106.00 108.00

WRITE TODAY FOR DETAILED INFORMATION ON OTHER MODELS OF DC POWER SUPPLIES

ROSEMOUNT PLUG-IN, INC.

MANUFACTURED BY

• P. O. BOX 107 • NASHVILLE, TENNESSEE 37210

A615/244-1330

TWX-810-371-1699

Prices and Specifications Subject to Change Without Notice.
TLX: 55-4349

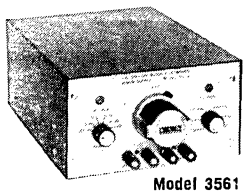
SRC MOXON

ISOLATED POWER SUPPLIES*

* Partial listing. SRC transducers and data generators are covered in other sections of this publication. Send for detailed literature on specific products.

MITEY-MITE—Ultra Compact Power Supplies

The Mitey-Mite series features all silicon solid-state circuitry, multi-shielded transformers, fiberglass panels and precise component layout that produces complete AC-DC isolation, low ripple, tight regulation and high stability . . . performance unequalled by any supply in its class.



Model 3561

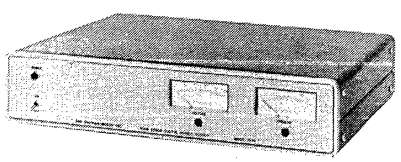
SPECIFICATIONS

Input Voltage: 105 to 125 VAC/60Hz (220 to 240 VAC/50 to 400Hz optional.
Output Impedance: Less than 0.02 ohms at DC.
DC Isolation: More than 10,000 megohms.
Temperature Range: 35 to 135°F.
Constant Current: Optional.
AC Isolation: Less than 0.1 pF typical, (when AC power switch is used, less than 6 pF).
Temperature Stability: Less than .005% per degree F (Model 3561 internal oven less than .002% per degree F).
Panel Voltage Control: 10 turn pot for excellent resolution. (Range switches: 3569, 0-15 and 15-30V; 3561, 0, 10, 20 and 40V). Power switching in 3591 and 7468 produces higher efficiency.

Model	Price	Title	Output	Output Current	Line and Load Reg.	Pk. to Pk. Ripple	Resolution	Metering	Time Stability After Warm-up	Constant Current or Short CKT Protect	Size	Weight
3564	$ 84	Mitey-Mite	0-25 VDC	200ma	0-005% or 700μV	75μV	±5mv	No	.01% Full Scale 8-hr.	Current Limiting to less than 300ma	1¾"H 3½"W 6¼"D	1¾ lbs.
3567B	$165	Mitey-Twin	0-25 VDC (each side)	200ma (each side)	0-005% or 700μV	75μV	±5mv	M Model Voltage	.01% Full Scale 8-hr.	Current Limiting to less than 300ma	4⅛"H 3½"W 6¼"D	4 lbs.
3567BM	$180	Mitey-Twin										
3569A	$129	Super-Mite	0-30 VDC	500ma	0.01% or 1.5mv	100μV	±5mv	M Model Voltage	.01% Full Scale 8-hr.	Current Limiting to less than 800ma	2½"H 4"W 7½"D	5 lbs.
3569AM	$144	Super-Mite										
3591	$275	Kilo-Mite	0-50 VDC	1 Ampere	0-005% or 1.5mv	100μV	±10mv	M Model Voltage	.01% Full Scale 8-hr.	Current Limiting to less than 1.5 amp	4"H 7"W 10¾"D	11 lbs.
7468	$595	Giant-Mite	0-50 VDC	5 Amperes	0.01% or 2mv	350μV	±10mv	Current and Voltage	.05% Full Scale 8-hr.	Constant Current Mode ADJ 0-5 amps	3½"H 19"W 12"D	30 lbs.
3561	$275	Digi-Mite	0-50 VDC	500ma	0.01% or 1mv	150μV	±1mv	3 decade Digital Pot	.002% Full Scale 24-hr.	Constant Current Mode ADJ 0-500ma	4D" 7"W 10¾"D	11 lbs.
3584	$298	—	0-20 VDC	0 to 2a	.02% or 2mv	500μV	±5mv	No	0.02% Full Scale 8-hr.	Current Limiting to less than 3 amp	Rack Mounts 4 per 5¼"	8 lbs.
3586	$345	—	0-10 VDC 10-20 VDC	0 to 3a	.01% or 1mv	100μV	±2.5mv	No	0.02% Full Scale 8-hr.	Current Limiting 10ma to 3a variable	Rack Mounts 4 per 5¼"	10 lbs.
3587	$525	—	15-25 VDC	0 to 5a	.01% or 1mv	100μV	±2.5mv	Current and Voltage	0.02% Full Scale 8-hr.	Current Limiting 0 to 5a variable	Rack Mounts 2 per 5¼"	24 lbs.

DIGITAL POWER SUPPLIES

The SRC Digital Power Supplies are completely isolated, highly stable, all solid-state sources for lab or system. They are supplied with either relay or solid-state switching to meet customer needs for high stability or high speed programming.



SPECIFICATIONS

Input Voltage: 105 to 125 VAC/60Hz (200 to 240 VAC/50 to 400Hz optional).
AC Isolation: 6 pF High-Speed Digital (less than .1 pF).
Remote Sensing: At rear terminals.
Calibration Controls: Zero and full scale.
Operating Temperature: 35 to 135°F.
Temperature Stability: Typically less than .001% per degree F.
Warm-up Time: 30 minutes.
Constant Current: 7467, 3532 and 3533 standard. Contact factory on other models.

HIGH SPEED DIGITAL POWER SUPPLIES — Remote Programming, BCD or Binary TTL Logic Levels. Front Panel Controls optional.

Model	Price	Output Voltage	Output Current	10% Line or NL/FL Load Reg.	Pk. to Pk. Ripple	30 day Stability	Readout Accuracy	Resolution	Repeatability	Setability	Front Panel Controls	Remote Programming	Short CKT Protect	Constant Current	Size	Weight
3530	$1495	−10, +10 −50, +50	0 to 1a	.005% or 1.5mv	1mv	0.05% FS	±LSB	*1mv 5mv	—	14 Bit DAC	Optional	Binary 14 bit with sign	Less than 1.6a	Option.	3½"Hx19"W 14"D	28 lbs.
3532	$2540	−1, +1 −10, +10 −100, +100	0 to 0.01a 0 to 0.1a 0 to 1a	.005% or 250μV	.5mv	.05% 8-hr.	0.1% ±.025 range	1mv 10mv 100mv	—	10 Bit DAC	Optional	Binary 10 bit plus sign	Yes	Binary 10 bit Program	5"Hx19"W 14"D	28 lbs.
3533	$2540	−.1, +.1 −1, +1 −10, +10	0 to .1a 0 to 1a 0 to 10a	.005% or 250μV	.5mv	.05% 8-hr.	0.1% ±.025 range	.1mv 1mv 10mv	—	10 Bit DAC	Optional	Binary 10 bit plus sign	Yes	Binary 10 bit Program	3½"Hx19"W 14"D	28 lbs.

*Resolution and corresponding full scale output must be specified on P.O.

DIGITAL POWER SUPPLIES — Front Panel and Remote Resistance Programming.

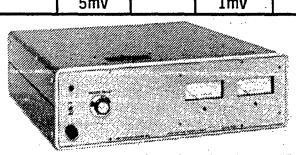
3512	$ 995	0-100 VDC	100ma	.005% or 500μV	50μV	.005%	.01% or 1mv	1mv	.005% or 150μV	5 Decade	5 Decade Switches	Resistance 500 ohm/V	Current Limiting	No	3½"Hx19"W 11½"	15 lbs.
3514	$ 995	0-10 VDC	100ma	.005% or 500μV	50μV	.005%	.01% or 100μV	100μV	.005% or 150μV	5 Decade	5 Decade Switches	Resistance 500 ohm/V	Current Limiting	No	3½"Hx19"W 11½"	15 lbs.
3522	$ 995	0-100 VDC	500ma	.01% or 1mv	100μV	.01%	.01% or 1mv	1mv	.005% or 150μV	5 Decade	5 Decade Switches	Resistance 500 ohm/V	Current Limiting	No	3½"Hx19"W 11½"	15 lbs.

COMPUTER CONTROLLED SIGNAL SOURCES — Remote or Front Relay Programming, BCD or Binary

3516	$1395	0-10 VDC	100ma	.005% or 500μV	50μV	.005%	.01% or 100μV	100μV	.005% or 150μV	5 Decade	5 Decade Switches	BCD (1-2-4-8)	Current Limiting	No	3½"Hx19"W 11½"	15 lbs.
3517	$1395	0-100 VDC	100ma	.005% or 500μV	50μV	.005%	.01% or 1mv	1mv	.005% or 150μV	5 Decade	5 Decade Switches	BCD (1-2-4-8)	Current Limiting	No	3½"Hx19"W 11½"	15 lbs.
3525	$1595	0-300 VDC	500ma	.01% or 1mv	100μV	.01%	.01% or 1mv	10mv	.005% or 150μV	5 Decade	None	BCD (1-2-4-8)	Current Limiting	No	5¼"Hx19"W 20"D	20 lbs.
7467	$1495	0-50 VDC	5ma	.01% or 3mv	500μV	.01%	.1% or 5mv	100mv	.01% or 1mv	3 Decade	3 Decade Switches	BCD (1-2-4-8)	Constant Curr. Adj.	Yes	5¼"Hx19"W 20"D	20 lbs.

HIGH VOLTAGE POWER SUPPLIES

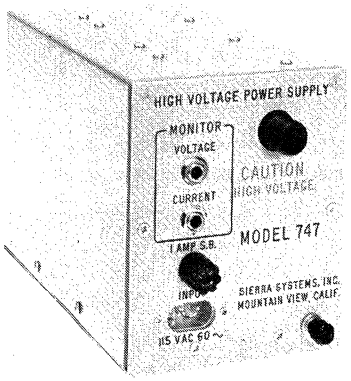
- All solid-state
- Small size
- Lightweight
- Rack or bench mount
- High average efficiency of 85%



Model	Price	Output Voltage	Output Current	Line or Load Reg.	Pk. to Pk. Ripple	30 Day Stability	Readout Accuracy	Resolution	Setability	Front Panel Controls	Short CKT Protect	Operating Temp.	Size	Weight
9001	$ 850	0 to 5kv	0 to 100ma	.01%	.01%	5V	5%	1%	1%	Meters for Volt. & Curr.	Current Ltd. and Fused	35 to 135°F	3½" Panel Full Rack	25 lbs.
9006	$ 920	0 to 25kv	0 to 2ma	.5%	.01%	25V	5%	1%	1%	Meters for Volt. & Curr.	Current Ltd. and Fused	35 to 135°F	5" Panel Full Rack	15 lbs.

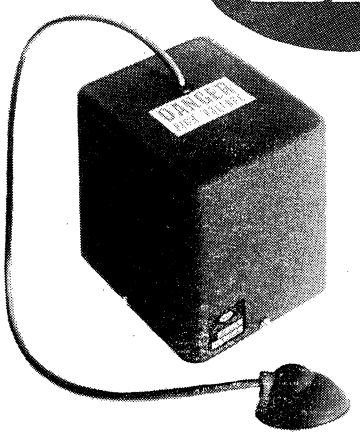
C. R. T. Power Supplies

DC-DC Converters



Model HV-747

Input:	115 V.A.C.
Output:	
Voltage:	20 KV — 30 KV
Current:	125 μa
Regulation:	.001%
Ripple:	100 mv pk-pk
Stability:	.01%/24 hours
Temperature Coefficient:	25PPM/°C



Model HV-725

Input:	+28 volts
*Output #1:	12,000 volts @ 250 μa. Ripple and Regulation: 0.1%
*Output #2:	+400 volts @ 1 ma. Ripple:: 0.1% Regulation: 5%
*Output #3:	−100 volts @ 1 ma. Ripple: 0.1% Regulation: 5%
Price:	$149.00 (in small quantities)

*Available: 2 KV — 20 KV
50 V — 600 V

Sierra Systems, Inc. specializes in the production of high voltage power supply systems for critical cathode ray tube and similar applications. These units are constructed with all silicon diodes and transistors for reliable operation and include such features as current limiting and short circuit protection. Custom requirements are processed with the speed and at the price of off-the-shelf items while requirements such as miniature high voltage power supplies and units designed for military specifications are also met. Sierra Systems, Inc. has the in-house capability to produce thick film integrated circuits . . . a process which permits quick and economical response to unusual packaging requirements and large volume orders. Contact S.S.I. the next time you need a high voltage power supply.

Also leading manufacturer of other types of High Voltage Power Supplies, Modules and Systems.

Sierra Systems, Inc.

2255 Old Middlefield Way, Mountain View, Calif. 94040
Telephone (415) 969-3056

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HIGH-VOLTAGE ELECTRONICS CORPORATION

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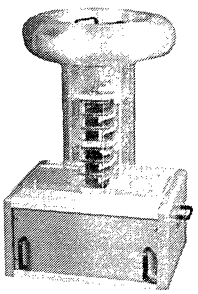
1930 ADEE AVENUE, BRONX, NEW YORK 10469 (212) 671-0300

HIGH VOLTAGE D.C. POWER SUPPLIES — RHR/UHR SERIES

RHR10P100



RHR150P150

FEATURES:

- All Silicon, Solid State Design
- 0.01% Regulation / 0.02% Ripple
- Wide Dynamic Range
- Overload and Short Circuit Proof
- Small Size / Lightweight
- Economical Pricing
- Three Year Warranty

APPLICATIONS:

- CRT Displays
- Capacitor Charging
- Electron Microscopes
- Ionization Chambers
- Electrostatic Flocking and Spraying
- Insulation Fault Detection
- Corona Testing

The RHR Series features a highly regulated DC output in ratings from 0 to 400 KV and up to 150 watts.

The UHR Series features moderate regulation in the same ratings. All power supplies employ high frequency oscillator circuitry with Spellman's exclusive low stored energy feature that ensures safe and trouble free operation.

SPECIFICATIONS:

RHR SERIES

Output Voltage: Continuously adjustable over entire range from zero to rated voltage by means of ten-turn potentiometer. Resolution better than 250 ppm. Finer resolution available on special order.

Input Voltage: 105-125 Volts AC, 55-65 Hz, single phase. Other inputs available on request.

Regulation: Load: 0.01% +1V, for full load change.
Line: ±0.01% ±1V, for ±10% change.

Ripple: 0.02% +2 volts, RMS.

Polarity: Positive, Negative, and Reversible with respect to ground available.

Stability: 0.02% +2 volts per hour, 0.05% +5 volts per eight hours.

Temperature Coefficient (Per °C): 0.02% +2 volts.

Temperature Range: Operating: −20°C to +55°C
Storage: −40°C to +85°C

Overload Protection: All units are overload and short circuit protected by means of fast acting trip out. Optional current limit available. Surge limiting resistors included.

AC Power Input Protection: Control Fuse.

Controls: AC ON Toggle Switch. AC ON Indicator. Output Adjust — Ten-turn potentiometer with locking calibrated dial.

Metering: Single range voltmeter, 2% accuracy, Single range ammeter, 2% accuracy.

Physical Characteristics: All units in this series up to 100 KVDC output are designed for rack mounting. Panels are 19″ wide with standard notching. Units are fully enclosed for desk or table top operation. Optional bench mounting cabinet available. High voltage sections of higher voltage units are contained in a plexiglas tubular enclosure mounted on a base cabinet. The high voltage electrode is located at the top of the structure.

UHR SERIES

All specifications are the same as for the RHR series except for the following:

Regulation: ±1% of rated voltage for line or load change.

Ripple: 0.1% RMS of rated voltage.

Stability & Temperature Coefficient (Per °C): 0.2% of rated voltage.

VOLTAGE CONTROL

SINGLE TURN POTENTIOMETER

STANDARD OPTIONS AVAILABLE:

- Current Limiting (at rated current) $25 (Specify CL when ordering)
- Remote Resistance Programming $25 (Specify RC when ordering)
- Remote Voltage Programming $25 (Specify RVC when ordering)
- Bench Cabinet $75 (Specify C when ordering)
- 220 Volt Input (50-60 Hz) $50 (Specify/220 when ordering)
- Focus Tap (on 30KV & 40KV units only) $75 (Specify PF when ordering)

SPECIAL OPTIONS

(Contact Factory Before Ordering):

- Current Regulation
- BCD Digital Remote Programming
- Floating Outputs
- Dual Tracking Outputs
- Multiple Outputs
- Test Monitor Terminals
- Remote Control Panels
- Automatic Polarity Switching

Max. Ratings KV	MA.	Watts	RHR Series		UHR Series		Size - Inch. H x W x D	Wt. - Lbs. Net	Ship.
5	2	10	RHR-5P10	$400	UHR-5P10	$325			
			RHR-5N10	400	UHR-5N10	325			
5	6	30	RHR-5P30	425	UHR-5P30	350			
			RHR-5N30	425	UHR-5N30	350			
			RHR-5PN30	475	UHR-5PN30	400			
5	10	50	RHR-5P50	475	UHR-5P50	400			
			RHR-5N50	475	UHR-5N50	400			
			RHR-5PN50	525	UHR-5PN50	450			
10	1	10	RHR-10P10	470	UHR-10P10	345			
			RHR-10N10	470	UHR-10N10	345			
10	3	30	RHR-10P30	495	UHR-10P30	370			
			RHR-10N30	495	UHR-10N30	370			
			RHR-10PN30	575	UHR-10PN30	420			
10	6	60	RHR-10P60	535	UHR-10P60	400			
			RHR-10N60	535	UHR-10N60	400			
			RHR-10PN60	625	UHR-10PN60	450			
10	10	100	RHR-10P100	575	UHR-10P100	430			
			RHR-10N100	575	UHR-10N100	430			
			RHR-10PN100	675	UHR-10PN100	480			
15	0.67	10	RHR-15P10	615	UHR-15P10	355	5¼x14x16½	25	33
			RHR-15N10	615	UHR-15N10	355			
15	2	30	RHR-15P30	650	UHR-15P30	390			
			RHR-15N30	650	UHR-15N30	390			
			RHR-15PN30	750	HR-15PN30	440			
15	4	60	RHR-15P60	705	UHR-15P60	430			
			RHR-15N60	705	UHR-15N60	430			
			RHR-15PN60	805	UHR-15PN60	480			
15	8	120	RHR-15P120	755	UHR-15P120	470			
			RHR-15N120	755	UHR-15N120	470			
			RHR-15PN120	855	UHR-15PN120	520			
20	0.50	10	RHR-20P10	670	UHR-20P10	380			
			RHR-20N10	670	UHR-20N10	380			
20	1.5	30	RHR-20P30	720	UHR-20P30	410			
			RHR-20N30	720	UHR-20N30	410			
			RHR-20PN30	820	UHR-20PN30	460			
20	3	60	RHR-20P60	770	UHR-20P60	450			
			RHR-20N60	770	UHR-20N60	450			
			RHR-20PN60	870	UHR-20PN60	500			
20	6	120	RHR-20P120	825	UHR-20P120	490			
			RHR-20N120	825	UHR-20N120	490			
			RHR-20PN120	925	UHR-20PN120	540			

Max. Ratings KV	MA.	Watts	RHR Series		UHR Series		Size - Inch. H x W x D	Wt. - Lbs. Net	Ship.
30	0.33	10	RHR-30P10	$730	UHR-30P10	$380			
			RHR-30N10	730	UHR-30N10	380			
30	1	30	RHR-30P30	790	UHR-30P30	430			
			RHR-30N30	790	UHR-30N30	430			
			RHR-30PN30	890	UHR-30PN30	480			
			RHR-30PF30	865	—	—			
30	2	60	RHR-30P60	840	UHR-30P60	470	5¼x14x16½	25	33
			RHR-30N60	840	UHR-30N60	470			
			RHR-30PN60	940	UHR-30PN60	520			
			RHR-30PF60	915	—	—			
30	4	120	RHR-30P120	895	UHR-30P120	510			
			RHR-30N120	895	UHR-30N120	510			
			RHR-30PN120	995	UHR-30PN120	560			
			RHR-30PF120	970	—	—			
40	0.75	30	RHR-40P30	920	UHR-40P30	580			
			RHR-40N30	920	UHR-40N30	580			
			RHR-40PN30	1070	UHR-40PN30	630			
			RHR-40PF30	995	—	—			
40	1.5	60	RHR-40P60	980	UHR-40P60	620			
			RHR-40N60	980	UHR-40N60	620	8¾x19x16½	30	50
			RHR-40PN60	1130	UHR-40PN60	670			
			RHR-40PF60	1055	—	—			
40	3	120	RHR-40P120	1065	UHR-40P120	660			
			RHR-40N120	1065	UHR-40N120	660			
			RHR-40PN120	1215	UHR-40PN120	710			
			RHR-40PF120	1140	—	—			
60	0.50	30	RHR-60P30	1380	UHR-60P30	790			
			RHR-60N30	1380	UHR-60N30	790			
			RHR-60PN30	1630	UHR-60PN30	880			
60	1	60	RHR-60P60	1500	UHR-60P60	850			
			RHR-60N60	1500	UHR-60N60	850	12¼x19x16½	35	75
			RHR-60PN60	1750	UHR-60PN60	940			
60	2	120	RHR-60P120	1620	UHR-60P120	910			
			RHR-60N120	1620	UHR-60N120	910			
			RHR-60PN120	1870	UHR-60PN120	1000			
100	1	100	RHR-100P100	2250	UHR-100P100	1200			
			RHR-100N100	2250	UHR-100N100	1200	17½x19x16½	40	100
			RHR-100PN100	2750	UHR-100PN100	1750			
150	1	150	RHR-150P150	3250	UHR-150P150	1800			
			RHR-150N150	3250	UHR-150N150	1800	34x22x18	125	300
300	0.5	150	RHR-300P150	4200	UHR-300P150	2850			
			RHR-300N150	4200	UHR-300N150	2850	48x22x18	175	350
400	0.25	100	RHR-400P100	4750	UHR-400P100	3600			
			RHR-400N100	4750	UHR-400N100	3600	60x22x18	210	375

NOTES: 1. Output polarity indicated by P (Positive), N (Negative), PN (Reversible). 2. PF indicates Focus Option on 30KV and 40KV units.

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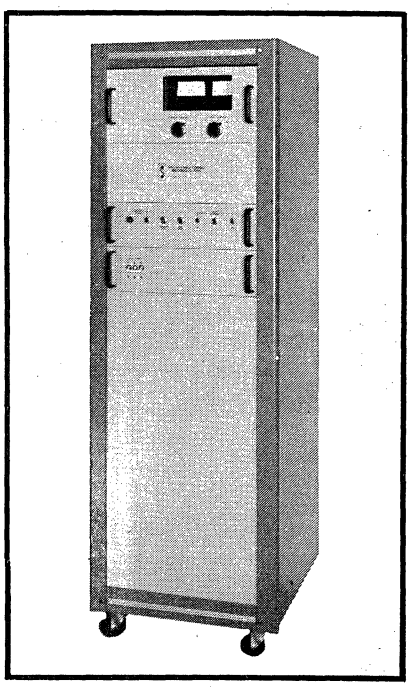
SERIES REGULATED POWER SUPPLIES

HP SERIES



APPLICATIONS:

- Gas Lasers • Capacitor Chargers
- Sputtering Supplies • Modulators
- General Laboratory Power Supplies

FEATURES:

- Voltage and current regulation with automatic crossover
- 100 microsecond recovery to line and load transients
- Voltage regulation better than 0.002%. Ripple better than 0.01%.
- Reversible polarity (most models)

Typical of this line is Model HP20PN-200SR, designed specifically as a gas laser power supply. The automatic regulating system permits the arc breakdown to occur at maximum open circuit voltage, followed by immediate current limiting action at any desired level. The unit features a high speed electronic series regulation system which provides fast transient response for line and load variations.

SPECIFICATIONS:

OUTPUT VOLTAGE—OUTPUT CURRENT: Continuously adjustable over the entire range from zero to rated voltage/current by means of separate ten-turn potentiometers. Resolution is better than 250 ppm. Finer resolution available on special order.

REGULATION: All models provide both voltage and current regulation with automatic crossover in accordance with the following characteristics.

Voltage Mode: Load: 0.002%, for full load changes. Line: 0.01%, for 10% line change. Specification holds down to 10% of rated output voltage.

Current Mode: Load: 0.01% + 1 microampere, for 10% load change (i.e., 10% voltage compliance variation); 100 microamperes, maximum, for full load (full voltage compliance) change. Line: 0.01% + 1 microampere, for 10% line change.

TRANSIENT RESPONSE: Voltage Mode: Less than 100 microseconds to recover to within 1% of maximum voltage level for 100% load step change, or 5% line voltage step change. Current Mode: Less than 100 microseconds to recover to within 1% of maximum current level for 10% load (voltage compliance) step change, or 5% line voltage step change. (Consult factory for response time to greater changes).

RIPPLE: Voltage Mode: 0.01% + 100 millivolts, peak to peak. Current Mode: 100 microamperes, peak to peak.

INPUT VOLTAGE: 105-125 Volts, 55-65 Hz, single phase or 200-240 Volts line-to-line, 55-65 Hz, three phase, four wire, for "nominal" 115 Volts and 220 Volts listed in rating chart. Other voltages and frequencies available on request.

POLARITY: Reversible on all models up to 20 KVDC. Negative on all models above 20 KVDC. Positive polarity on higher voltage models available on special order only.

STABILITY: Voltage: 0.01% + 100 millivolts per hour, 0.025% + 250 millivolts per 8 hours. Current: Less than 100 microamperes, 8 hours.

TEMPERATURE COEFFICIENT: Voltage: 0.01%/°C. Current: 0.1%/°C.

TEMPERATURE RANGE: Operating: −20°C to +55°C. Storage: −40°C to +85°C.

METERS: Single range voltmeter, 2% accuracy. Single range ammeter, 2% accuracy.

CONTROLS: Main Circuit Breaker. AC ON indicator. Interlock Open indicator. High Voltage ON pushbutton. High Voltage ON indicator. High Voltage OFF pushbutton.

PROTECTION: Units up to 30 KVDC output are inherently protected by the automatic crossover regulating system. Thus, output voltage and output current must remain within ratings, and automatically limit at the preset levels for any extraordinary load condition. All power supplies are overload and short-circuit proof. Units are self-restoring when abnormal load condition is removed on all models up to 30 KVDC. Surge limiting resistors included. Circuit Breaker and control fuse included. Provision is made for external interlock.

Model No.	Voltage Range (Kilovolts)	Current Range (Milliamperes)	Nominal Input Voltage (Volts RMS)	Input Phases	Line Current (Amps)	Size W" x D" x H"	Weight (Lbs.)
HP2.5PN250SR	0-2.5	0-250	115	1	10	22 x 24 x 50	210
HP2.5PN500SR	0-2.5	0-500	115	1	20	22 x 24 x 50	290
HP5PN100SR	0-5	0-100	115	1	10	22 x 24 x 50	220
HP5PN250SR	0-5	0-250	115	1	20	22 x 24 x 50	305
HP5PN500SR	0-5	0-500	220	3	10	22 x 24 x 72	370
HP10PN50SR	0-10	0-50	115	1	10	22 x 24 x 50	225
HP10PN100SR	0-10	0-100	115	1	20	22 x 24 x 50	310
HP10PN250SR	0-10	0-250	220	3	10	22 x 24 x 72	370
HP10PN500SR	0-10	0-500	220	3	20	22 x 24 x 72	380
HP20PN25SR	0-20	0-25	115	1	10	22 x 24 x 50	295
HP20PN50SR	0-20	0-50	115	1	20	22 x 24 x 50	335
HP20PN100SR	0-20	0-100	220	3	10	22 x 24 x 72	375
HP20PN200SR	0-20	0-200	220	3	20	22 x 24 x 72	390
HP30N25SR	0-30	0-25	115	1	15	22 x 24 x 50	325
HP30N50SR	0-30	0-50	115	1	25	22 x 24 x 72	340
HP30N100SR	0-30	0-100	220	3	15	22 x 24 x 72	390
HP50N10SR	0-50	0-10	115	1	10	30 x 40 x 30	500*
HP50N25SR	0-50	0-25	115	1	20	30 x 45 x 30	500*
HP50N40SR	0-50	0-40	115	1	30	30 x 50 x 35	750*
HP100N10SR	0-100	0-10	115	1	20	30 x 45 x 35	750*
HP100N20SR	0-100	0-20	115	1	30	34 x 50 x 35	1000*
HP150N10SR	0-150	0-10	115	1	25	34 x 45 x 40	1000*
HP200N10SR	0-200	0-10	115	1	30	36 x 55 x 45	1250*

* Shipping weight. Oil insulation required on these models. Oil not included in shipment or in price.

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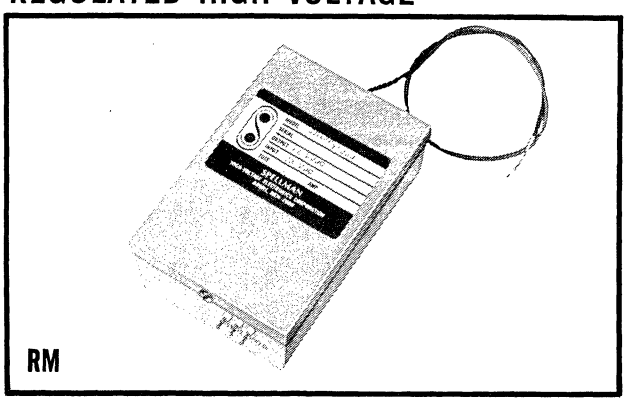
MINIATURE D.C. POWER SUPPLIES

REGULATED HIGH VOLTAGE

RM SERIES



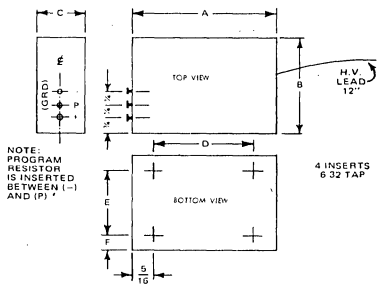
RM

FEATURES:

- Low Ripple
- Fully Enclosed Shielded Metal Case
- All Solid State
- Encapsulated for Full Environmental Protection
- Excellent Regulation

APPLICATIONS:

- Cathode Ray Tubes
- Photomultipliers
- Image Intensifiers
- Electron Beam Systems
- Scintillation Counters
- Control Grid Bias



RATINGS TO 24 KV

Model	A	B	C	D	E	F
TO 18 KV	5	3¼	1½	4¼	2⅝	5/16
18-24 KV	6½	3½	2	4¼	2⅝	7/16

Model Number*	Output Voltage (V)	Output Current (ua)	Model Number*	Output Voltage (V)	Output Current (ua)
RM-0.15P150D	120-150	1000	RM-2P1500D	1800-2000	750
RM-0.15N150D	120-150	1000	RM-2N1500D	1800-2000	750
RM-0.18P180D	150-180	1000	RM-2.4P1500D	2000-2400	500
RM-0.18N180D	150-180	1000	RM-2.4N1500D	2000-2400	500
RM-0.20P200D	180-200	1000	RM-3P1500D	2500-3000	500
RM-0.20N200D	180-200	1000	RM-3N1500D	2500-3000	500
RM-0.24P240D	200-240	1000	RM-4P1500D	3000-4000	300
RM-0.24N240D	200-240	1000	RM-4N1500D	3000-4000	300
RM-0.30P300D	260-300	1000	RM-5P1500D	4000-5000	250
RM-0.30N300D	260-300	1000	RM-5N1500D	4000-5000	250
RM-0.40P400D	300-400	1000	RM-6P1500D	5000-6000	250
RM-0.40N400D	300-400	1000	RM-6N1500D	5000-6000	250
RM-0.50P500D	400-500	1000	RM-8P1500D	6000-8000	150
RM-0.50N500D	400-500	1000	RM-8N1500D	6000-8000	150
RM-0.60P600D	500-600	1000	RM-10P1500D	8000-10,000	150
RM-0.60N600D	500-600	1000	RM-10N1500D	8000-10,000	150
RM-0.80P800D	600-800	1000	RM-12P1200D	10,000-12,000	100
RM-0.80N800D	600-800	1000	RM-12N1200D	10,000-12,000	100
RM-1P1000D	800-1000	1000	RM-15P1200D	12,000-15,000	75
RM-1N1000D	800-1000	1000	RM-15N1200D	12,000-15,000	75
RM-1.2P1200D	1000-1200	1000	RM-18P1200D	15,000-18,000	60
RM-1.2N1200D	1000-1200	1000	RM-18N1200D	15,000-18,000	60
RM-1.5P1500D	1200-1500	1000	RM-20P1200D	18,000-20,000	60
RM-1.5N1500D	1200-1500	1000	RM-20N1200D	18,000-20,000	60
RM-1.8P1500D	1500-1800	750	RM-24P1200D	20,000-24,000	50
RM-1.8N1500D	1500-1800	750	RM-24N1200D	20,000-24,000	50

*"P" in model number indicates positive polarity. "N" indicates negative polarity.

SPECIFICATIONS: RM, UM

Input: RM — For positive polarity supplies, input is +28 volts DC ±10%. For negative polarity supplies, the input is −28 volts DC ±10%.
UM — +24 VDC ±10% for rated maximum output voltage.

Regulation:
Line: RM — ±0.01% for ±10% input variations.
UM — Output voltage is approximately proportional to input voltage.
Load: RM — 1% for no load to full load variation.
UM — 15% for no load to full load variation.

Ripple: 0.1% RMS

Temperature Coefficient: 0.025% per degree Centigrade from 0° to 60° Centigrade.

Efficiency: RM — 40%; UM — 50%

Output Polarity: Available in positive or negative polarity with respect to ground (case). (Letter "P" or "N" in model number is used to designate positive or negative polarity respectively.)

Voltage Adjustment: RM — Resistance programming terminals are provided for adjustments over specified range.
UM — Output voltage is adjustable from near zero to rated voltage by adjustment of the DC input voltage. The output is approximately proportional to input voltage.

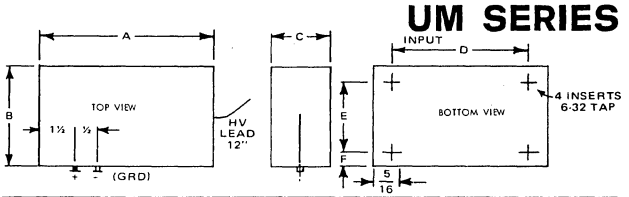
Protection: Unit is fully protected against all overload and short circuit conditions.

Mechanical Information: RM — See outline drawing for size. All units up to and including 18KV are 3¼" x 5" x 1½" H. The 20KV and 24KV units are 3½" x 6½" x 2" H. Terminals are provided for DC input, and programming. A 12" "flying" lead is provided for the high voltage output. The unit is encapsulated in a closed metal case with mounting inserts in the base on 2⅝" x 4¼" centers. Weight is 2 lbs.
UM — See outline drawing for size. All units up to and including 12KVDC are 2½" x 4⅜" x 1½" H. 18 KVDC units are 3¼" x 5" x 1½". 24KVDC units are 3½" x 6½" x 2". Terminals are provided for DC input and common. A 12" "flying" lead is provided for the high voltage output. The unit is encapsulated in a closed metal case with mounting inserts in the base on 1⅞" x 3⅝" centers. Weight is 1¾ lbs.

Service Conditions: 0-60° unless otherwise specified.

Circuit Concept: High frequency power oscillator circuit enables low ripple to be achieved with small, low stored energy capacitors, resulting in greater safety as well as better performance.

UM SERIES

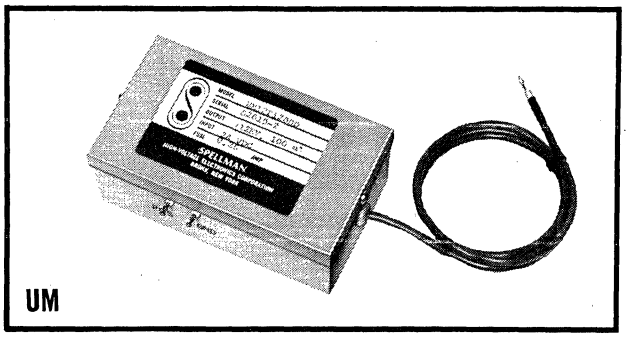


Size Code	Model	A	B	C	D	E	F
I	TO 12 KV	4⅜	2½	1½	3⅝	1⅞	5/16
II	18 KV	5	3¼	1½	4¼	2⅝	5/16
III	24 KV	6½	3½	2	4¼	2⅝	7/16

Model Number*	Output Voltage Range (Volts)	Output Current (Microamperes)	Size Code
UM-1.0P1000D	0-1000	1000	I
UM-1.0N1000D	0-1000	1000	I
UM-1.5P1500D	0-1500	1000	I
UM-1.5N1500D	0-1500	1000	I
UM-3P1500D	0-3000	500	I
UM-3N1500D	0-3000	500	I
UM-6P1500D	0-6000	250	I
UM-6N1500D	0-6000	250	I
UM-12P1200D	0-12,000	100	I
UM-12N1200D	0-12,000	100	I
UM-18P1200D	0-18,000	60	II
UM-18N1200D	0-18,000	60	II
UM-24P1200D	0-24,000	50	III
UM-24N1200D	0-24,000	50	III

*"P" in model number indicates positive polarity. "N" indicates negative polarity.

HIGH VOLTAGE ENCAPSULATED



UM

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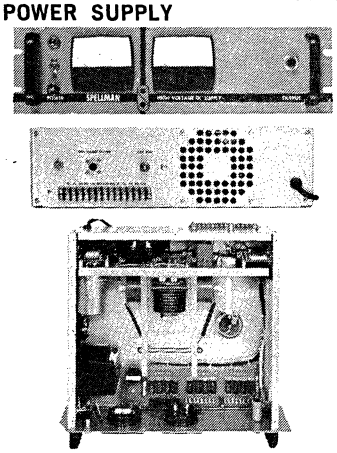
SPELLMAN SOLVED THE PROBLEM!

During the past three decades, Spellman High Voltage Electronics Corporation has solved many vexing problems in high voltage power supply technology presented by its customers. The experience gained in providing solid solutions to these problems has given Spellman engineers the capability of designing and producing DC power supplies in ratings from 0 to 400 KV and special designs up to 1 million volts, for applications in Industrial Electrostatic Processes, Test Instrumentation, Aerospace, Scientific Research, Computer Peripherals, and Education.

These are some of the many problems we have successfully and economically solved.

DIGITALLY PROGRAMMABLE 10KVDV POWER SUPPLY



PROBLEM:

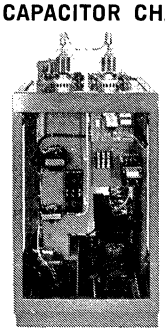
To design a highly regulated 10 KV power supply for component testing that can be computer controlled from a remote location.

SOLUTION:

The Model RHR10P100X241 features 0.02% line and load regulation with an output accuracy of 0.2% of rating. It is digitally programmable in 3 decades, BCD 1-2-4-8 to provide additive voltage outputs from 0 to 10,000 volts DC.

Spellman Solved the Problem!

REGULATED CAPACITOR CHARGER



PROBLEM:

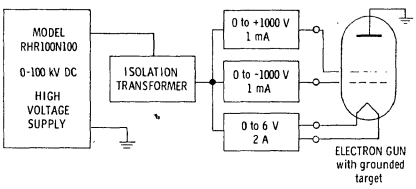
To design a precision regulated 3 KV power supply for use in a pulse welding system with a capability for capacitor bank charging.

SOLUTION:

The HP3PN1000SR DC Charger was designed to meet this need by producing a 3 KVDC output at 1 amp. It features a high speed recovery system, automatic charge and discharge, reversible polarity switching and is capable of 30 pulses per minute.

Spellman Solved the Problem!

MULTIPLE-OUTPUT, 100KV ISOLATED ELECTRON GUN POWER SUPPLY



PROBLEM:

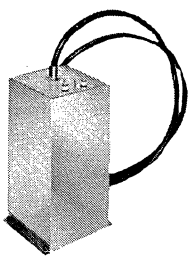
To design a multiple output high voltage power source for electron gun applications.

SOLUTION:

A standard, off-the-shelf RHR Series unit providing a 0 to 100 KVDC at 1 mA output was used as the basic power source in a 6-foot rack. Two additional floating outputs of 0 to +1000 VDC and 0 to −1000 VDC used as grid bias voltages were modified Spellman RM Series modules. A 0 to 6 VDC output at 2 amps for filament voltage was specially designed for this system. The floating outputs were all isolated for operation at 100 KVDC with respect to ground.

Spellman Solved the Problem!

ELECTRON MICROSCOPE 50KV POWER SUPPLY



PROBLEM:

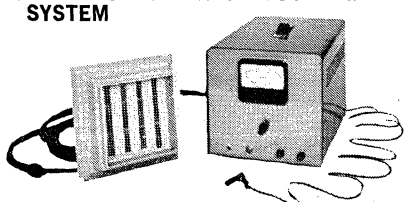
To design a high voltage, low current, compact power source for use with electron beam devices.

SOLUTION:

An all solid state, 24 VDC input oil filled unit was designed in a 4½ x 4½ x 9½ inch case, capable of 50 KVDC output at 200 μA using the current foldback method of short circuit protection complete with automatic recovery.

Spellman Solved the Problem!

60KV ELECTROSTATIC FLOCKING SYSTEM



PROBLEM:

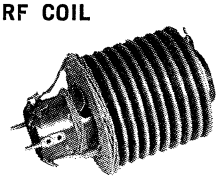
To design a compact; heavy duty, portable power unit for use in electrostatic processing, detearing, wall and object flocking, paint spraying, pinning, pinhole detection, and particle precipitation as well as general laboratory use.

SOLUTION:

The PF-60 (negative output, 50 μA) and ST-60 (positive output, 250 μA) 60 KVDC power units were developed with features such as resistance surge protection and remote control operation making it ideal for the required applications.

Spellman Solved the Problem!

10KV RF COIL



PROBLEM:

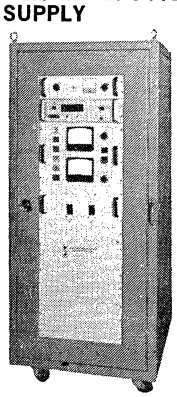
To create a high voltage step up coil for use in transistor drive circuits.

SOLUTION:

The Model TRF-10 was developed to be driven by a single transistor self-oscillator. It is capable of outputs up to 10 KVDC at 1 mA. Now an in-stock model, the TRF-10 is a 4¼" high 3" dia. coil and is available for immediate delivery.

Spellman Solved the Problem!

15KW REGULATED SPUTTERING POWER SUPPLY



PROBLEM:

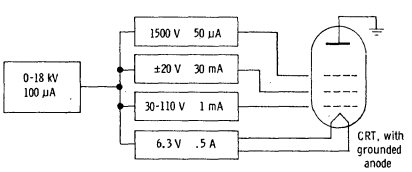
To design a highly sophisticated power system for use in the manufacture of hybrid integrated circuits.

SOLUTION:

Spellman engineers developed a 0.05% regulation, low ripple power system with variable output from 0 to 10 KVDC at 1.5 amps. This system features high speed transient recovery and protective overload circuits to ensure safe and trouble-free operation. For the sputtering application essential to IC manufacture, this power system operates in a constant voltage mode with overcurrent interruption and current limiting.

Spellman Solved the Problem!

MULTIPLE OUTPUT CRT POWER SUPPLY



PROBLEM:

To design a multiple output high voltage power supply for powering a CRT display in a facsimile system.

SOLUTION:

Using a unique packaging concept, Spellman engineers using the circuit configurations of its RM and UM Series modules, were able to achieve outputs of 18 KVDC at 100 μA, 1500 VDC at 50 μA, ±20 VDC at 30 mA, 30 VDC to 110 VDC at 1 mA and 6.3 VDC at 0.5 amps, all with good regulation and low ripple and isolated for 18 KVDC operation.

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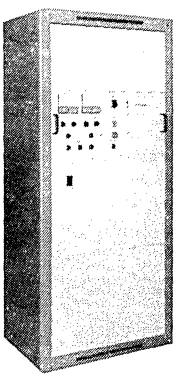
15KW REGULATED INSULATION AND CORONA TESTER



PROBLEM:

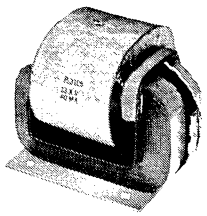
To design a fully protected 30 KVDC high power system for hi-pot, insulation and corona testing applications.

SOLUTION:

The Model HP30-500 was developed and features a continuously adjustable, regulated 0 to 30 KVDC output at 500 mA, with 440 VAC, 3 phase input. Housed in a fully enclosed rack, the HP30-500 is equipped with such safety and protective devices as overload and over-voltage protection, door interlocks, circuit breakers, zero start interlocks and surge protectors.

Spellman Solved the Problem!

13KV HIGH VOLTAGE TRANSFORMER



PROBLEM:

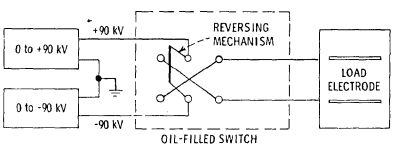
To design a rugged high voltage transformer for integration with many high power output devices.

SOLUTION:

The Model T-13 met this requirement with an output of 13 KVDC RMS at 40 mA. It can be used in air or oil in a single-ended or doubler circuit and measures 5½" H x 7" W x 5¼" D.

Spellman Solved the Problem!

180KV POWER SUPPLY WITH AUTOMATIC POLARITY REVERSIBILITY



PROBLEM:

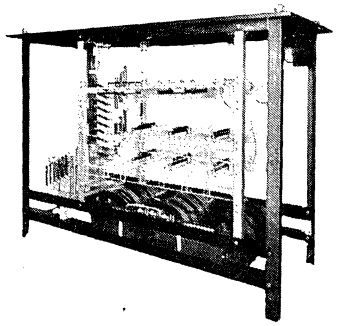
To design a high voltage power supply system capable of reversing its polarity for use in beam separation studies.

SOLUTION:

Spellman engineers met this challenge with two 0.01% regulated 90 KVDC power supplies and an oil-filled switch to reverse polarity on command, and withstand 180 KVDC potential. Each power supply was short circuit proof and equipped with current limiting to 100 μA.

Spellman Solved the Problem!

175KVDC, 30KW POWER SUPPLY



PROBLEM:

To design a very high voltage and high current source for use with beam devices.

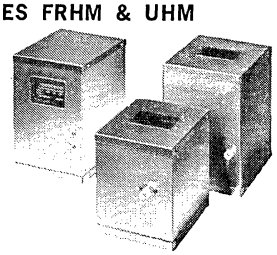
SOLUTION:

For this application, a 0 to 170 KVDC power supply was developed with a current capability to 175 mA and an internal capacitance necessary for pulse loading.

Spellman Solved the Problem!

MODULAR STYLE

SERIES FRHM & UHM



Modules are built into heavy-gage aluminum housings. Seven standard sizes are available.

OPTIONAL ITEMS:

Floating outputs, positive/negative dual outputs and special taps available on order. Other modules at higher voltages available on request. Modules with adjustable output available for both DC and AC input.

SIZE AND WEIGHT:

Model Type	Input	Rated KV	Output Watts	Dimensions W"	L"	H"	Net Wt.	Ship. Wt.
FRHM	DC	5, 10, 15, & 20	10	5½	7½	7½	4	12
		30		5½	10	9	5	13
FRHM UHM	DC	all	30	5½	10	9	5	13
FRHM	AC	5, 10, 15, & 20	10	5½	10	8	13	23
		30		5½	12	10	15	25
FRHM UHM	AC	all	30	5½	12	10	15	25
UHM	DC	5, 10 15, 20, 30	10	5 5¼	6 6¾	6 8¼	2 3	10 11
UHM	AC	5, 10 15, 20. 30	10	5 5¼	6 6¾	9 11¼	10 11	20 21

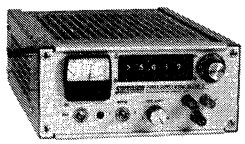
HIGH VOLTAGE POWER SUPPLIES

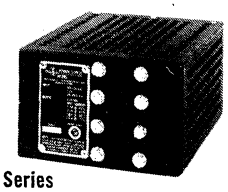
	FRHM — REGULATED FIXED OUTPUT		UHM — UNREGULATED INPUT — CONTROLLABLE	
	DC — Input 24-32V	AC — Input 105-125V	DC — Input 0-24V	AC — Input 0-115V
REGULATION No load to full load	0.01% or 1V	0.01% or 1V	20% of max. voltage	20% of max. voltage
Line from Min.-Max.	±0.01% or ±1V	±0.01% or ±1V	Not applicable	Not applicable
Ripple	0.02% RMS or 2V	0.02% RMS or 2V	0.1% of max. voltage	0.5% of max. voltage
Temperature Coefficient	0.01%/°C between 0°C and 60°C	0.01%/°C between 0°C and 60°C	0.2%/°C between 0°C and 60°C	0.2%/°C between 0°C and 60°C

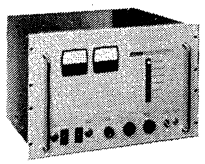
MAX. RATINGS KV	MA.	Watts								
5	2	10	FRHM-5P10D	$235	FRHM-5P10A	$285	UHM-5P10D	$ 75	UHM-5P10A	$110
			FRHM-5N10D	235	FRHM-5N10A	285	UHM-5N10D	75	UHM-5N10A	110
							UHM-5PN10D	95	UHM-5PN10A	130
5	6	30	FRHM-5P30D	335	FRHM-5P30A	385	UHM-5P30D	200	UHM-5P30A	235
			FRHM-5N30D	335	FRHM-5N30A	385	UHM-5N30D	200	UHM-5N30A	235
							UHM-5PN30D	220	UHM-5PN30A	255
10	1	10	FRHM-10P10D	260	FRHM-10P10A	310	UHM-10P10D	75	UHM-10P10A	110
			FRHM-10N10D	260	FRHM-10N10A	310	UHM-10N10D	75	UHM-10N10A	110
							UHM-10PN10D	95	UHM-10PN10A	130
10	3	30	FRHM-10P30D	400	FRHM-10P30A	450	UHM-10P30D	220	UHM-10P30A	255
			FRHM-10N30D	400	FRHM-10N30A	450	UHM-10N30D	220	UHM-10N30A	255
							UHM-10PN30D	240	UHM-10PN30A	275
15	0.67	10	FRHM-15P10D	435	FRHM-15P10A	485	UHM-15P10D	125	UHM-15P10A	160
			FRHM-15N10D	435	FRHM-15N10A	485	UHM-15N10D	125	UHM-15N10A	160
							UHM-15PN10D	145	UHM-15PN10A	180
10	2	30	FRHM-15P30D	505	FRHM-15P30A	555	UHM-15P30D	240	UHM-15P30A	275
			FRHM-15N30D	505	FRHM-15N30A	555	UHM-15N30D	240	UHM-15N30A	275
							UHM-15PN30D	260	UHM-15PN30A	295
20	0.50	10	FRHM-20P10D	435	FRHM-20P10A	485	UHM-20P10D	125	UHM-20P10A	160
			FRHM-20N10D	435	FRHM-20N10A	485	UHM-20N10D	125	UHM-20N10A	160
							UHM-20PN10D	145	UHM-20PN10A	180
20	1.5	30	FRHM-20P30D	570	FRHM-20P30A	620	UHM-20P30D	260	UHM-20P30A	295
			FRHM-20N30D	570	FRHM-20N30A	620	UHM-20N30D	260	UHM-20N30A	295
							UHM-20PN30D	280	UHM-20PN30A	315
30	0.33	10	FRHM-30P10D	480	FRHM-30P10A	535	UHM-30P10D	150	UHM-30P10A	185
			FRHM-30N10D	480	FRHM-30N10A	535	UHM-30N10D	150	UHM-30N10A	185
30	1	30	FRHM-30P30D	635	FRHM-30P30A	685	UHM-30P30D	280	UHM-30P30A	315
			FRHM-30N30D	635	FRHM-30N30A	685	UHM-30N30D	280	UHM-30N30A	315

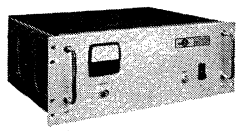
Sorensen POWER SUPPLIES

The Most Complete Selection Available from Stock


QHS Series


QSA Series


DCR-HV Series


ACR Series

DC POWER SUPPLIES — Regulated

QRD SERIES

General laboratory instruments featuring excellent voltage and current regulation, low noise and ripple, and high-speed programmability. Seven models from 30 to 90 watts, 15 to 60 volts, full range. Accessories include overvoltage protectors, rack adapters and calibrated ten-turn voltage and current controls.

QHS SERIES

Ultra-high stability power source with unique precision thumb-wheel voltage adjust switch. Three models: 20 watts; 20, 40, and 100 volts; full range. Accessories include single and dual rack adapters and overvoltage protectors.

DCR SERIES

Ideal for most industrial system and laboratory applications. Offers more watts per dollar than any competitive line. Thirty-seven models, 400 to 20,000 watts; 20 to 30,000 volts; wide range. All models feature remote programming; remote sensing with large allowable lead drop; and both voltage and current mode operation. Overvoltage protectors available for all models.

QSA SERIES

Modular power supplies designed for OEM systems. U.L. listed. Excellent regulation, ripple and response time characteristics. Three to 330 volts, up to 300 watts. Complete line of accessories, including metered panels, rack adapters, chassis slides, filler panels and overvoltage protectors — build your own multi-output system or let us do it for you!

QSB SERIES

Highly regulated, extremely low ripple, slot-type half and full rack sources. Excellent value with attractive pennies per watt ratio. Twelve models, 5 to 36 volts, up to 315 watts. Accessories include overvoltage protectors and rack adapters.

SRL SERIES

New, low-voltage, low ripple, well regulated series featuring built-in overvoltage protection with exclusive quick set and check capability. Fourteen models, 10, 20, 40 and 60 volts, currents to 100 amperes. Ten-turn voltage and current-adjust potentiometers available for all models. (See complete SRL tabulation on adjoining page.)

HIGH VOLTAGE DC POWER SUPPLIES — Regulated and unregulated

DCR-HV SERIES

High voltage, regulated, fully solid state. All models feature voltage and current mode operation with automatic crossover, remote programmability, and full personnel and equipment safeguards, including overvoltage and overload protection, zero-start operation, and mechanical interlocks. Seven models: 600, 1500, 3000, 6000, 12000, 20000 and 30000 volts; 1500 watts.

5000 SERIES

High-voltage regulated supplies. Regulation to ±0.03% for line and load combined, polarity reversible. Two models, voltages to 30 kv, currents to 8 ma.

200, 1000 & 2000 SERIES

High-voltage, unregulated supplies, featuring simplicity in design, ease of operation and complete personnel and equipment safeguards. Sixteen models, 3 kv to 150 kv, currents to 1000 ma. The 200 series is completely portable. Line regulators and d-c filters available for the 1000 and 2000 series.

AC LINE VOLTAGE REGULATORS

ACR SERIES

All solid-state, high efficiency ac line regulators designed to protect voltage sensitive loads against the effects of line voltage swings and "brownouts." Features include automatic current limiting, remote sensing and remote programmability. Eight models, regulated 115 volts output, 500 to 15,000 volt-amperes.

VR SERIES

Low volt-ampere line of ferroresonant ac regulators. Economical, highly efficient. Six models, regulated 115 vac output, 30 to 500 volt-amperes. Models available which will maintain regulation for inputs between 70 and 130 vac and loads to 250 volt-amperes.

CUSTOM/SPECIAL PURPOSE POWER SUPPLIES

Sorensen, the world's most experienced power supply manufacturer, would be pleased to work with you on your most demanding problems. Some of our recent custom power supplies include units for use with standard AEC nuclear instrumentation systems and module bins; data display console logic circuitry; cathode-ray tube display systems; electronic phototypesetting systems; electrostatic equipment; and Xenon arc lamps.

New SRL Power Supply Features Built-in Overvoltage Protection That Can Be Set and Checked Even Under Full Load!

Sorensen's SRL power supplies are low-voltage, well-regulated dc units for systems and laboratory applications. All 14 models feature an exclusive internal overvoltage protector that can be adjusted, and the set point checked, without removing the load from the supply.

Offering fast response time over the full load range, the new medium-power SRL series provides constant voltage/constant current operation with automatic crossover; remote programming in both the voltage and current modes; remote sensing; master-slave paralleling; and fine and coarse voltage and current adjust controls. Integrated circuits make possible high reliability and stability.

Write or call today for your free copy of the informative Sorensen condensed catalog. Raytheon Company, Sorensen Power Supplies, 676 Island Pond Road, Manchester, New Hampshire, 03103. Tel. (603) 668-1600; TWX 710-220-1339.

Sorensen POWER SUPPLIES

Model	Output Voltage (Vdc)	Output Current (amps) Max. 55°C	60°C	71°C	Voltage Reg. Line & Load (Comb)	Voltage Ripple (PARD)*	Current Reg. Line & Load (Comb)	Current Ripple PARD* RMS	Transient Response Time	% Eff. (Typ)	Input** Voltage (Vac)	Input Current (Amps ac)	Cabinet Size (In.) W	H	D	Weight (Lbs.) Net	Price
SRL10-25	0-10	25	22	16.7	0.01% or 2mV[2]	350μV rms[a] 20mV p-p[b]	±.02% +4mA	10mA	150μS	45.5	105-125 190-230 210-250	7.5 4.1 3.75	19	5¼	17¾	64	$450
SRL10-50	0-10	50	44	33.5		300μV rms 10mV p-p	±.02% +4mA	20mA	150μS	42.4	105-125 190-230 210-250	14.7 8.0 7.3	19	5¼	21	81	650
SRL10-100	0-10	100	88	67		300μV rms 20mV p-p	±.02% +6mA	30mA	150μS	45.5	105-125 190-230 210-250	32.5 18.5 16.3	19	7	23	132	825
SRL20-12	0-20	12	10.5	8		200μV rms 20mV p-p	±.02% +4mA	3mA	70μS	42	105-125 190-230 210-250	7.8 4.3 3.9	19	3½	17¾	45	435
SRL20-25	0-20	25	22	16.7		200μV rms 20mV p-p	±.02% +4mA	10mA	150μS	52.5	105-125 190-230 210-250	13.6 7.5 6.8	19	5¼	17¾	64	525
SRL20-50	0-20	50	44	33.5		500μV rms 40mV p-p	±.02% +4mA	10mA	150μS	53.6	105-125 190-230 210-250	28.0 15.4 14.0	19	7	21	128	775
SRL40-6	0-40	6	5.3	4		200μV rms 20mV p-p	±.02% +1mA	0.5mA	70μS	56	105-125 190-230 210-250	6.3 3.5 3.2	19	3½	17¾	44	435
SRL40-12	0-40	12	10.5	8		300μV rms 20mV p-p	±.02% +4mA	1mA	150μS	60	105-125 190-230 210-250	13.2 7.3 6.6	19	5¼	17¾	64	525
SRL40-25	0-40	25	22	16.7		500μV rms 10mV p-p	±.02% +4mA	10mA	150μS	59.7	105-125 190-230 210-250	22.0 12.0 11.0	19	5¼	21	95	630
SRL40-50	0-40	50	44	33.5		700μV rms 40mV p-p	±.02% +4mA	10mA	150μS	62.5	190-230 210-250	25.0 23.0	19	7	21	120	850
SRL60-4	0-60	4	3.5	2.68		300μV rms 20mV p-p	±.02% +1mA	0.5mA	70μS	50	105-125 190-230 210-250	6.0 3.3 3.0	19	3½	17¾	44	450
SRL60-8	0-60	8	7	5.36		300μV rms 20mV p-p	±.02% +1mA	1mA	70μS	64	105-125 190-230 210-250	12.5 6.9 6.25	19	5¼	17¾	64	580
SRL60-17	0-60	17	14.9	11.4		500μV rms 10mV p-p	±.02% +4mA	3mA	150μS	61.7	105-125 190-230 210-250	22.0 12.0 11.0	19	5¼	21	95	690
SRL60-35	0-60	35	31	23.4		700μV rms 10mV p-p	±.02% +4mA	10mA	150μS	67.8	190-230 210-250	26.0 24.0	19	7	21	120	910

All Models: Drift (8 hrs.) 0.25% +500μV; Temp. Coef. 0.01% +200μV/°C; Input Freq. (Hz) 47-53; Input Phase 1φ.

NOTE: All prices above are U.S.A. list, f.o.b. Manchester, New Hampshire.

[a]at 10 Hz to 7 MHz. [b]at 7 Hz to 25 MHz. [2]Whichever is greater.

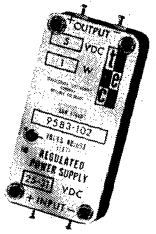
*PARD — "The Periodic and Random Deviation" of the output DC voltage, current or power from its average value, with all external operational and environmental parameters maintained constant.

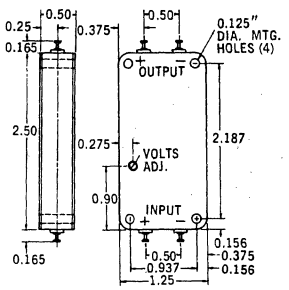
**Standard model has 105-125 Vac input. Models with M1 suffix (example SRL10-50 M1) have 190-230 Vac input. Models with M2 suffix (example SRL10-50 M2) have 210-250 Vac input.

Regulated DC-DC power supplies

tecnetics inc.

1 watt DC-DC regulated power supplies 9583 series





TOLERANCE ±0.02" unless otherwise specified
ALL DIMENSIONS IN INCHES

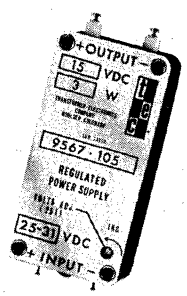
COMMON SPECIFICATIONS

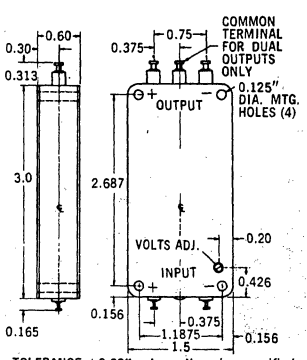
(3) Input Voltage: 28VDC ±3VDC, continuous. 50VDC, 1 second max.
Input Current: 27ma typical @ 30 mw load, 87ma typical @ full load.
Output Voltage Adjust: ±10% @ full load, −40% @ 330mw load.
Temperature: Operating, −55 to +100°C case. Storage, −55 to +150°C. Case rise, 5° @ full load.
(2) Isolation: Models 101-114, 121, 1000VDC. Models 115-118, 3000VDC.
Output Power Derating: None to 100°C case.
Weight: 2.4 oz. fully encapsulated.
Minimum Load: 30mw.

MODEL SPECIFICATIONS

Model	Output			Regulation (Vdc)					Price
	Voltage (VDC)	Current (ma)	Ripple(1) (Vp-p)	Line (Vin = 25 to 31 VDC)		Load (½ to Full)		Temp. (−55°C to 100°C Case)	
9583-	Nom.	Max.	Max.	Typ.	Max.	Typ.	Max.	Typ.	1 ea.
101	3	330	.020	.025	.035	.098	.110	0.09	$196.00
102	5	200	.015	.035	.045	.110	.130	0.15	185.00
103	7.5	130	.025	.035	.045	.150	.165	0.23	180.00
104	10	100	.030	.045	.055	.210	.230	0.30	180.00
105	15	67	.050	.075	.085	.250	.275	0.45	175.00
106	30	33	.050	.135	.160	.440	.480	0.90	168.00
107	50	20	.030	.210	.225	.800	.850	1.50	185.00
108	75	13	.020	.300	.350	1.20	1.60	2.25	192.00
109	100	10	.150	.390	.420	1.30	1.60	3.00	192.00
110	150	6.7	.200	.670	.750	2.60	3.10	4.50	177.00
111	300	3.3	.225	1.20	1.70	4.00	5.50	9.00	177.00
112	500	2.0	.300	2.00	2.60	6.00	8.00	15.0	201.00
113	750	1.3	2.4	3.00	3.50	19.0	21.0	22.5	202.00
114	1000	1.0	3.0	4.00	5.00	24.0	26.0	30.0	232.00
115	1500	0.67	21	6.00	7.50	40.0	50.0	45.0	248.00
116	2000	0.50	25	9.50	10.5	68.0	75.0	60.0	254.00
117	2500	0.40	20	10.0	13.0	68.0	75.0	75.0	258.00
118	3000	0.33	25	12.0	15.0	68.0	75.0	90.0	270.00
121	±15	±33	.010	.060	.080	.250	.280	0.30	209.00

3 watt DC-DC regulated power supplies 9567 series





TOLERANCE ±0.02" unless otherwise specified
ALL DIMENSIONS IN INCHES

COMMON SPECIFICATIONS

(3) Input Voltage: 28VDC ±3VDC, continuous. 50VDC, 1 second max.
Input Current: 38ma typical @ 100mw load, 210ma typical @ full load.
Output Voltage Adjust: ±10% @ full load, −40% @ 1W load.
Temperature: Operating, −55 to +100°C case. Storage, −55 to +150°C. Case rise, 25°C @ full load.
(2) Isolation: Models 101-114, 121-124, 1000VDC. Models 115-120, 5000VDC.
Output Power Derating: None to +55°C case.
Weight: 4.0 oz. fully encapsulated.
Minimum Load: 100mw.

MODEL SPECIFICATIONS

Model	Output			Regulation (Vdc)					Price
	Voltage (VDC)	Current (ma)	Ripple(1) (Vp-p)	Line (Vin = 25 to 31 VDC)		Load (½ to Full)		Temp. (−55°C to 100°C Case)	
9567-	Nom.	Max.	Max.	Typ.	Max.	Typ.	Max.	Typ.	1 ea.
101	3	1000	0.06	.016	.025	.145	.165	0.45	$178.00
102	5	600	0.05	.026	.035	.170	.210	0.10	168.00
103	7.5	400	0.08	.036	.045	.200	.260	0.15	164.00
104	10	300	0.20	.045	.055	.220	.265	0.20	164.00
105	15	200	0.60	.080	.080	.360	.410	0.30	159.00
106	30	100	0.15	.130	.175	.425	.500	0.80	153.00
107	50	60	0.10	.220	.270	.600	.700	1.0	168.00
108	75	40	0.38	.300	.350	.900	1.20	1.5	175.00
109	100	30	0.20	.450	.550	1.00	1.30	2	175.00
110	150	20	0.25	.650	.850	1.50	1.75	3	161.00
111	300	10	0.60	1.25	1.75	3.00	3.60	6	161.00
112	500	6	0.45	2.20	3.00	4.50	5.20	10	183.00
113	750	4	0.50	3.00	4.00	16.0	19.5	15	184.00
114	1000	3	0.55	4.00	5.50	16.5	20.0	20	211.00
115	1500	2	13.0	6.50	9.00	43.0	55.0	30	226.00
116	2000	1.5	16.0	8.00	10.0	39.0	55.0	40	231.00
117	2500	1.2	12.0	10.0	13.5	45.0	55.0	50	235.00
118	3000	1.0	33.0	12.5	17.0	130	160	60	246.00
119	4000	0.75	28.0	17.0	21.0	145	165	80	256.00
120	5000	0.60	45.0	20.0	32.0	140	170	100	267.00
121	± 15	±100	0.09	.060	.090	.350	.410	0.30	190.00
122	± 25	± 60	0.03	.100	.130	.500	.600	0.50	190.00
123	± 50	± 30	0.01	.200	.300	1.00	1.25	1.00	207.00
124	±100	± 15	0.05	.400	.500	1.50	2.00	2.00	216.00

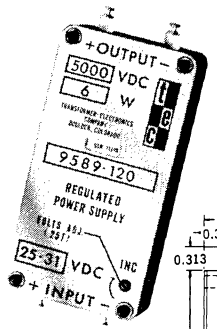
NOTES:
(1) Filter in Positive Leg, for negative filter prefix part no. with "N".
(2) Input terminals shorted to case, output terminals shorted.
(3) Reverse polarity protection provided to 50VDC. Contact factory for modifications such as remote adjustment, AC outputs, and different output voltages.

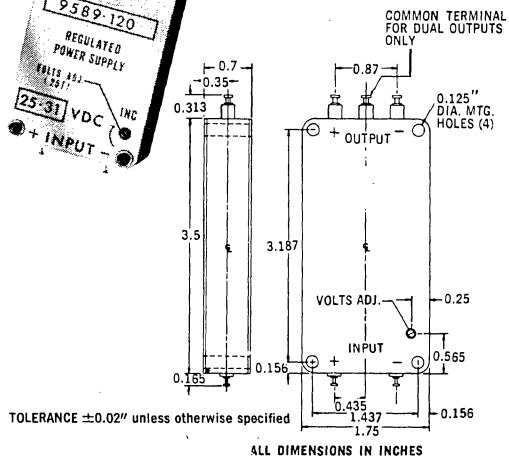
TECNETICS, INC. • P.O. BOX 910 • BOULDER INDUSTRIAL PARK • BOULDER, COLORADO 80302 • TELEPHONE (303) 442-3837 • TWX 910-940-3246

Regulated DC-DC power supplies

tecnetics inc.

6 watt DC-DC regulated power supplies 9589 series





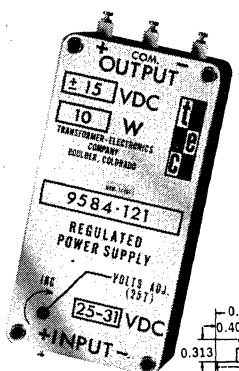
COMMON SPECIFICATIONS

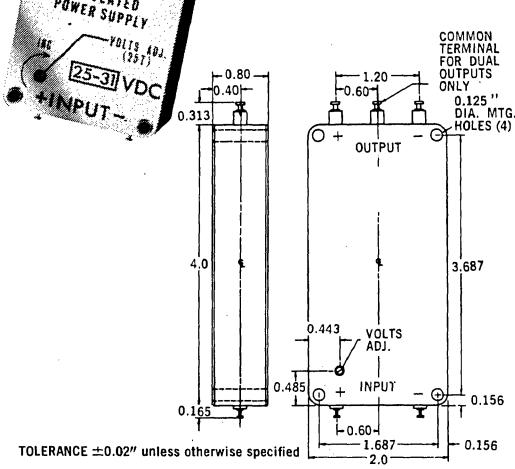
(3) Input Voltage: 28VDC ±3VDC continuous. 50VDC, 1 second max.
Input Current: 100ma typical @ 200mw load. 400ma typical @ full load.
Output Voltage Adjust: ±10% @ full load, −40% @ 2W load.
Temperature: Operating, −55 to +100°C, case. −55 to +150°C, storage. Case rise, +30°C @ full load.
(2) Isolation: Models 102-114, 121-124, 1000VDC. Models 115-120, 5000VDC.
Output Power Derating: None to 100°C case.
Weight: 7.0 oz. fully encapsulated.
Minimum Load: 200mw.

MODEL SPECIFICATIONS

Model	Output			Regulation (Vdc)					Price
	Voltage (VDC)	Current (ma)	Ripple(1) (Vp-p)	Line (Vin = 25 to 31 VDC)		Load (½ to Full)		Temp. (−55°C to 100°C Case)	
9589-	Nom	Max.	Max.	Typ.	Max.	Typ.	Max.	Typ.	1 ea.
102	5	1200	.050	.003	.005	.150	.230	.075	$177.00
103	7.5	800	.060	.003	.006	.200	.300	.113	172.00
104	10	600	.120	.003	.006	.240	.325	.150	172.00
105	15	400	.090	.005	.013	.260	.380	.225	167.00
106	30	200	.090	.010	.016	.360	.450	.450	161.00
107	50	120	.250	.015	.025	.700	.850	.750	176.00
108	75	80	.430	.030	.050	1.00	1.50	1.13	184.00
109	100	60	.600	.040	.065	1.10	1.60	1.50	184.00
110	150	40	.900	.050	.070	1.50	2.00	2.25	169.00
111	300	20	1.80	.100	.125	2.75	4.00	4.50	169.00
112	500	12	2.50	.200	.250	5.00	7.00	7.50	192.00
113	750	8.0	4.10	.400	.550	7.00	11.0	11.3	193.00
114	1000	6.0	6.0	.450	.700	12.5	17.0	15.0	222.00
115	1500	4.0	9.0	.500	1.25	35.0	45.0	22.5	238.00
116	2000	3.0	12.0	1.25	2.00	35.0	45.0	30.0	243.00
117	2500	2.4	15.0	1.40	2.00	50.0	75.0	38.0	247.00
118	3000	2.0	18.0	1.50	3.00	85.0	100	45.0	259.00
119	4000	1.5	75.0	1.60	2.20	105	125	60.0	269.00
120	5000	1.2	30.0	3.00	5.00	125	165	75.0	281.00
121	± 15	±200	.090	.005	.012	.250	.300	.225	198.00
122	± 25	±120	.120	.007	.012	.410	.500	.38	198.00
123	± 50	± 60	.300	.025	.050	.800	1.10	.75	218.00
124	±100	± 30	.500	.025	.060	1.70	2.20	1.50	227.00

10 watt DC-DC regulated power supplies 9584 series





COMMON SPECIFICATIONS

(3) Input Voltage: 28VDC ±3VDC, continuous. 50VDC, 1 second max.
Input Current: 120ma typical @ 300mw load. 750ma typical @ full load.
Output Voltage Adjust: ±10% @ full load, −40% @ 3.3W load.
Temperature: Operating, −55 to +100°C case. Storage, −55 to +150°C. Case rise, +30° @ full load.
(2) Isolation: Models 102-114, 121-124, 1000VDC. Models 115-120, 5000VDC.
Output Power Derating: None to 100°C Case.
Weight: 9.6 oz. fully encapsulated.
Minimum Load: 300mw.

MODEL SPECIFICATIONS

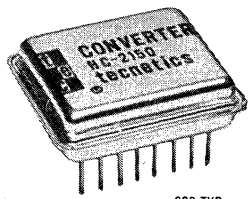
Model	Output			Regulation (Vdc)					Price
	Voltage (VDC)	Current (ma)	Ripple(1) (Vp-p)	Line (Vin = 25 to 31 VDC)		Load (½ to Full)		Temp. (−55°C to 100°C Case)	
9584-	Nom.	Max.	Max.	Typ.	Max.	Typ.	Max.	Typ.	1 ea.
102	5	2000	.030	.003	.008	.200	.260	.075	$192.00
103	7.5	1300	.045	.004	.010	.210	.270	.112	187.00
104	10	1000	.020	.005	.012	.250	.300	.150	187.00
105	15	670	.015	.008	.013	.290	.360	.225	182.00
106	30	330	.060	.011	.015	.500	.750	.450	175.00
107	50	200	.050	.025	.035	.700	1.10	.750	192.00
108	75	130	.075	.030	.045	1.10	1.50	1.13	200.00
109	100	100	.100	.037	.065	1.20	2.00	1.5	200.00
110	150	67	.150	.055	.080	2.20	3.00	2.25	184.00
111	300	33	.30	.100	.220	4.00	6.00	4.50	184.00
112	500	20	1.0	.200	.320	7.00	10.0	7.50	209.00
113	750	13	1.5	.300	.500	9.00	13.0	11.30	210.00
114	1000	10	2.5	.750	1.50	16.0	22.0	15.0	241.00
115	1500	6.7	3.0	1.00	1.60	20.0	30.0	22.5	258.00
116	2000	5.0	5.5	1.50	2.70	25.0	40.0	30.0	264.00
117	2500	4.0	5.0	2.00	3.30	60.0	75.0	38.0	268.00
118	3000	3.3	9.0	2.50	4.00	75.0	100	45.0	280.00
119	4000	2.5	14.0	2.50	4.50	85.0	125	60.0	288.00
120	5000	2.0	17.5	4.00	6.00	120	220	75.0	299.00
121	± 15	±335	.030	.007	.017	.300	.450	.225	217.00
122	± 25	±200	.050	.010	.030	.750	.850	.38	217.00
123	± 50	±100	.100	.016	.030	1.25	1.50	.75	238.00
124	±100	± 50	.100	.040	.065	1.60	2.75	1.50	243.00

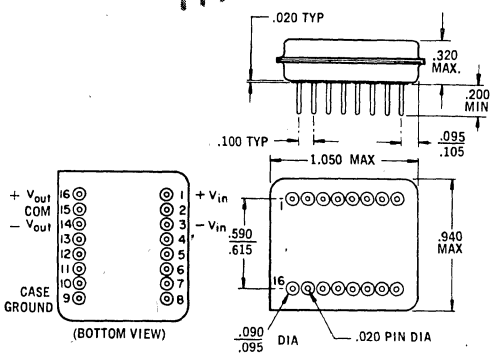
NOTES:
(1) Filter in Positive Leg, for negative filter prefix part no. with "N".
(2) Input terminals shorted to case, output terminals shorted.
(3) Reverse polarity protection provided to 50VDC. Contact factory for modifications such as remote adjustment, AC output and different output voltages.

Hybrid converters

tecnetics inc.

5 volts input hybrid DC-DC converter, HC series





COMMON SPECIFICATIONS, $T_A = 25°C$, $V_{in} = 5$ VDC, $P_{out} = 2$ Watts

Input Voltage (see Note 1): 5VDC Nominal Operating, 8VDC Max.
Input Current: 560ma Typ. @ Full Load, 320ma Typ. @ ½ Load.
Output Power: 2 Watts Max. (see Note 8).
Efficiency: 70% Typ. @ Full Load (2 Watts), 62% Typ. @ ½ Load (1 Watt).
Reflected Ripple (see Note 2): 1.5 Amps.
Isolation (see Note 5): 600VDC.
Temperature, Operating: Ambient −55 to +125°C, Case −55 to +125°C.
Temperature, Rise (Case): 40°C/Watt Dissipation (see Note 4).

MODEL SPECIFICATIONS

Model	Output[6]		Ripple Vp-p Max.	Recommended Filter	Regulation (VDC)		Price
	Voltage (VDC) ±3%[6]	Current (ma) Max.		Capacitor μf[3]	Load (½-Full) Max.	Temp. −55 to +125°C Max.	Each[7]
HC-7150	±15	±67	.300	22	10.0	2.5	$49.00

NOTES:
(1) Units can be protected against all transients as described in MIL-STD-704A.
(2) Reflected ripple current is measured with a current probe and 50mHz band width scope.
(3) Output ripple is measured across an external filter capacitor. See chart for recommended values. Capacitor voltage rating should provide safety factor @ max. V_{out} and T_A max.
(4) Special Heat Sinks available, contact Tecnetics, Inc.
(5) Input terminals shorted to case and output terminals shorted together.
(6) Other output and input voltages available on special order, contact Tecnetics, Inc.
(7) Hermetically sealed version is available at $59.00 each.
(8) Minimum load 300mw to avoid internal damage.
(9) HC-4050 through HC-4100 limited to 2.5 Watts out.

12 volts input hybrid DC-DC converter, HC series

COMMON SPECIFICATIONS, $T_A = 25°C$, $V_{in} = 12$ VDC, $P_{out} = 3.0$ watts[9]

Input Voltage (see Note 1): 12VDC Nominal Operating, 20VDC Absolute Max.
Input Current: 330ma Typ. @ Full Load, 185ma Typ. @ ½ Load.
Output Power: 3 Watts Max. (see Notes 8 and 9).
Efficiency: 75% Typ. @ Full Load (3 Watts), 67% Typ. @ ½ Load (1.5 Watts).
Reflected Ripple (see Note 2): 900ma.
Isolation (see Note 5): 600VDC.
Temperature, Operating: Ambient −55 to +125°C, Case −55 to +125°C.
Temperature Rise (Case): 40°C/Watt Dissipation (see Note 4).

MODEL SPECIFICATIONS

Model	Output[6]		Price
HC-	Voltage	Current (ma) Max.	Each[7]
HC-4050	5 ±5%	500	$49.00
HC-4060	6 ±5%	500	49.00
HC-4080	8 ±5%	375	49.00
HC-4100	10 ±5%	300	49.00
HC-4120	12 ±2%	250	49.00
HC-4150	15 ±2%	200	49.00
HC-4200	20 ±2%	150	49.00
HC-4240	24 ±2%	125	49.00
HC-4280	28 ±2%	108	49.00
HC-4300	30 ±2%	100	49.00
HC-4500	50 ±2%	60	49.00
HC-4750	75 ±2%	40	49.00
HC-4101	100 ±2%	30	49.00
HC-4151	150 ±2%	20	49.00
HC-4201	200 ±2%	15	49.00
HC-4301	300 ±2%	10	49.00
HC-5120	±12 ±2%	±125	49.00
HC-5150	±15 ±2%	±100	49.00
HC-5180	±18 ±2%	± 83	49.00
HC-5250	±25 ±2%	± 60	49.00

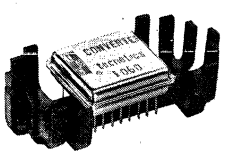
20 volts input hybrid DC-DC converter, HC series

COMMON SPECIFICATIONS, $T_A = 25°C$, $V_{in} = 20$ VDC, $P_{out} = 3.0$ watts

Input Voltage (see Note 1): 20VDC Nominal Operating, 32VDC Absolute Max.
Input Current: 200ma Typ. @ Full Load, 110ma Typ. @ ½Load.
Output Power: 3 Watts Max. (see Note 8).
Efficiency: 80% Typ. @ Full Load (3 Watts), 75% Typ. @ ½ Load (1.5 Watt).
Reflected Ripple (see Note 2): 360ma.
Isolation (see Note 5): 600VDC.
Temperature, Operating: Ambient −55 to +125°C, Case −55 to +125°C.
Temperature Rise (Case): 40°C/Watt Dissipation (see Note 4).

MODEL SPECIFICATIONS

Model	Output[6]		Price
HC-	Voltage (VDC) ±2%	Current (ma) Max.	Each[7]
HC-1050	5	600	$49.00
HC-1060	6	500	49.00
HC-1080	8	375	49.00
HC-1100	10	300	49.00
HC-1120	12	250	49.00
HC-1150	15	200	49.00
HC-1200	20	150	49.00
HC-1240	24	125	49.00
HC-1280	28	108	49.00
HC-1300	30	100	49.00
HC-1500	50	60	49.00
HC-1750	75	40	49.00
HC-1101	100	30	49.00
HC-1151	150	20	49.00
HC-1201	200	15	49.00
HC-1301	300	10	49.00
HC-3120	±12	±125	49.00
HC-3150	±15	±100	49.00
HC-3180	±18	± 83	49.00
HC-3250	±25	± 60	49.00



Also available as an accessory to All Tecnetics' hybrid converters is a heat sink. Price: $1.30 each.

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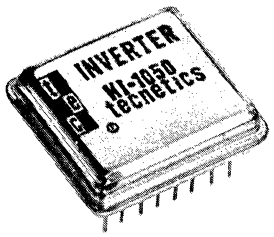
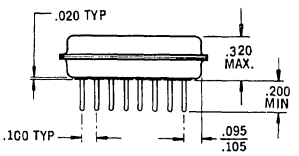
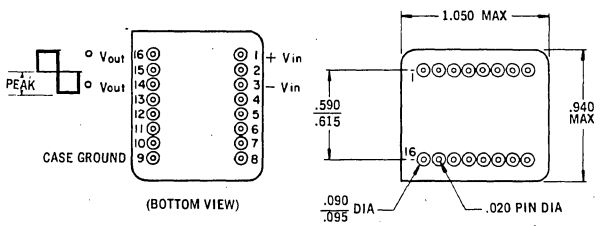
Hybrid inverters

tecnetics inc.

5 volts input hybrid DC-AC inverter, HI series, 8kHz







COMMON SPECIFICATIONS, $T_A = 25°C$, $V_{in} = 5$ VDC, $P_{out} = 2$ Watts

Input Voltage (see Note 1): 5VDC Nominal Oper.; 8VDC Max.
Input Current: 560ma Typ. @ Full Load, 320ma Typ. @ ½ Load.
Output Power: 2 Watts Max. (see Note 8).
Efficiency: 70% Typ. @ Full Load (2 Watts), 62% Typ. @ ½ Load (1 Watt).
Reflected Ripple (see Note 2): 1.5 amps (Typical).
Isolation (see Note 6): 600VDC.
Temperature, Operating: Ambient −55 to +125°C, Case −55 to +125°C.
Temperature Rise (Case): 40°C/Watt Dissipation (see Note 4).

MODEL SPECIFICATIONS

Model*	Output[6]		Price
	Voltage VAC[3] Peak ±2%	Current (ma) Max.	Each**
HI-6150	15	134	$39.00

* Other output voltages available on request.
** Price quoted is for non-hermetic version. (See Note 7.)

12 volts input hybrid DC-AC inverter, HI series, 11kHz

COMMON SPECIFICATIONS, $T_A = 25°C$, $V_{in} = 12$ VDC, $P_{out} = 3$ watts[9]

Input Voltage (see Notes 1 and 6): 12VDC Nominal Oper.; 20VDC Abs. Max.
Input Current: 320ma Typ. @ Full Load, 185ma Typ. @ ½ Load.
Output Power: 3 Watts Max. (see Notes 8 and 9).
Efficiency: 75% Typ. @ Full Load (3 Watts), 67% Typ. @ ½ Load (1.5 Watt).
Reflected Ripple (see Note 2): 900ma (Typical).
Isolation (see Note 5): 600VDC.
Temperature, Operating: Ambient −55 to +125°C, Case −55 to +125°C.
Temperature Rise (Case): 40°C/Watt Dissipation (see Note 4).

MODEL SPECIFICATIONS

Model	Output[6]		Price
HI-	Voltage VAC[3] Peak ±2%	Current (ma) Max.	Each*
HI-4050	5	500	$39.00
HI-4060	6	416	39.00
HI-4080	8	312	39.00
HI-4100	10	250	39.00
HI-4120	12	250	39.00
HI-4150	15	200	39.00
HI-4200	20	150	39.00
HI-4240	24	125	39.00
HI-4280	28	108	39.00
HI-4300	30	100	39.00
HI-4500	50	60	39.00
HI-4750	75	40	39.00
HI-4101	100	30	39.00
HI-4151	150	20	39.00
HI-4201	200	15	39.00
HI-4301	300	10	39.00

* Prices quoted are for non-hermetic version. (See Note 7.)

NOTES:

(1) Units can be protected against all transients as described in MIL-STD-704A.
(2) Reflected ripple current is measured with a current probe and 50Mhz band width scope.
(3) All outputs are peak voltages.
(4) Special Heat Sinks available, contact Tecnetics, Inc.

20 volts input hybrid DC-AC inverter, HI series, 15kHz

COMMON SPECIFICATIONS, $T_A = 25°C$, $V_{in} = 20$ VDC, $P_{out} = 3$ watts

Input Voltage (see Notes 1 and 6): 20VDC Nominal Oper.; 32VDC Abs. Max.
Input Current: 180ma Typ. @ Full Load, 100ma Typ. @ ½ Load.
Output Power: 3 Watts Max. (see Note 8).
Efficiency: 83% Typ. @ Full Load (3 Watts), 75% Typ. @ ½ Load (1.5 Watt).
Reflected Ripple (see Note 2): 360ma (Typical).
Isolation (see Note 5): 600VDC.
Temperature, Operating: Ambient −55 to +125°C, Case −55 to +125°C.
Temperature Rise (Case): 40°C/Watt Dissipation (see Note 4).

MODEL SPECIFICATIONS

Model	Output[6]		Price
HI-	Voltage VAC[3] Peak ±2%	Current (ma) Max.	Each*
HI-1050	5	600	$39.00
HI-1060	6	500	39.00
HI-1080	8	375	39.00
HI-1100	10	300	39.00
HI-1120	12	250	39.00
HI-1150	15	200	39.00
HI-1200	20	150	39.00
HI-1240	24	125	39.00
HI-1280	28	108	39.00
HI-1300	30	100	39.00
HI-1500	50	60	39.00
HI-1750	75	40	39.00
HI-1101	100	30	39.00
HI-1151	150	20	39.00
HI-1201	200	15	39.00
HI-1301	300	10	39.00

* Prices quoted are for non-hermetic version. (See Note 7.)

(5) Input terminals shorted to case and output terminals shorted together.
(6) Other output and input voltages available on special order, contact Tecnetics, Inc.
(7) Hermetically sealed version is available at $49.00 each.
(8) Minimum load 300mw to avoid internal damage.

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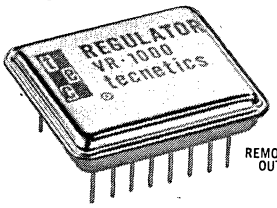
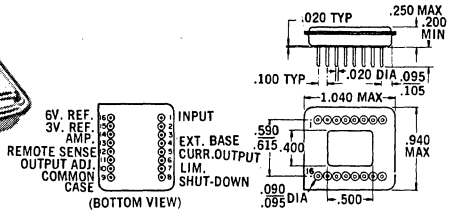
Hybrid regulators and regulated power supplies

tecnetics inc.

hybrid voltage regulators





FEATURES

- Current and power dissipation limited
- Continuous short circuit protection
- Extremely good line and load regulation
- Excellent ripple rejection and very low output impedance, specified to 1 MHz
- No latch-up with ± regulators driving common load
- Low temperature coefficient
- High power capability with external pass transistors
- Remote sensing, programming and shut-down capabilities
- Wide range of output voltages
- Price: $39.00 each.

+3 to +36 hybrid voltage regulator, VR1000

SPECIFICATIONS

Input Voltage: +40VDC, max.
Input-Output Voltage Differential: 27VDC, max.
Regulated output current: 250ma, max.
Operating Temperature: −55 to +125°C.
Storage Temperature: −55 to +125°C.
Maximum power dissipation: (T_A = 25°C) 2.0 Watts.
Maximum Junction Temperature: +150°C.
Derating Factor: self-limiting.
Electrical Characteristics: T_A = 25°C; V in - V out differential = 3.5V min.; R_S = 2.0 ohms; R_{load} = ∞ (unless otherwise stated).

CHARACTERISTICS	Min.	Max.	Units
Input voltage range	9	40	VDC
Output voltage range (adjustable with external pot)	3	36	VDC
Input-output voltage differential	3.5	27	VDC
Internal reference tolerance	—	±1	%
Input current (Vin = 40V)	—	7.3	ma
Line regulation factor	—	0.8	mV/V
Ripple rejection, DC - 1KHz	70	—	db
1KHz - 1MHz	60	—	db
Load regulation factor (I_L = 0 to 250mA)	—	7.0	μV/ma
Output impedance (I_L = 100mA)			
DC - 100KHz	—	0.002	ohm
100Hz - 10KHz	—	0.2	ohm
10KHz - 1MHz	—	0.5	ohm
Average temperature coefficient of Vout	—	±0.01	%/°C.
Current limit knee	—	300	ma
Output voltage stability (1000 Hr., full load)	—	±0.15	%

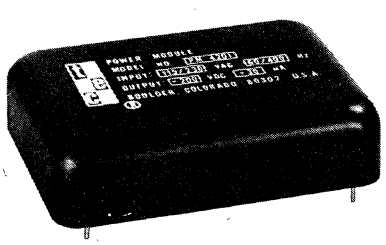
−3 to −36 hybrid voltage regulator, VR2000

SPECIFICATIONS

Input Voltage: −40VDC, max.
Input-Output Voltage Differential: 27VDC, max.
Regulated output current: 250ma, max.
Operating Temperature: −55 to +125°C.
Storage Temperature: −55 to +125°C.
Maximum Power Dissipation: (T_A = 25°C) 2.0 Watts.
Maximum Junction Temperature: +150°C.
Derating factor: self-limiting.
Electrical Characteristics: T_A = 25°C; V in - V out differential = 4.5V min.; R_S = 2.0 ohms; R_{load} = ∞ (unless otherwise stated).

CHARACTERISTICS	Min.	Max.	Units
Input voltage range	−9	−40	VDC
Output voltage range (adjustable with external pot)	−3	−36	VDC
Input-output voltage differential	4.5	27	VDC
Internal reference tolerance	—	±1	%
Input current (Vin = 40V)	—	7.3	ma
Line regulation factor	—	0.8	mV/V
Ripple rejection, DC - 1KHz	70	—	db
1KHz - 1MHz	60	—	db
Load regulation factor (I_L = 0 to 250mA)	—	7.0	μV/ma
Output impedance (I_L = 100mA)			
DC - 100KHz	—	0.002	ohm
100Hz - 10KHz	—	0.2	ohm
10KHz - 1MHz	—	0.5	ohm
Average temperature coefficient of Vout	—	±0.01	%/°C.
Current limit knee	—	300	ma
Output voltage stability (1000 Hr., full load)	—	±0.15	%

AC-DC regulated power supplies, MR series



COMMON SPECIFICATIONS

Input Voltage: 115/230 ±10% VAC(1).
Input Frequency: 57-440 Hz.
Temperature: operating 0 to 55°C.
non-operating −25 to +85°C.
Protection: Short circuit.
Regulation: Line 0.15%.
Load 0.15%. Temp. 0.03%/°C.
Ripple: 1.5mv (RMS). 5.0mv p-p.
Dimensions: 3W 3½" x 2½" x 1".
5W 3½" x 2½" x 1½"
8W 3½" x 2½" x 2".

NOTES:
(1) Wiring diagram supplied with unit.
(2) Dual output units can be connected in series to obtain 2X voltage.
(3) Current and power are specified at nominal output voltage. Derate for other output voltage.
(4) For special requirements, contact factory.

MODEL SPECIFICATIONS (4)

Model	Output				
	Volts (VDC)	ADJ Range Voltage	(3) Current (A)	Power (Watts)	Price
MR	Nom.	Volts	Nom.	Nom.	1 ea.
1050-3	5	3.5 to 6.0	0.60	3	$45.00
1050-5	5	3.5 to 6.0	1.00	5	55.00
1050-8	5	3.5 to 6.0	1.50	8	65.00
1150-3	15	12 to 16	0.20	3	45.00
1150-5	15	12 to 16	0.30	5	55.00
1150-8	15	12 to 16	0.50	8	65.00
2150-5	Dual 15 (2)	12 to 16	0.15	5	55.00
2150-8	Dual 15 (2)	12 to 16	0.25	8	65.00
3050-8	5 Dual 15 (2)	3.5 to 6.0 12 to 16	1.00 0.10	8	75.00

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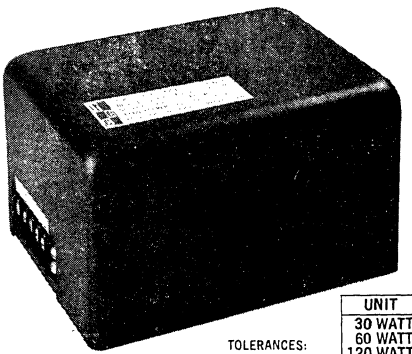
Power supplies

tecnetics inc.

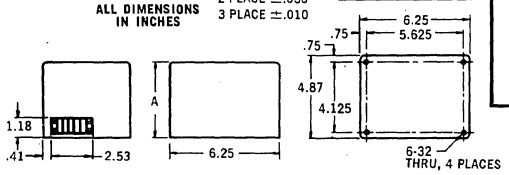
30, 60 and 120 watt AC-DC power supplies, PP series



UNIT	A
30 WATT	3.50
60 WATT	4.00
120 WATT	4.50

TOLERANCES:
2 PLACE ±.030
3 PLACE ±.010

ALL DIMENSIONS IN INCHES



COMMON SPECIFICATIONS

Input Voltage: 105-135VAC.
Input Frequency: 47-62 Hz.
Efficiency: 65% typical.
Temperature Operating: −25 to +70°C.

NOTES:

(1) Input slow blow fuse recommended.
(2) Contact factory for units designed for 400Hz only, and/or 230VAC input. Other inputs also available.

DESCRIPTION

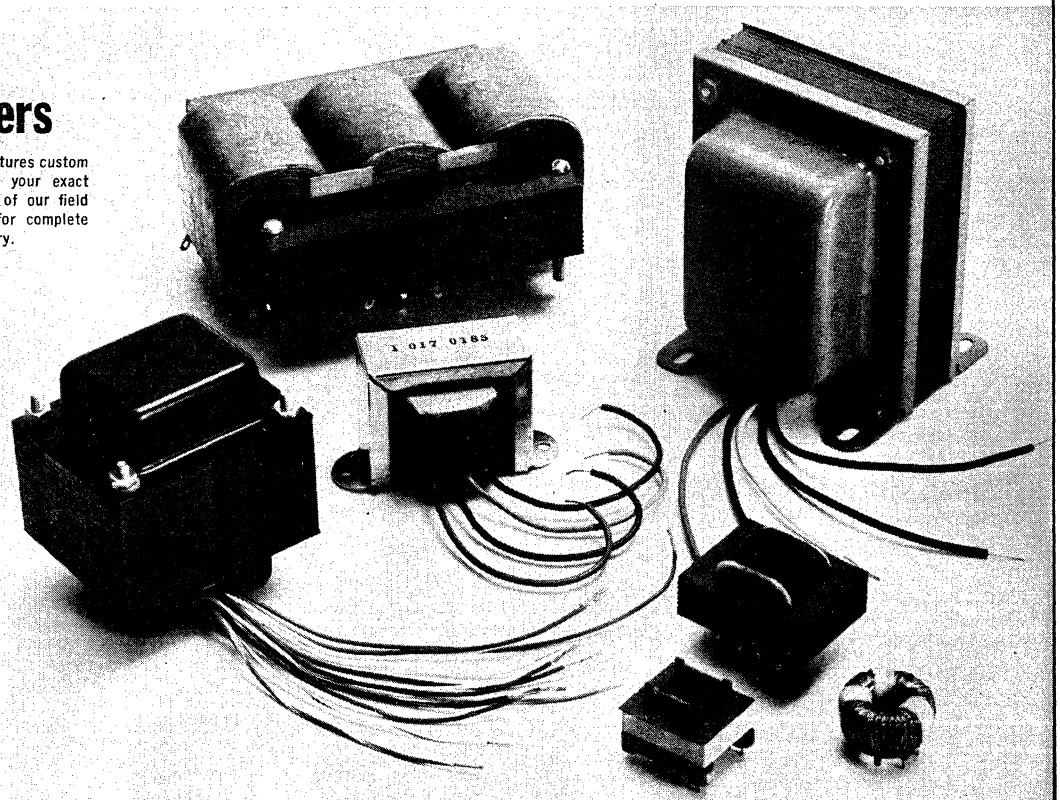
The Prime Power Series AC/DC Power Supplies are especially useful as central unregulated power sources for feeding "Point-of-Load" regulators. Three power levels, 30W, 60W, and 120W, and two choices of output voltages (±20VDC and +28VDC) make these rugged supplies well suited for many applications. High reliability components and conservative ratings provide trouble-free operation.

MODEL SPECIFICATIONS

Model	Output			Regulation			Price
	Voltage VDC	Current A	Ripple Vp-p	Line 105-135VAC	Load ½-F	Temp. 25-70°C	
PP-	Nom.	Max.	Typ.	Typ.	Typ.	Typ.	1 ea.
1280	+28	1.07	1.9	6.5	2.1	0.2	$41.20
2200	±20	±0.75	1.4	3.9	1.4	0.1	48.60
3280	+28	2.15	1.9	6.9	2.4	0.1	46.40
4200	±20	±1.5	1.0	5.0	1.1	0.1	58.20
5280	+28	4.3	2.0	7.5	2.2	0.1	55.80
6200	±20	±3.0	1.7	5.0	1.0	0.2	61.00

Custom transformers

Tecnetics, Inc. also manufactures custom transformers in volume to your exact specifications. Contact one of our field engineers or the factory for complete details on price and delivery.

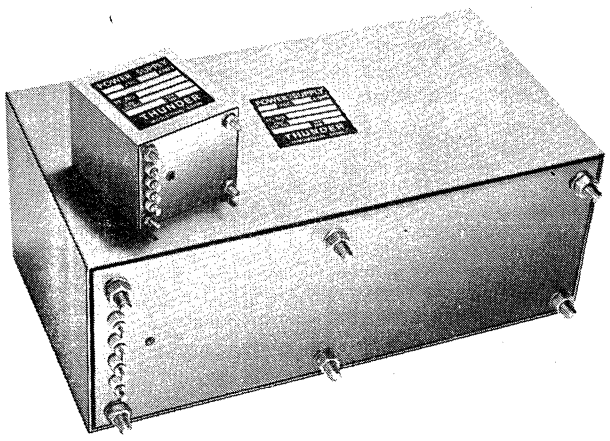


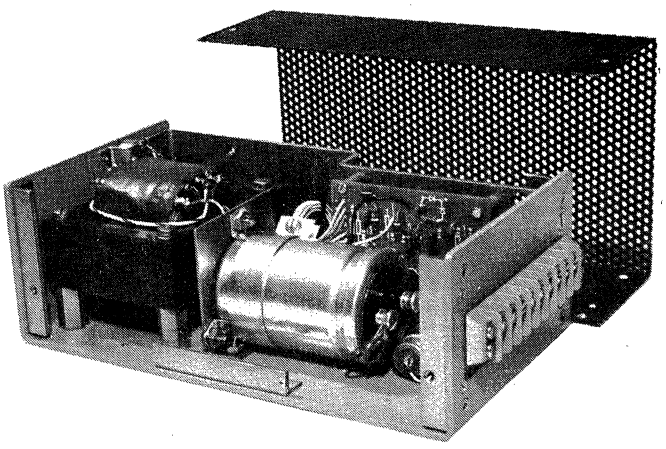
Prices and specifications in this catalog are effective 1 May 1971 and are subject to change without notice. Contact our field engineer or factory for quantity discounts. Terms: Net 30 days. F.O.B. Boulder, Colorado U.S.A.

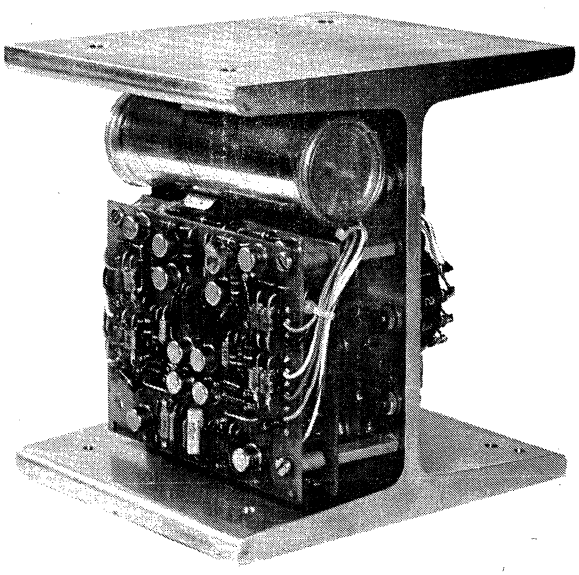
TECNETICS, INC. • P.O. BOX 910 • BOULDER INDUSTRIAL PARK • BOULDER, COLORADO 80302 • TELEPHONE (303) 442-3837 • TWX 910-940-3246

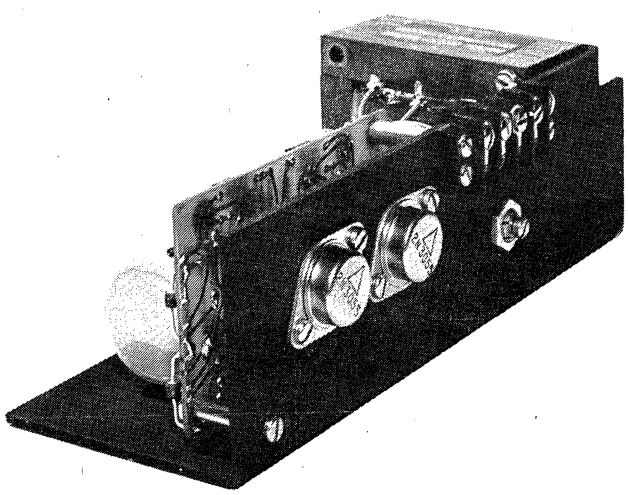
TIC

POWER SUPPLIES









THUNDER INTERNATIONAL CORPORATION 64 TUTTLE ROAD, MIDDLETOWN, CONN. 06457 • (203) 347-8536

POWER BY THUNDER

specifications
TI & TIF

SPECIFICATIONS OF TI AND TIF MODELS

AC INPUT

Line ..... 105-132 VAC: 45-440 Hz. 40°C rating not applicable for 50 Hz operation. 205-265 VAC, see AC input option.

Power ..... TI-A models, 20 watts; TI-B models, 40 watts; TI-C and TI-D models, 125 watts; TI-E models, 140 watts; TI-F models, 450 watts; TI-G models, 750 watts. TIF-C models, 80 watts; TIF-D models, 80 watts; TIF-E models, 140 watts; TIF-F models, 450 watts; TIF-G models, 750 watts.

TEMPERATURE RANGE

Ambient operating ..... Continuous duty from −20°C to +71°C ambient with corresponding load current ratings for all modes of operation and mounting positions.

Storage ..... −55°C to +85°C

Coefficient ..... 0.03%/°C; 0.01%/°C (HP option)

OVERLOAD PROTECTION

Electrical ..... External overload protection. Fixed and automatic electronic current limiting circuit limits output current on external overloads, including short circuit, providing protection for the load as well as for the supply.

CONTROLS

DC Output ..... Screwdriver adjustment.

Remote sensing ..... Provision is made for remote sensing to eliminate the effect of power output lead resistance on the DC regulation.

PHYSICAL DATA

Mounting ..... Three surfaces, each with tapped mounting holes, can be utilized to mount all models.

Finish ..... Grey and black, FED. STD. 595 epoxy enamel paint.

OPTIONS

High Performance ..... Add the suffix "HP." All models available with these specifications for $15.00 extra: Line regulation 0.01% + 1 mV; Load regulation 0.02% + 2 mV; Ripple and noise with 60 Hz input ½ mV RMS, 1½ mV peak to peak with either positive or negative terminal grounded; Temperature coefficient 0.01%/°C.

AC Input ..... Add the suffix "L." All models available with 205-265 VAC, 45-440 Hz (40°C rating not applicable) Add $10.00 or 10% to the price, whichever is greater.

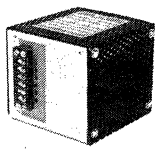
Fungus Proofing ..... Add the suffix "F." For a $10.00 surcharge, all models can be obtained with MIL-V-173 varnish for all fungi nutrient components.

TDC
POWER BY THUNDER

Modular power supplies single output wide range models specifications

TI-A SINGLE OUTPUT

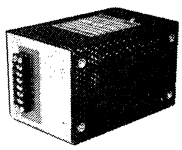
$3\frac{5}{32}$" x $3\frac{5}{32}$" x $3\frac{5}{32}$"
REGULATION: 0.01% + 1mV
RIPPLE: 1 mV RMS
$80.00



Model	Adj. Volt Range VDC	Max. mA at Ambient of: 40°C	50°C	60°C	71°C
TI-A-7	0-7	550	455	350	240
TI-A-18	0-18	330	275	210	140
TI-A-32	0-32	240	205	155	95
TI-A-60	0-60	145	115	87	57
TI-A-120	0-120	50	50	45	30

TI-B SINGLE OUTPUT

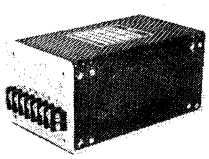
$3\frac{3}{16}$" x $3\frac{5}{16}$" x 5"
REGULATION: 0.01% + 1mV
RIPPLE: 1 mV RMS
$89.00



TI-B-7	0-7	1200	1000	750	500
TI-B-18	0-18	750	620	480	320
TI-B-32	0-32	400	350	265	170
TI-B-60	0-60	240	190	140	85

TI-C SINGLE OUTPUT

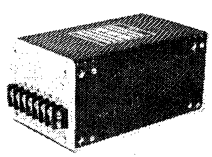
$3\frac{3}{16}$" x $3\frac{3}{4}$" x $6\frac{1}{2}$"
REGULATION: 0.01% + 1mV
RIPPLE: 1 mV RMS
$98.00



TI-C-7	0-7	2.0	1.9	1.6	1.1
TI-C-18	0-18	1.1	1.0	0.9	0.7
TI-C-32	0-32	0.69	0.64	0.60	0.45
TI-C-60	0-60	0.37	0.34	0.31	0.25
TI-C-120	0-120	0.10	0.10	0.10	0.10

TI-D SINGLE OUTPUT

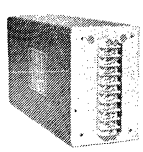
$3\frac{3}{16}$" x $4\frac{15}{16}$" x $6\frac{1}{2}$"
REGULATION: 0.01% + 1mV
RIPPLE: 1 mV RMS
$129.00



TI-D-7	0-7	3.7	3.3	2.7	1.7
TI-D-18	0-18	2.0	1.8	1.6	1.2
TI-D-32	0-32	1.1	1.0	0.8	0.5
TI-D-60	0-60	0.6	0.55	0.45	0.3
TI-D-120	0-120	0.25	0.25	0.22	0.16

TI-E SINGLE OUTPUT

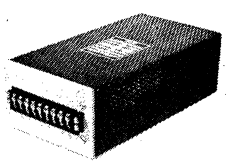
$3\frac{3}{16}$" x $4\frac{15}{16}$" x $9\frac{3}{8}$"
REGULATION:
0.05% + 4 mV — line
0.03% + 3 mV — load
RIPPLE: 1 mV RMS
$145.00



TI-E-7	0-7	4.0	3.6	3.0	2.4
TI-E-14	0-14	2.2	2.0	1.8	1.5
TI-E-32	0-32	1.1	1.0	0.90	0.80
TI-E-14A	8.5-14	3.3	3.0	2.5	2.0
TI-E-23	13-23	2.3	2.1	1.7	1.4
TI-E-32A	22-32	2.0	1.8	1.5	1.2
TI-E-60	30-60	1.1	1.0	0.80	0.60

TI-F SINGLE OUTPUT

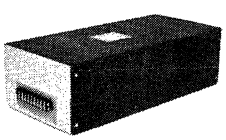
$4\frac{15}{16}$" x $7\frac{1}{2}$" x $11\frac{3}{4}$"
REGULATION:
0.05% + 4 mV — line
0.03% + 3 mV — load
RIPPLE: 1 mV RMS
$245.00



TI-F-7	0-7	12.0	10.5	8.5	6.8
TI-F-14	0-14	7.4	6.4	5.2	4.1
TI-F-32	0-32	3.7	3.2	2.6	2.1

TI-G SINGLE OUTPUT

$4\frac{15}{16}$ x $7\frac{1}{2}$" x $16\frac{1}{2}$"
REGULATION:
0.05% + 4 mV — line
0.03% + 3 mV — load
RIPPLE: 1 mV RMS
$333.50



TI-G-7	0-7	16.0	13.5	11.2	9.2
TI-G-14	0-14	10.2	8.6	7.3	6.1
TI-G-32	0-32	5.2	4.4	3.8	3.2

EQUIVALENT
Lambda LC & LM series
Powermate OEM

THUNDER INTERNATIONAL CORPORATION 64 TUTTLE ROAD, MIDDLETOWN, CONN. 06457 • (203) 347-8536

TDC

POWER BY THUNDER

Modular power supplies single output fixed voltage models specifications

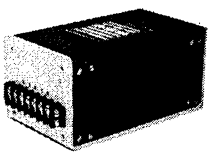
TIF-C SINGLE OUTPUT

3 3/16" x 3 3/4" x 6 1/2"

REGULATION: 0.01% + 1 mV

RIPPLE: 1 mV RMS

$93.00



Model	Fixed Volt. Range VDC	Max. Amps at Ambient of:(1) 40°C	50°C	60°C	71°C
TIF-C-3	3±5%	3.0	2.5	2.0	1.4
TIF-C-3.6	3.6±5%	2.9	2.4	1.9	1.3
TIF-C-4	4±5%	2.9	2.4	1.9	1.3
TIF-C-4.5	4.5±5%	2.8	2.3	1.8	1.2
TIF-C-5	5±5%	2.7	2.3	1.8	1.2
TIF-C-6	6±5%	2.6	2.2	1.8	1.2
TIF-C-8	8±5%	2.4	2.0	1.7	1.1
TIF-C-10	10±5%	2.1	1.8	1.5	1.0
TIF-C-12	12±5%	1.9	1.7	1.3	0.9
TIF-C-15	15±3%	1.8	1.5	1.2	0.9
TIF-C-18	18±5%	1.6	1.3	1.1	0.8
TIF-C-20	20±5%	1.4	1.2	1.0	0.8
TIF-C-24	24±5%	1.1	1.0	0.85	0.70
TIF-C-28	28±5%	1.0	0.9	0.75	0.60
TIF-C-36	36±5%	0.90	0.80	0.70	0.50
TIF-C-48	48±5%	0.60	0.55	0.50	0.45

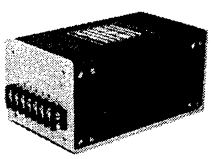
TIF-D SINGLE OUTPUT

3 3/16" x 4 15/16" x 6 1/2"

REGULATION:
0.05% + 4 mV — line
0.03% + 3 mV — load

RIPPLE: 1 mV RMS

$115.00



TIF-D-5	5±5%	3.7	3.2	2.5	1.5
TIF-D-6	6±5%	3.2	2.9	2.4	1.4
TIF-D-12	12±5%	2.5	2.3	2.1	1.3
TIF-D-15	15±5%	2.2	2.0	1.8	1.3
TIF-D-20	20±5%	1.8	1.6	1.5	1.2
TIF-D-24	24±5%	1.4	1.3	1.2	1.1
TIF-D-28	28±5%	1.3	1.2	1.1	1.0

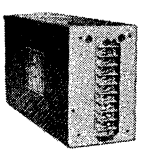
TIF-E SINGLE OUTPUT

3 3/16" x 4 15/16 x 9 3/8"

REGULATION:
0.05% + 4 mV — line
0.03% + 3 mV — load

RIPPLE: 1 mV RMS

$138.00



TIF-E-5	5±5%	5.1	4.3	3.4	2.4
TIF-E-6	6±5%	4.8	4.1	3.3	2.4
TIF-E-12	12±5%	4.0	3.5	2.9	1.9
TIF-E-15	15±5%	3.5	3.2	2.8	1.9
TIF-E-20	20±5%	3.1	2.9	2.6	1.8
TIF-E-24	24±5%	2.5	2.4	2.2	1.5
TIF-E-28	28±5%	2.3	2.1	2.0	1.4

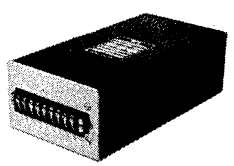
TIF-F SINGLE OUTPUT

4 15/16" x 7 1/2" x 11 3/4"

REGULATION:
0.05% + 4 mV — line
0.03% + 3 mV — load

RIPPLE: 1 mV RMS

$265.00



TIF-F-5	5±5%	20.0	18.0	16.4	10.0
TIF-F-6	6±5%	19.0	17.3	15.6	10.0
TIF-F-12	12±5%	15.0	13.6	12.3	9.5
TIF-F-15	15±5%	14.0	12.7	11.5	8.6
TIF-F-20	20±5%	12.0	10.9	9.8	8.5
TIF-F-24	24±5%	11.0	10.0	9.0	7.6
TIF-F-28	28±5%	10.0	9.0	8.0	7.1
TIF-F-36	36±5%	8.0	7.0	6.2	6.0

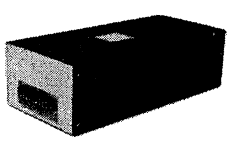
TIF-G SINGLE OUTPUT

4 15/16" x 7 1/2" x 16 1/2"

REGULATION:
0.05% + 4 mV — line
0.03% + 3 mV — load

RIPPLE: 1 mV RMS

$335.00



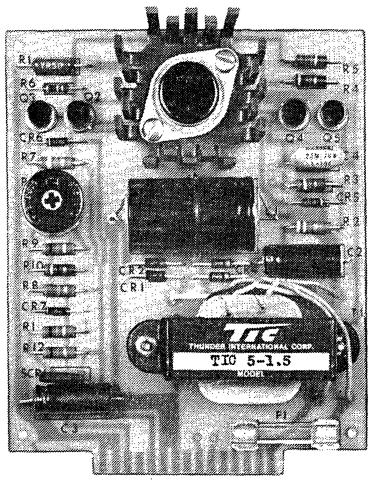
TIF-G-5	5±5%	31.0	24.6	20.8	17.3
TIF-G-6	6±5%	30.0	24.6	20.8	17.3
TIF-G-12	12±5%	21.0	19.0	16.1	13.2
TIF-G-15	15±5%	19.0	18.0	15.5	12.7
TIF-G-20	20±5%	15.2	13.7	11.8	9.7
TIF-G-24	24±5%	14.0	12.5	10.8	9.0
TIF-G-28	28±5%	13.0	11.5	9.8	8.2
TIF-G-48	48±5%	7.7	7.1	6.5	5.4

EQUIVALENT
Lambda LC & LM series
Powermate OEM

THUNDER INTERNATIONAL CORPORATION 64 TUTTLE ROAD, MIDDLETOWN, CONN. 06457 • (203) 347-8536

TIC
POWER BY THUNDER

Low cost plug-in IC power supplies specifications



TIC-5 & TIC-H

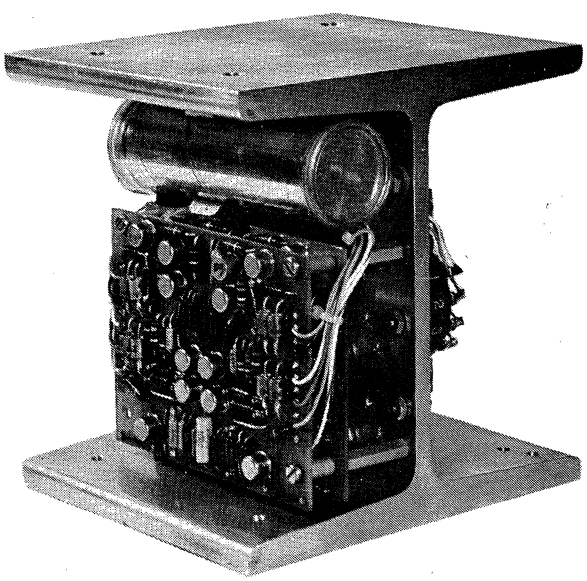
TYPICAL SPECIFICATIONS

Input Voltage Range:	105-125 VAC
Input Frequency Range:	47-420 Hertz
Output Voltage:	5.0 Adjustable ±5%
Output Current:	1.5 Amps
Regulation:	Line & Load ±0.1%
Ripple:	Less than 5mv RMS
Temperature Ambient:	Operating −20 to +55°C Storage −20 to 85°C
Temperature Coefficient:	0.05%/°C
Recovery Time:	Less than 50 μsec ½ load to full load.
Short Circuit Protected	

TIC-5 Series

Model	Amps	Size	10 to 99 Price
TIC-5-1.5	1.5	4½ x 5⅛ x 2⅛	23.00
TIC-5-3.0	3.0	4½ x 6⅜ x 2¾	36.95

OPTIONS	SUFFIX	PRICE
Overvoltage Protection	C	5.00 for TIC-5 Series 8.00 for TIC-5H Series
Remote Programming	P	3.00
Input Fusing	I	1.50
Fixed Voltage	F	n/c



TIC-H-M6

with multiple outputs available!
5.0 VDC @ 6.0 A
±15 VDC @ 500 ma
Size: 7 x 6 x 6
Temperature Ambient: −20 to +65°C
Price: 168.00

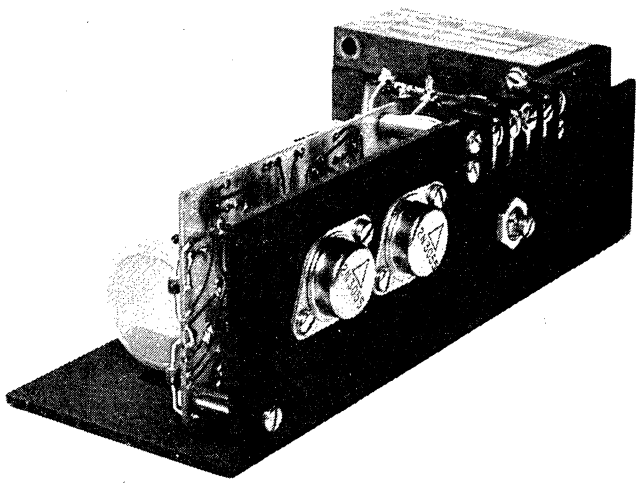
TIC-H Series

Model	Amps	Size	Unit Price
TIC-H-5.0	5.0	5 x 6 x 6	67.00
TIC-H-7.0	7.0	5 x 6 x 6	74.00
TIC-H-10.0	10.0	7 x 6 x 6	95.00

POWER BY THUNDER

Lightning series commercial AC to DC regulated supplies specifications

Low cost, high performance power supplies, 5 thru 28 volts, designed for transistor circuitry, power operational amplifiers, logic IC's, or similar commercial applications.



SPECIFICATIONS

Input voltage range: 105-125 volts.

Input frequency range: 47-420 Hz.

Regulation-Line and Load Combined: ±0.1%

Ripple (RMS): 10 mv

Temperature Coefficient: (TYP.) ±0.05%/°C or 5 mv/°C whichever is greater.

Polarity: May be used positive or negative.

Short circuit protection: Automatic circuit protects the power supply if the output is shorted continuously. Automatic recovery upon removal of short circuit without disconnecting load.

Remote sensing: Provisions are made for remote sensing.

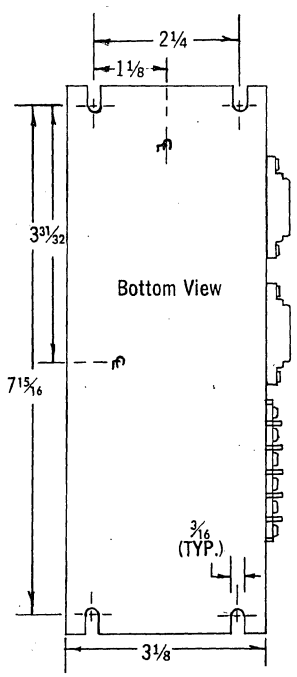
Operating temperature: 0°C to +55°C for current ratings specified in model listing.

Storage temperature: −20°C to +85°C.

Overvoltage protection: Available for all models as an option.

Recovery time: Less than 50 usec, ½ L to FL.

MOUNTING DIMENSIONS



VOLTAGE AND CURRENT RATINGS

Adjustable Output Voltage	Output Current	Standard Model No.	Price 1-4 Units	Price 5-9 Units	Overvoltage Suffix	Price
5.0±5%	5.0	LHL5.0-5.0	$46.00	$41.00	C	Add $5.00
6.0+5%	4.5	LHL6.0-4.5	46.00	41.00	C	Add $5.00
12.0±5%	2.5	LHL12.0-2.5	46.00	41.00	C	Add $5.00
15.0±5%	2.0	LHL15.0-2.0	46.00	41.00	C	Add $5.00
24.0±5%	1.5	LHL24.0-1.5	46.00	41.00	C	Add $5.00
28.0±5%	1.2	LHL28.0-1.2	46.00	41.00	C	Add $5.00

EQUIVALENT
Technipower Practicals Power/Mate ICX

10 To 99 Pcs.

Prices for large quantities, consult factory.
Custom specifications on request.

$36.95

THUNDER INTERNATIONAL CORPORATION 64 TUTTLE ROAD, MIDDLETOWN, CONN. 06457 • (203) 347-8536

TDC
POWER BY THUNDER

specifications

S-90, DD-115, DDF-115

S-90 INDUSTRY STANDARD

Input Voltage Range:
103-127 volts
(95-135; 200-240 range available)

Input Frequency Range:
47-420 cycles

Output VDC Adjust. Range:
10% with screwdriver adjustment in base (25% adjust. available)

Regulation (Line, Load, and Frequency)
A models: ±0.05% or 15 mv whichever is greater
B models: ±0.5%

Recovery Time:
Less than 50 μsec, ½ L. to FL.

Designed to Meet MIL Environmental Specifications:
RFI: MIL-I-6181D
Shock: MIL-STD-202C, Method 205C
Vibration: MIL-STD-202C, Method 201A
Humidity: MIL-STD-202C, Method 103B

Options:
Consult factory for various options available

Output Impedance: (typical)
A models: 0.1 ohms DC- 50 KC
0.5 ohms DC-500 KC
B models: 0.1 ohms DC- 50 KC
0.5 ohms DC-500 KC

Ripple: (typical)
A models: less than 0.006% or 3 mv rms, whichever is greater, with 60 Hz input; 0.004% or 3 mv rms, whichever is greater, with 400 Hz input.
B models: less than 0.01% or 5 mv rms, whichever is greater, with 60 Hz input; 0.04% or 10 mv rms, whichever is greater, with 400 Hz input.

Polarity:
Either positive or negative.

Storage Temperature:
−65°C to +85°C

Short Circuit Protection:
Standard foldback circuitry protects each model if output is shorted. Automatic recovery.

Temperature:
Base temperature operation at 90°C maximum. Operating temperature range −20°C to +90°C; temperature coefficient 0.02%/°C (typical).

DD-115 and DDF-115

Qualified for Extreme MIL Environments

Input Voltage Range:
105-125 volts
(95-135; 200-240 range available)

Input Frequency Range:
47-400 cycles (DD-115 series)
400 cycles (DDF-115 series)

Output VDC Adjust. Range:
10% with screwdriver adjustment in base (25% adjust. available)

Regulation (Line, Load and Frequency):
±0.05% or 15 mv rms whichever is greater

Output Impedance (typical):
0.1 ohms DC- 50 KC
0.5 ohms DC-500 KC

Recovery Time:
Less than 50 μsec, ½ L to FL.

Ripple:
DD-115 models: less than 0.002% or 1 mv rms (whichever is greater), 0.004% or 3 mv rms with 400 Hz input.
DDF-115 models: less than 0.004% or 3 mv rms (whichever is greater).

Polarity:
Either positive or negative.

Temperature:
Operation at 115°C base temperature permissible.

Storage Temperature:
−62°C to +125°C

Short Circuit Protection:
Unique foldback circuitry protects each module if output should be shorted continuously. Automatic return after short removal.

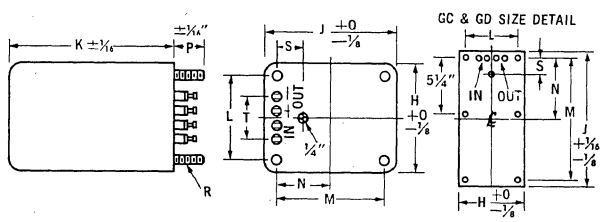
POWER BY THUNDER

S-90 INDUSTRY STANDARD
single output adjustable voltage specifications

Output Voltage Adjust. Range	Output Current (Amps)	Case Size (See Dwg)	"A" Models ±0.05% Accuracy Model	Price	"B" Models ±0.5% Accuracy Model	Price
2.8-3.2	0.375	B2	S3.0-0.375A	90	S3.0-0.375B	85
2.8-3.2	0.750	C2	S3.0-0.750A	95	S3.0-0.750B	90
2.8-3.2	1.5	E2	S3.0-1.5A	100	S3.0-1.5B	95
2.8-3.2	3.0	F2	S3.0-3.0A	105	S3.0-3.0B	100
2.8-3.2	6.0	G2	S3.0-6.0A	135	S3.0-6.0B	130
2.8-3.2	12.0	GB	S3.0-12.0A	195	S3.0-12.0B	190
2.8-3.2	25.0	GC	S3.0-25.0B	285	S3.0-25.0B	280
3.9-4.3	0.375	B2	S4.1-0.375A	90	S4.1-0.375B	85
3.9-4.3	0.750	C2	S4.1-0.750A	95	S4.1-0.750B	90
3.9-4.3	1.5	E2	S4.1-1.5A	100	S4.1-1.5B	95
3.9-4.3	3.0	F2	S4.1-3.0A	110	S4.1-3.0B	105
3.9-4.3	6.0	G2	S4.1-6.0A	150	S4.1-6.0B	145
3.9-4.3	12.0	GB	S4.1-12.0A	215	S4.1-12.0B	210
3.9-4.3	25.0	GC	S4.1-25.0A	305	S4.1-25.0B	300
5.8-6.3	0.375	B2	S6.0-0.375A	90	S6.0-0.375B	85
5.8-6.3	0.750	C2	S6.0-0.750A	95	S6.0-0.750B	90
5.8-6.3	1.5	E2	S6.0-1.5A	100	S6.0-1.5B	95
5.8-6.3	3.0	F2	S6.0-3.0A	120	S6.0-3.0B	115
5.8-6.3	6.0	G2	S6.0-6.0A	165	S6.0-6.0B	160
5.8-6.3	12.0	GB	S6.0-12.0A	245	S6.0-12.0B	240
5.8-6.3	25.0	GC	S6.0-25.0A	340	S6.0-25.0B	335
11.4-12.5	0.200	B2	S12.0-0.200A	90	S12.0-0.200B	85
11.4-12.5	0.375	B2	S12.0-0.375A	95	S12.0-0.375B	90
11.4-12.5	0.750	D2	S12.0-0.750A	100	S12.0-0.750B	95
11.4-12.5	1.5	F2	S12.0-1.5A	110	S12.0-1.5B	105
11.4-12.5	3.0	G2	S12.0-3.0A	155	S12.0-3.0B	150
11.4-12.5	6.0	GA	S12.0-6.0A	205	S12.0-6.0B	200
11.4-12.5	12.0	GB	S12.0-12.0A	270	S12.0-12.0B	265
11.4-12.5	25.0	GC	S12.0-25.0A	405	S12.0-25.0B	400
18.5-20.2	0.100	A2	S19.2-0.100A	85	S19.2-0.100B	80
18.5-20.2	0.200	B2	S19.2-0.200A	90	S19.2-0.200B	85
18.5-20.2	0.375	C2	S19.2-0.375A	95	S19.2-0.375B	90
18.5-20.2	0.750	D2	S19.2-0.750A	100	S19.2-0.750B	95
18.5-20.2	1.5	G2	S19.2-1.5A	135	S19.2-1.5B	130
18.5-20.2	3.0	GA	S19.2-3.0A	165	S19.2-3.0B	160
18.5-20.2	6.0	GB	S19.2-6.0A	220	S19.2-6.0B	215
18.5-20.2	12.0	GC	S19.2-12.0A	300	S19.2-12.0B	295
18.5-20.2	25.0	GD	S19.2-25.0A	415	S19.2-25.0B	410

MECHANICAL DATA

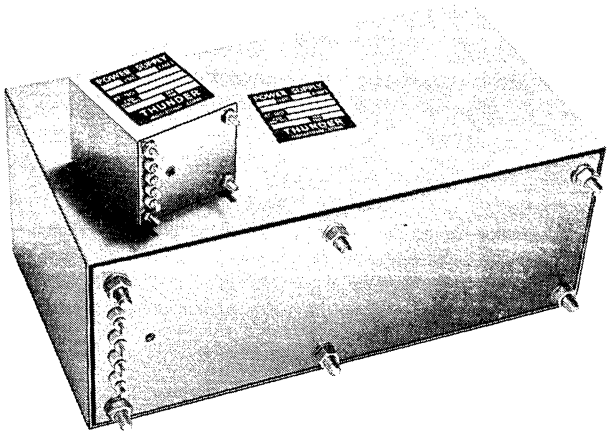
(Case size is called out in list of models and prices)



Case Size	MODULE DIMENSIONS H	J	K	L	M	N	P	R	S	T	Tolerances L,M,N,S	Recommended Clearance Terminal Cutouts	Terminal Height ±1/16
A2	2 3/8	2 3/4	3 13/16	1 3/4	2 1/8	1 1/16	11/32	6-32	19/32	15/16	±1/64	3/8x1 5/16	19/32
B2	2 5/8	3 1/16	4 1/4	1 55/64	2 19/64	1 5/32	11/32	8-32	19/32	15/16	±1/64	3/8x1 5/16	19/32
C2	3 1/16	3 9/16	4 7/8	2 1/8	2 5/8	1 5/16	11/32	8-32	19/32	15/16	±1/64	3/8x1 5/16	19/32
D2	3 3/8	3 15/16	5 1/4	2 7/16	3	1 1/2	15/32	10-32	19/32	15/16	±1/32	3/8x1 5/16	19/32
E2	3 11/16	4 5/16	5 9/16	2 11/16	3 5/16	1 21/32	7/16	10-32	19/32	15/16	±1/32	3/8x1 5/16	19/32
F2	4	4 11/16	6	3	3 11/16	1 27/32	9/16	1/4-20	19/32	15/16	±3/64	3/8x1 5/16	19/32
G2	4 5/16	5 1/16	6 13/16	3 5/16	4 1/16	2 1/32	9/16	1/4-20	19/32	15/16	±3/64	3/8x1 5/16	19/32
GA	4 15/16	6 9/16	7	3 5/8	5 1/4	2 5/8	21/32	5/16-18	3/4	1 1/2	±3/64	1/2x2	5/8
GB	6 9/16	6 3/4	7	5 1/4	5 7/16	2 23/32	21/32	5/16-18	3/4	1 1/2	±3/64	1/2x2	5/8
GC*	4 15/16	13 1/16	7	3 5/8	11 13/16	5 29/32	21/32	5/16-18	3/4	1 7/8	±3/64	5/8x2 1/2	5/8
GD*	6 9/16	13 1/16	7	5 1/16	11 13/16	5 29/32	21/32	5/16-18	3/4	1 7/8	±3/64	5/8x2 1/2	5/8

*See detail

Consult factory for voltage ranges not listed.
All voltages 2.8 thru 350 VDC standard.



Output Voltage Adjust. Range	Output Current (Amps)	Case Size (See Dwg)	"A" Models ±0.05% Accuracy Model	Price	"B" Models ±0.5% Accuracy Model	Price
26.8-29.2	0.100	A2	S28.0-0.100A	90	S28.0-0.100B	85
26.8-29.2	0.200	B2	S28.0-0.200A	95	S28.0-0.200B	90
26.8-29.2	0.375	C2	S28.0-0.375A	100	S28.0-0.375B	95
26.8-29.2	0.750	E2	S28.0-0.750A	115	S28.0-0.750B	110
26.8-29.2	1.5	G2	S28.0-1.5A	140	S28.0-1.5B	135
26.8-29.2	3.0	GA	S28.0-3.0A	170	S28.0-3.0B	165
26.8-29.2	6.0	GB	S28.0-6.0A	235	S28.0-6.0B	230
26.8-29.2	12.0	GC	S28.0-12.0A	315	S28.0-12.0B	310
26.8-29.2	25.0	GD	S28.0-25.0A	420	S28.0-25.0B	415
36.2-40.0	0.050	A2	S38.0-0.050A	90	S38.0-0.050B	85
36.2-40.0	0.100	A2	S38.0-0.100A	95	S38.0-0.100B	90
36.2-40.0	0.200	B2	S38.0-0.200A	100	S38.0-0.200B	95
36.2-40.0	0.375	D2	S38.0-0.375A	105	S38.0-0.375B	100
36.2-04.0	0.750	F2	S38.0-0.750A	130	S38.0-0.750B	125
36.2-40.0	1.5	G2	S38.0-1.5A	155	S38.0-1.5B	150
36.2-40.0	3.0	GA	S38.0-3.0A	210	S38.0-3.0B	205
36.2-40.0	6.0	GB	S38.0-6.0A	280	S38.0-6.0B	275
36.2-40.0	12.0	GC	S38.0-12.0A	370	S38.0-12.0B	365
59.0-65.0	0.050	C2	S62.0-0.050A	100	S62.0-0.050B	95
59.0-65.0	0.100	D2	S62.0-0.100A	105	S62.0-0.100B	100
59.0-65.0	0.200	E2	S62.0-0.200A	110	S62.0-0.200B	105
59.0-65.0	0.375	F2	S62.0-0.375A	140	S62.0-0.375B	135
59.0-65.0	0.750	G2	S62.0-0.750A	160	S62.0-0.750B	155
59.0-65.0	1.5	GA	S62.0-1.5A	200	S62.0-1.5B	195
59.4-65.0	3.0	GB	S62.0-3.0A	280	S62.0-3.0B	275
59.4-65.0	6.0	GC	S62.0-6.0A	380	S62.0-6.0B	375
59.0-65.0	12.0	GD	S62.0-12.0A	495	S62.0-12.0B	490
80.0-88.0	0.050	C2	S84.0-0.050A	110	S84.0-0.050B	105
80.0-88.0	0.100	D2	S84.0-0.100A	115	S84.0-0.100B	110
80.0-88.0	0.200	E2	S84.0-0.200A	120	S84.0-0.200B	115
80.0-88.0	0.375	G2	S84.0-0.375A	155	S84.0-0.375B	150
80.0-88.0	0.750	GA	S84.0-0.750A	185	S84.0-0.750B	180
80.0-88.0	1.5	GB	S84.0-1.5A	235	S84.0-1.5B	230
80.0-88.0	3.0	GC	S84.0-3.0A	325	S84.0-3.0B	320
80.0-88.0	6.0	GD	S84.0-6.0A	445	S84.0-6.0B	440
275.0-315.0	0.050	F2	S290.0-0.050A	150	S290.0-0.050B	145
275.0-315.0	0.100	G2	S290.0-0.100A	190	S290.0-0.100B	185
275.0-315.0	0.200	GA	S290.0-0.200A	235	S290.0-0.200B	230
275.0-315.0	0.375	GB	S290.0-0.375A	295	S290.0-0.375B	290
275.0-315.0	0.750	GC	S290.0-0.750A	405	S290.0-0.750B	400
275.0-315.0	1.5	GD	S290.0-1.5A	545	S290.0-1.5B	540

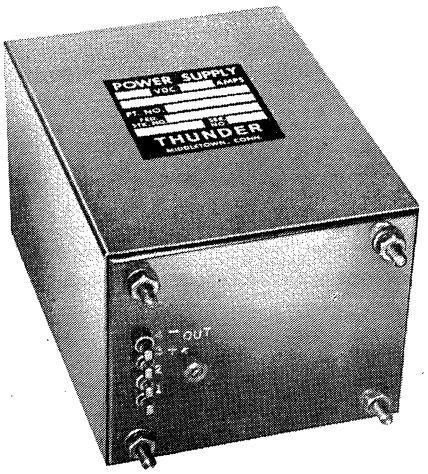
EQUIVALENT
Technipower P-80 CEA6 Series

TDC
POWER BY THUNDER

Power modules
DD & DDF
specifications

Output Voltage Adjust. Range	Output Current (Amps)	50-400 Hz Models	Case Size (See Dwg)	Price	400 Hz Models	Case Size (See Dwg)	Price
2.8-3.2	0.375	DD3.0-0.375	D1	105	DDF3.0-0.375	D1	85
2.8-3.2	0.750	DD3.0-0.750	E1	120	DDF3.0-0.750	D1	100
2.8-3.2	1.5	DD3.0-1.5	F1	140	DDF3.0-1.5	E1	115
2.8-3.2	3.0	DD3.0-3.0	G1	170	DDF3.0-3.0	F1	130
2.8-3.2	6.0	DD3.0-6.0	GA1	225	DDF3.0-6.0	G1	185
2.8-3.2	12.0	DD3.0-12.0	GB1	340	DDF3.0-12.0	GA1	280
2.8-3.2	25.0	DD3.0-25.0	GD1	520	DDF3.0-25.0	GB1	430
4.7-5.3	0.375	DD5.1-0.375	C1	115	DDF5.1-0.375	B1	95
4.7-5.3	0.750	DD5.1-0.750	D1	135	DDF5.1-0.750	C1	110
4.7-5.3	1.5	DD5.1-1.5	E1	160	DDF5-1-1.5	D1	130
4.7-5.3	3.0	DD5.1-3.0	G1	200	DDF5.1-3.0	E1	165
4.7-5.3	6.0	DD5.1-6.0	GA1	295	DDF5.1-6.0	F1	245
4.7-5.3	12.0	DD5.1-12.0	GB1	440	DDF5-1-12.0	GA1	365
4.7-5.3	25.0	DD5.1-25.0	GD1	660	DDF5.1-25.0	GB1	550
5.8-6.3	0.375	DD6.0-0.375	C1	120	DDF6.0-0.375	B1	100
5.8-6.3	0.750	DD6.0-0.750	D1	140	DDF6.0-0.750	C1	115
5.8-6.3	1.5	DD6.0-1.5	F1	160	DDF6.0-1.5	D1	130
5.8-6.3	3.0	DD6.0-3.0	G1	220	DDF6.0-3.0	E1	180
5.8-6.3	6.0	DD6.0-6.0	GA1	315	DDF6.0-6.0	F1	260
5.8-6.3	12.0	DD6.0-12.0	GC1	470	DDF6.0-12.0	GA1	390
5.8-6.3	25.0	DD6.0-25.0	GD1	710	DDF6.0-25.0	GB1	590
11.4-12.5	0.200	DD12.0-0.200	C1	115	DDF12.0-0.200	B1	95
11.4-12.5	0.375	DD12.0-0.375	C1	135	DDF12.0-0.375	B1	110
11.4-12.5	0.750	DD12.0-0.750	E1	160	DDF12.0-0.750	D1	125
11.4-12.5	1.5	DD12.0-1.5	G1	175	DDF12.0-1.5	E1	145
11.4-12.5	3.0	DD12.0-3.0	GA1	270	DDF12.0-3.0	F1	225
11.4-12.5	6.0	DD12.0-3.0	GB1	385	DDF12.0-6.0	G1	320
11.4-12.5	12.0	DD12.0-12.0	GC1	555	DDF12.0-12.0	GB1	460
11.4-12.5	25.0	DD12.0-25.0	GD1	840	DDF12.0-25.0	GB1	700

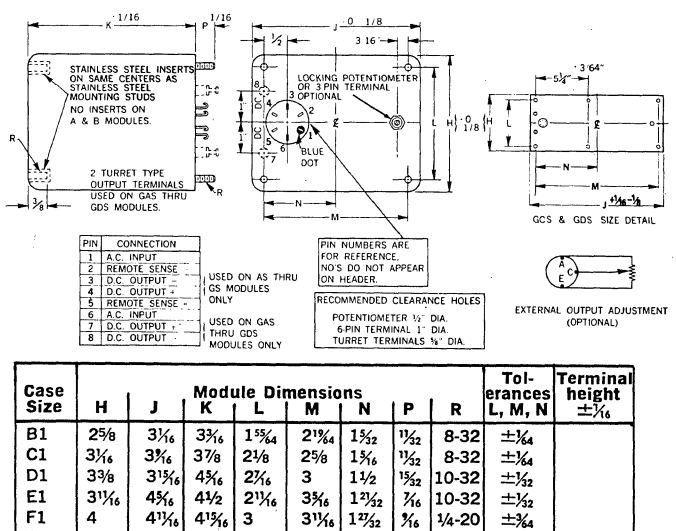
Consult factory for voltage ranges not listed.
All voltages 2.8 thru 350 VDC standard.



Output Voltage Adjust. Range	Output Current (Amps)	50-400 Hz Models	Case Size (See Dwg)	Price	400 Hz Models	Case Size (See Dwg)	Price
16.5-18.5	0.100	DD17.5-0.100	C1	110	DDF17.5-0.100	B1	90
16.5-18.5	0.200	DD17.5-0.200	D1	130	DDF17.5-0.200	B1	105
16.5-18.5	0.375	DD17.5-0.375	D1	140	DDF17.5-0.375	C1	115
16.5-18.5	0.750	DD17.5-0.750	F1	160	DDF17.5-0.750	D1	130
16.5-18.5	1.5	DD17.5-1.5	G1	225	DDF17.5-1.5	F1	185
16.5-18.5	3.0	DD17.5-3.0	GA1	295	DDF17.5-3.0	F1	245
16.5-18.5	6.0	DD17.5-6.0	GB1	435	DDF17.5-6.0	GA1	360
16.5-18.5	12.0	DD17.5-12.0	GD1	660	DDF17.5-12.0	GB1	550
24.4-26.8	0.100	DD25.7-0.100	C1	120	DDF25.7-0.100	B1	100
24.4-26.8	0.200	DD25.7-0.200	D1	135	DDF25.7-0.200	B1	110
24.4-26.8	0.375	DD25.7-0.375	E1	140	DDF25.7-0.375	C1	115
24.4-26.8	0.750	DD25.7-0.750	G1	180	DDF25.7-0.750	E1	150
24.4-26.8	1.5	DD25.7-1.5	GA1	225	DDF25.7-1.5	F1	185
24.4-26.8	3.0	DD25.7-3.0	GA1	320	DDF25.7-3.0	G1	265
24.4-26.8	6.0	DD25.7-6.0	GC1	475	DDF25.7-6.0	GB1	395
24.4-26.8	12.0	DD25.7-12.0	GD1	760	DDF25.7-12.0	GC1	630
32.7-36.2	0.050	DD34.5-0.050	C1	140	DDF34.5-0.050	B1	115
32.7-36.2	0.100	DD34.5-0.100	D1	145	DDF34.5-0.100	B1	120
32.7-36.2	0.200	DD34.5-0.200	D1	150	DDF34.5-0.200	B1	125
32.7-36.2	0.375	DD34.5-0.375	E1	165	DDF34.5-0.375	C1	135
32.7-36.2	0.750	DD34.5-0.750	G1	205	DDF34.5-0.750	E1	170
32.7-36.2	1.5	DD34.5-1.5	GA1	250	DDF34.5-1.5	F1	205
32.7-36.2	3.0	DD34.5-3.0	GB1	345	DDF34.5-3.0	GA1	285
32.7-36.2	6.0	DD34.5-6.0	GC1	500	DDF34.5-6.0	GB1	415
32.7-36.2	12.0	DD34.5-12.0	GD1	830	DDF34.5-12.0	GC1	690
44.0-48.0	0.050	DD46.0-0.050	C1	160	DDF46.0-0.050	B1	130
44.0-48.0	0.100	DD46.0-0.100	D1	165	DDF46.0-0.100	C1	135
44.0-48.0	0.200	DD46.0-0.200	E1	170	DDF46.0-0.200	C1	140
44.0-48.0	0.375	DD46.0-0.375	F1	200	DDF46.0-0.375	D1	165
44.0-48.0	0.750	DD46.0-0.750	GA1	230	DDF46.0-0.750	F1	190
44.0-48.0	1.5	DD46.0-1.5	GB1	270	DDF46.0-1.5	G1	225
44.0-48.0	3.0	DD46.0-3.0	GC1	380	DDF46.0-3.0	GA1	315
44.0-48.0	6.0	DD46.0-6.0	GD1	535	DDF46.0-6.0	GB1	445
275.0-315.0	0.050	DD290.0-0.050	F1	250	DDF290.0-0.050	D1	205
275.0-315.0	0.100	DD290.0-0.100	G1	320	DDF290.0-0.100	F1	265
275.0-315.0	0.200	DD290.0-0.200	GB1	355	DDF290.0-0.200	G1	295
275.0-315.0	0.375	DD290.0-0.375	GB1	465	DDF290.0-0.375	GA1	385
275.0-315.0	0.750	DD290.0-0.750	GD1	630	DDF290.0-0.750	GB1	525
275.0-315.0	1.5	DD290.0-1.5	GD1	825	DDF290.0-1.5	GC1	685

MECHANICAL DATA

(Case size is called out in list of models and prices)



PIN	CONNECTION
1	A.C. INPUT
2	REMOTE SENSE +
3	D.C. OUTPUT −
4	D.C. OUTPUT +
5	REMOTE SENSE −
6	A.C. INPUT
7	D.C. OUTPUT +
8	D.C. OUTPUT −

Case Size	Module Dimensions H	J	K	L	M	N	P	R	Tolerances L, M, N	Terminal height ±1/16
B1	2⅝	3 1/16	3 3/16	1 55/64	2 19/64	1 5/32	11/32	8-32	±1/64	
C1	3 1/16	3⅝	3⅞	2 1/8	2⅝	1 5/16	11/32	8-32	±1/64	
D1	3⅜	3 15/16	4 3/16	2 7/16	3	1½	15/32	10-32	±1/32	
E1	3 11/16	4 5/16	4½	2 11/16	3 5/16	1 21/32	7/16	10-32	±1/32	
F1	4	4 11/16	4 13/16	3	3 11/16	1 27/32	9/16	1/4-20	±3/64	
G1	4 5/16	5 1/16	5½	3 5/16	4 1/16	2 1/32	5/16	1/4-20	±3/64	
GA1	4 13/16	6 3/16	5 3/4	3 5/8	5 1/4	2 5/8	2 1/32	5/16-18	±3/64	5/8
GB1	6 1/16	6 3/4	5 3/4	5 1/4	5 7/16	2 23/32	2 1/32	5/16-18	±3/64	5/8
GC1	4 13/16	13 1/16	5 3/4	3 5/8	11 13/16	5 23/32	2 1/32	5/16-18	±3/64	5/8
GD1	6 1/16	13 1/16	5 3/4	5 7/16	11 13/16	5 23/32	2 1/32	5/16-18	±3/64	5/8

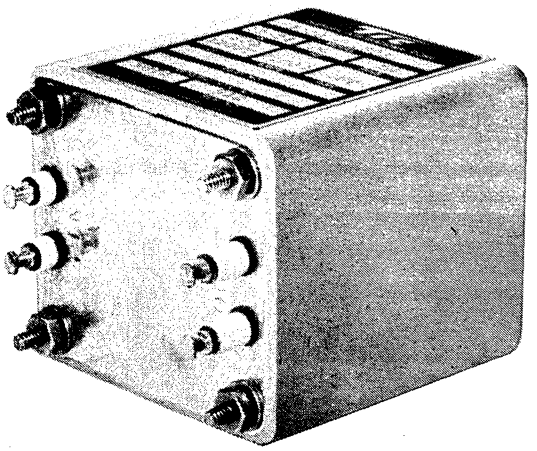
EQUIVALENT
Technipower F-115 FD-115

POWER BY THUNDER

specifications

single or dual output

DC to DC Capacitor Charging Circuits



Efficiency: 60% typical

Input Voltage range: 6VDC to 32VDC

Outputs: To 10,000VDC
(Can size will increase slightly for 5,000VDC to 10,000VDC outputs)

Power Out: To 25 Joules (Watt Seconds)

Size: 2.4″ x 2.7″ x 2.7″

Temperature: −65°C to +71°C

Weight: Approx. 16 oz.

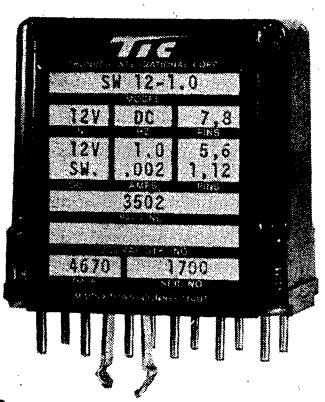
Inverse Input Protection

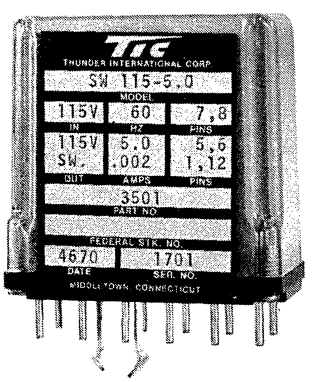
Low Level RFI from Input

Commercial or Full Mil-Spec.

SOLID STATE SWITCH

(Electronic Relay)





Input Current: 2MA

Output Capabilities: 5 Amps @ 115V AC
5 Amps @ 6-48V DC

Range can be extended to meet specific load requirements.

Load: Resistive or Inductive
Surge Current 1000%

Applications: Provides isolated power switching for motors solenoids, heaters, lamps, signal controls and capacitive loads under continuous cycling conditions.

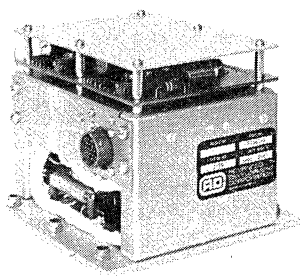
Units can be supplied in metal or plastic cases complete epoxy encapsulation.

TOPAZ ELECTRONICS 3855 RUFFIN ROAD, SAN DIEGO, CALIFORNIA 92123 • TELEPHONE (714) 279-0111

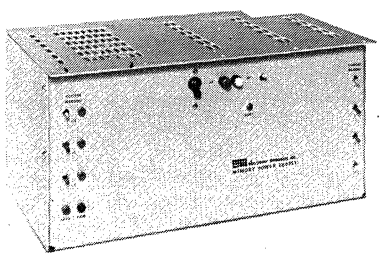
CUSTOM OEM POWER SUPPLIES: Multiple-Output DC

Power supplies, custom designed to meet specific system requirements have been the specialty of Advanced Development Corporation for over 10 years. Merged with TOPAZ early in 1971, ADC's broad custom-design experience is now offered as an important part of TOPAZ' service to the OEM market.

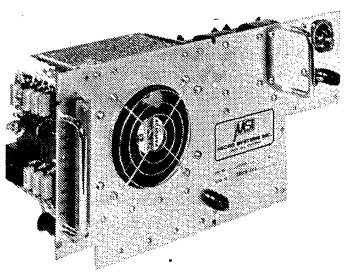
TOPAZ/ADC equipment features specialized circuit and packaging techniques for converting large amounts of power without thermal problems. Representative units have included hundreds of different supplies for: core memories, capstan drives, vacuum deposition, airborne electronics, pulsed TWT's, CW TWT's, photomultiplier tubes, and a broad variety of computers and peripherals. Pictured below is a small sample of typical TOPAZ/ADC supplies and their applications . . .



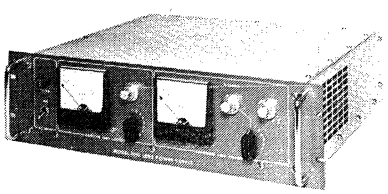
Airborne Logic System



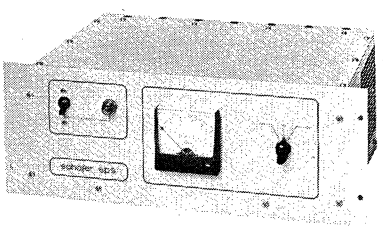
Nano 2610 Memory



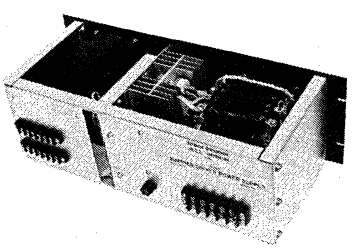
Micro 800 Computer



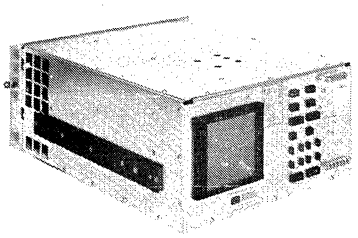
Electron Microscope System



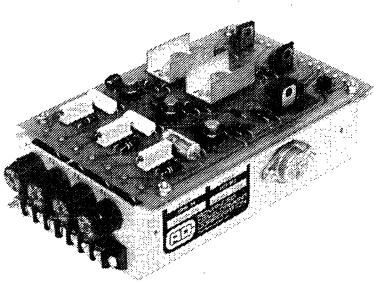
Automatic Broadcast System



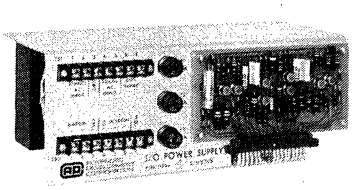
Line Printer



EMR 6100 Memory



Ticket Reservation Terminal



Remote I/O Terminal

"IF IT'S NOT ALREADY A TOPAZ STANDARD, LET US DESIGN A UNIT FOR YOU."

TOPAZ ELECTRONICS 3855 RUFFIN ROAD, SAN DIEGO, CALIFORNIA 92123 • TELEPHONE (714) 279-0111

NEW — FROM TOPAZ — the answer to brown outs, fluctuating AC voltages and most of the other ills of your utility company power

INTRODUCING

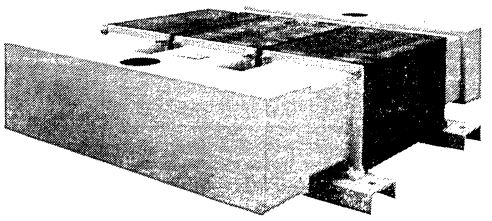
"THE TOPAZ" (Patent Applied For)

AC LINE VOLTAGE REGULATOR

OFFERING:

- Lowest cost approach to AC regulation problem.
- Large power handling capability.
- Available from 1 KVA (single phase) to 150 KVA (3-Phase).
- Insensitivity to line frequency variations.
- Fast response.
- Low distortion
- Remote shut-off capability provided.
- Power saver models (provide regulated "low-line" outputs).
- Extremely light weight.

Replaces — **with improved specs and at lower cost** — (1) Ferroresonant line voltage regulators, (2) Motor driven variable transformers, and (3) Most other types of AC voltage regulators.



AC Line Regulator Model 30 LRD 277T

MODEL NUMBER CODE

XXX LRX XXX X

- XXX → KVA output
- LRX → A = Wide range input (1), ±7% output; B = Normal input range (2), ±3% output; C = Wide range input (1), ±3% output; D = Normal input range (2), ±1% output
- XXX → Nominal output VAC
- X → Number of phases: S = Single phase; T = Three phase; P = Other polyphase

(1) Wide range inputs are: 80-125 V, or 160-250 V, or 200-300 V, or other on special order.

(2) Normal input ranges are: 105-125 V, or 210-250 V, or 252-302 V, or other on special order.

GENERAL SPECIFICATIONS

INPUT FREQUENCY:
44-70Hz

EFFICIENCY:
Nominally 95%

LINE VOLTAGE REGULATION:
See tables

REGULATION RESPONSE:
Less than 1 Hz

LOAD REGULATION:
1% for load change from 10% to 100% full load.

DISTORTION:
Adds less than 1% THD

REMOTE SHUT-OFF:
Available for all models
Power can be turned off and on by remotely controlled low-power signal.

TEMPERATURE:
0° to 55°C. operating

TEMPERATURE COEFFICIENT (regulation): 0.1%/°C. typical.

"LRA AND "LRC" SERIES AC LINE REGULATORS FOR "BROWN-OUT" LOW LINE VOLTAGE PROTECTION
These models provide regulation for power line drops of −30%. For input voltages below limits shown, output voltage decreases proportionally.

VAC Input	Out-put VAC	Phases No. of	Power KVA	Model No.	Reg. ±%	Price $ 1-4	Wt. #	Model No.	Reg. ±%	Price $ 1-4	Wt. #
80-125	117	1	1 2 4	1 LRA 117S 2 LRA 117S 4 LRA 117S	±7%	150.00 225.00 300.00	15 25 35	1 LRC 117S 2 LRC 117S 4 LRC 117S	±3%	225.00 337.50 450.00	25 35 45
160-250	230	1	2 4 8	2 LRA 230S 4 LRA 230S 8 LRA 230S	±7%	200.00 300.00 400.00	15 25 35	2 LRC 230S 4 LRC 230S 8 LRC 230S	±3%	300.00 450.00 600.00	25 35 45
80-125	117	3 (y)	6 12	6 LRA 117T 12 LRA 117T	±7%	600.00 900.00	65 90	6 LRC 117T 12 LRC 117T	±3%	900.00 1350.00	75 100
160-250	230	3 (y)	6 12 24	6 LRA 230T 12 LRA 230T 24 LRA 230T	±7%	600.00 900.00 1200.00	40 65 90	6 LRC 230T 12 LRC 230T 24 LRC 230T	±3%	900.00 1350.00 1800.00	50 75 100
200-300	277	3 (y)	15 30	15 LRA 277T 30 LRA 277T	±7%	1000.00 1500.00	75 100	15 LRC 277T 30 LRC 277T	±3%	1500.00 2250.00	75 100

"LRB" AND "LRD" SERIES AC LINE REGULATORS, FOR NORMAL POWER LINES
These models provide regulated outputs of ±3% or ±1%. For input voltages below limits shown, output voltage decreases proportionally.

105-125	115*	1	1 2 4	1 LRB 115S 2 LRB 115S 4 LRB 115S	±3%	150.00 225.00 300.00	15 25 35	1 LRD 115S 2 LRD 115S 4 LRD 115S	±1%	250.00 350.00 450.00	25 35 45
210-250	230*	1	2 4 8	2 LRB 230S 4 LRB 230S 8 LRB 230S	±3%	200.00 300.00 400.00	15 25 35	2 LRD 230S 4 LRD 230S 8 LRD 230S	±1%	300.00 450.00 600.00	25 35 45
105-125	115*	3 (y)	6 12	6 LRB 115T 12 LRB 115T	±3%	600.00 900.00	65 90	6 LRD 115T 12 LRD 115T	±1%	900.00 1350.00	75 100
210-250	230*	3 (y)	6 12 24	6 LRB 230T 12 LRB 230T 24 LRB 230T	±3%	600.00 900.00 1200.00	40 65 90	6 LRD 230T 12 LRD 230T 24 LRD 230T	±1%	900.00 1350.00 1800.00	50 75 100
252-302	277	3 (y)	15 30	15 LRB 277T 20 LRB 277T	±3%	1000.00 1500.00	65 90	15 LRD 277T 30 LRD 277T	±1%	1500.00 2250.00	75 100

* Regulated "low line" outputs can be provided to save power; e.g., 108 V ±3% is Model X LRB 108 or 216 V ±1% is Model X LRD 216.

Other models for higher power ratings (to 150 KVA 3-phase) and special (OEM) regulators with multiple outputs are available.

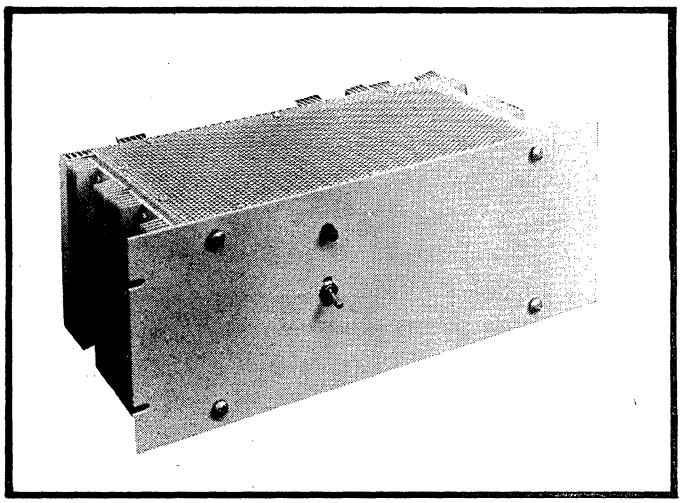
"IF IT'S NOT ALREADY A TOPAZ STANDARD, LET US DESIGN A UNIT FOR YOU."

TOPAZ ELECTRONICS 3855 RUFFIN ROAD, SAN DIEGO, CALIFORNIA 92123 • TELEPHONE (714) 279-0111

NEW

"GP" SERIES 60 Hz SINE WAVE INVERTERS

The new TOPAZ "GP" Series Inverters are designed for **continuous,** trouble-free operation and employ all solid-state circuitry. Yet they are priced competitively with lesser quality inverters capable of only intermittent duty and having unspecified (high) harmonic distortion outputs.



GENERAL SPECIFICATIONS

OUTPUT: 115 VAC average, 60 Hz, at 0 to 500 VA into loads of ±0.7 power factor, with 125% overload capacity for 1 minute.

Output voltage remains within 110 to 120 VAC average for worst simultaneous conditions of input and output and temperature.

Frequency remains between 58 and 62 Hz for worst simultaneous conditions.

EFFICIENCY: $\frac{P_{(OUT)}}{P_{(IN)}} \geqq 75\%$ at full load ,nominal line

OPERATING TEMPERATURE: −20 to +50°C.

COOLING: Natural convection.

DIMENSIONS: 17" W x 7" H x 13½" D. Panel for 19" rack mounting is available.

PROTECTION: Reverse polarity input • Electronic current limiting • Overload and short circuit on output.

ISOLATION: Will withstand 500 VRMS high potential test input to chassis. Output is transformer isolated.

DISTORTION: 6% THD at nominal input and full load at unity power factor, 10% THD maximum.

MODELS AVAILABLE

Model No.	Output VA	Input VDC	Rack Ht. (In.)	Net Wt. (Lbs.)	Price 1-4 pcs.
250GP-12-60	250	11-15	5¼	40	$395
250GP-24-60	250	22-30	5¼	40	$395
250GP-48-60	250	42-56	5¼	40	$395
250GP-125-60	250	105-140	5¼	40	$395
500GP-12-60	500	11-15	7	65	$550
500GP-24-60	500	22-30	7	65	$550
500GP-48-60	500	42-56	7	65	$550
500GP-125-60	500	105-140	7	65	$550
1000GP-12-60	1000	11-15	7	80	$875
1000GP-24-60	1000	22-30	7	80	$875
1000GP-48-60	1000	42-56	7	80	$875
1000GP-125-60	1000	105-140	7	80	$875

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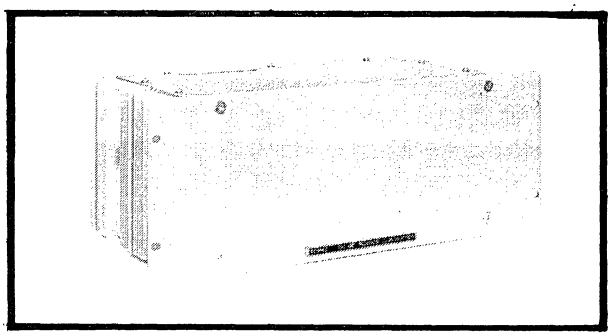


HIGH-EFFICIENCY DC-to-DC CONVERTERS

- **Uninterruptible power for critical control systems**
- **100 VA to 1000 VA power output, continuous duty**

1/3 to 2/3 greater overall efficiency than comparable systems using DC-to-AC inverters and AC-to-DC power supplies **plus** significant savings in power, weight, size and cost. High reliability through fewer parts and conservative component ratings.

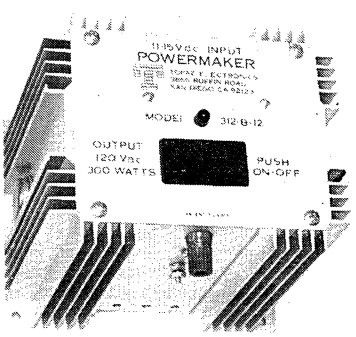
Replaces Inverter/Power Supply Combinations in: Process control remote terminals... EDP central processing units... memory and peripheral units... DC-powered electronics systems.

GENERAL SPECIFICATIONS

POWER OUTPUT:	Available from 100 to 1000 VA continuous duty.
STANDARD INPUT VOLTAGES:	12, 24, 28, 48, 125 VDC ±15% (units available for other DC or 117 VAC, 60 Hz input on special order).
MULTIPLE OUTPUT VOLTAGES:	3 VDC to 1000 VDC, + or −, all isolated, and in any combination. 100 VA Square Wave AC output (nom. 60 Hz) also available.
OUTPUT STABILITY:	**Regulation:** ±1% line and load (10% available at reduced price); **Ripple:** 1% maximum peak-to-peak vs. DC level; **Voltage/temperature coefficient:** 0.03% per degree C.
OVERALL EFFICIENCY:	Typically 65% to 75% (depends on output voltages).
CIRCUIT PROTECTION:	**Input** protected against reverse polarity. Filter for transient peaks of up to 2500 volts. 100 us period and 1 Hz rate available as standard option. **Output** protected against overload and short circuit, crowbar standard on +5 VDC output (optional on other voltages).
ENVIRONMENTAL:	**Temperature:** −20 to +71 degrees centigrade (operating); **Humidity:** to 95%.
TYPICAL DIMENSIONS:	19″ W x 7″ H x 12¼″ D (250-watt unit):

ASK FOR A CUSTOM QUOTE BASED ON STANDARD MODELS

POWERMAKER



- **Compact**
- **Rugged**
- **Easily Installed**
- **Converts 12, 24, 32 or 48 VDC to 60 Hz 120 VAC**

POWERMAKER by TOPAZ is available in four standard models for converting DC power from 12- through 48-volt batteries to 60 Hz AC power. All standard units are designed for **negative-ground circuits;** positive-ground units can be supplied to order. For special inverter requirements write to factory.

FEATURES

- All transistorized
- 300 watts continuous power
- Efficiency greater than 80%
- Short circuit and overload protected
- Ground-type outlet; accepts standard 2- or 3-prong plugs
- Complete with cables, mounting hardware, instructions
- Lightweight — only 11 lbs 14 oz, incl. cables
- Compact — 7″ x 7″ x 6½″
- Lustrous aluminum case

$89.95

"IF IT'S NOT ALREADY A TOPAZ STANDARD, LET US DESIGN A UNIT FOR YOU."

TOPAZ ELECTRONICS 3855 RUFFIN ROAD, SAN DIEGO, CALIFORNIA 92123 • TELEPHONE (714) 279-0111

GW SERIES • DC to AC SINE WAVE INVERTERS

Topaz GW series inverters supply quality AC power from DC sources. Output regulation and frequency stability are closely controlled, normally exceeding the specifications of public utility power. A wide tolerance from nominal input voltage is provided to accommodate the characteristics of storage batteries. Also, because most AC equipment exhibits a higher starting load than running load, the GW series is designed with automatic current limiting. This feature prevents turn off of the inverter even under continuous overload. Other specifications as outlined below exemplify the quality and forethought that have gone into the GW design.

GENERAL SPECIFICATIONS

FREQUENCY STABILITY:	±1% as listed. Std. Options (see below) offer 0.05% and 0.001%.
TEMPERATURE:	Operating −20°C. to +50°C. • Storage −40°C. to +80°C.
PROTECTION (Circuits included):	Input reverse polarity • Low or high input voltage • Overload and short circuit.
TOTAL HARMONIC DISTORTION:	< 5% at full load
OUTPUT VOLTAGE:	115 VAC normally supplied • 230 VAC available where listed.
VOLTAGE REGULATION:	Line: ±2% • Load: ±3%
INPUT FILTERING:	Filter S-1 — Reduces noise level at battery input to less than 30 dbrn. Filter S-2 — Protects unit from spikes on input of 1000 V. for up to 5 microseconds. Filter S-3 — Protects unit from spikes on input of 3000 V. for up to 1 millisecond.
PACKAGING:	Portable and rack-mounted units are available. Dimensions given in tables are for rack-mount versions. Add letter "D" in model number (GWD) to obtain portable mount.
AVAILABLE OPTIONS:	Mod "A" Frequency Stability: ±0.001% Mod "C" Frequency Stability: ±0.05% Mod "E" External Synchronization: By pulse or sine wave Mod "M" 2 meters (input or output voltage or amps.) Mod "R" Automatic Restart

60 Hz SINE WAVE OUTPUT

DUAL INPUT 12 or 24 VOLTS DC
(Selectable input range for operation from 11 - 15 VDC or 22 - 30 VDC)

RACK MODEL NO. (Request GWD for portable version)	OUTPUT (SINEWAVE) Power VA	OUTPUT (SINEWAVE) Volts AC	INPUT Amperage (No load to full load) @ 12 VDC	INPUT Amperage (No load to full load) @ 24 VDC	Full Load Eff.	HEIGHT Inches Overall All units 19" w x 13½" d	Net Wt. (Lbs.)	Ship Wt. (Lbs.)
125 GW-12-24-60	125	115	4 - 18	2 - 9	60%	5-1/4	30	44
250 GW-12-24-60	250	115	8 - 32	4 - 16	60%	5-1/4	39	55
500 GW-12-24-60	500	115	15 - 60	7.5- 30	70%	8-3/4	70	100
1000 GW-12-24-60	1000	115/230	22 - 120	11 - 60	70%	8-3/4	95	130
2000 GW-12-24-60	2000	115/230	44 - 240	22 - 120	70%	17-1/2	190	260
3000 GW-12-24-60	3000	115/230	70 - 360	35 - 180	70%	26-1/4	285	390
4000 GW-12-24-60	4000	115/230	90 - 480	45 - 240	70%	35	380	520

ALSO AVAILABLE AS: GW-28-60 (24-32 VDC INPUT); GW-48-60 (42-56 VDC INPUT); GW-125-60 (105-140 VDC INPUT); GW-250-60 (210-280 VDC INPUT).

400 Hz SINE WAVE OUTPUT

DUAL INPUT 12 or 24 VOLTS DC
(Selectable input range for operation from 11 - 15 VDC or 22 - 30 VDC)

125 GW-12-24-400	125	115	10 - 20	5 - 10	53%	5-1/4	25	40
250 GW-12-24-400	250	115	12 - 35	7 - 18	53%	5-1/4	30	45
500 GW-12-24-400	500	115	24 - 66	12 - 33	63%	8-3/4	43	75
1000 GW-12-24-400	1000	115	48 - 132	24 - 66	63%	8-3/4	56	90
2000 GW-12-24-400	2000	115	96 - 264	48 - 132	63%	17-1/2	112	182
3000 GW-12-24-400	3000	115	144 - 396	72 - 198	63%	26-1/4	168	273
4000 GW-12-24-400	4000	115	192 - 528	96 - 264	63%	35	224	364

ALSO AVAILABLE AS: GW-28-400 (24-32 VDC INPUT); GW-125-400 (100-140 VDC INPUT).

50 Hz SINE WAVE OUTPUT

DUAL INPUT 12 or 24 VOLTS DC
(Selectable input range for operation from 11 - 15 VDC or 22 - 30 VDC)

100 GW-12-24-50	100	115/230	5 - 14	2.5- 7	60%	5-1/4	30	44
200 GW-12-25-50	200	115/230	9 - 26	4.5- 13	60%	5-1/4	39	55
400 GW-12-24-50	400	115/230	15 - 60	7.5- 30	70%	8-3/4	70	100
800 GW-12-24-50	800	115/230	18 - 96	9 - 48	70%	8-3/4	95	130
1600 GW-12-24-50	1600	115/230	36 - 192	18 - 96	70%	17-1/2	190	260
2400 GW-12-24-50	2400	115/230	54 - 288	27 - 144	70%	26-1/4	285	390
3200 GW-12-24-50	3200	115/230	72 - 384	36 - 192	70%	35	380	520

ALSO AVAILABLE AS: GW-48-50 (42-56 VDC INPUT); GW-125-50 (105-140 VDC INPUT).

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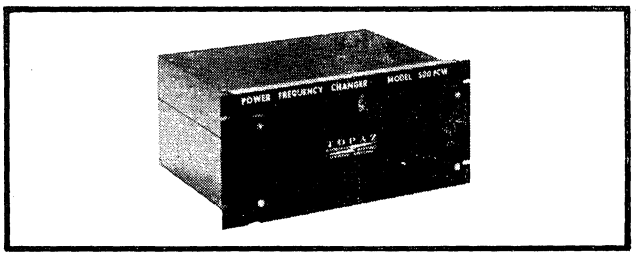
TOPAZ ELECTRONICS 3855 RUFFIN ROAD, SAN DIEGO, CALIFORNIA 92123 • TELEPHONE (714) 279-0111

FW SERIES • FREQUENCY CHANGERS SINE WAVE OUTPUT

(SINGLE OR THREE-PHASE* INPUT)



Topaz frequency changers are designed to convert any power line frequency of 45 Hz to 500 Hz to a single output frequency of either 50, 60, or 400 Hz. In addition to the obvious use of changing from one power system frequency to another, frequency changers also find wide application in stabilizing frequency and amplitude for critical electronic equipment.

* WRITE FACTORY FOR 3-PHASE AVAILABILITY.

60 Hz OUTPUT MODELS

RACK MODEL NO. (Request FWD for portable version)	OUTPUT Power VA	OUTPUT Volts AC	OUTPUT Freq. Hz	RACK HT. Inches Overall	Net Wt. (Lbs.)	Ship Wt. (Lbs.)
125 FW-60	125	115	60	5-1/4	38	52
250 FW-60	250	115	60	5-1/4	47	63
500 FW-60	500	115	60	8-3/4	80	110
1000 FW-60	1000	115/230	60	8-3/4	110	145
2000 FW-60	2000	115/230	60	17-1/2	220	290
3000 FW-60	3000	115/230	60	26-1/4	330	435
4000 FW-60	4000	115/230	60	35	440	580

400 Hz OUTPUT MODELS

125 FW-400	125	115	400	5-1/4	35	50
250 FW-400	250	115	400	5-1/4	40	55
500 FW-400	500	115	400	8-3/4	53	85
1000 FW-400	1000	115	400	8-3/4	60	95
2000 FW-400	2000	115	400	17-1/2	120	190
3000 FW-400	3000	115	400	26-1/4	180	285
4000 FW-400	4000	115	400	35	240	380

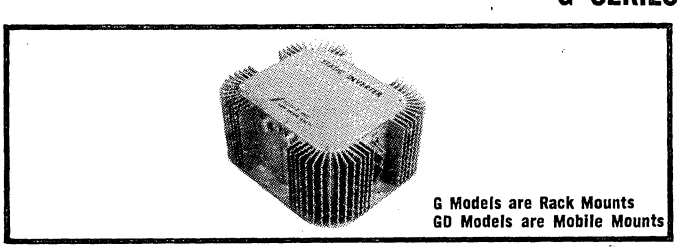
50 Hz OUTPUT MODELS

100 FW-50	100	115/230	50	5-1/4	38	52
200 FW-50	200	115/230	50	5-1/4	47	63
400 FW-50	400	115/230	50	8-3/4	90	110
800 FW-50	800	115/230	50	8-3/4	110	145
1600 FW-50	1600	115/230	50	17-1/2	220	290
2400 FW-50	2400	115/230	50	26-1/4	330	435
3200 FW-50	3200	115/230	50	35	440	580
4000 FW-50	4000	115/230	50	43-3/4	550	725

GENERAL SPECIFICATIONS

INPUT:	
Voltage:	95 to 125 VAC 190 to 250 VAC available
Frequency:	45 to 500 Hz
OUTPUT:	
Voltage:	115 VAC at fixed frequency 115/230 where listed
Voltage Regulation:	Line ±2%; Load ±3%
Frequency Stability:	±1% standard (Mod A & C avail.)
Total Harmonic Distortion:	< 5% at full load
PROTECTION: (Circuits included)	Low or high input voltage, Overload and short circuit (current limiting).
TEMPERATURE:	Operating −20°C. to +50°C. Storage −40°C. to +80°C.
PACKAGING:	Rack width: 19″ Rack depth: 19¾″ Height listed in tables.
AVAILABLE OPTIONS:	Frequency Stability: ±0.05% (see note 8, page 7), add "Mod C" after model number. ±0.001% add Mod "A". External Synchronization: By pulse or sine wave (see page 7), add "Mod E" after model number. Automatic Restart: (See page 7), add "Mod R" after model number.

G SERIES • DC-to-AC INVERTERS SQUARE WAVE OUTPUT



G Models are Rack Mounts
GD Models are Mobile Mounts

"G" series square wave inverters, while modestly priced, retain many features of the Topaz "GW" sine wave series. The square wave output and reduced voltage regulation are satisfactory for many less stringent applications where an extremely stable frequency is required.

60 Hz OUTPUT

Model Number	OUTPUT Power VA	OUTPUT Volts AC 60 Hz	INPUT Amperage (No load to full load) @ 12 VDC	INPUT Amperage (No load to full load) @ 24 VDC	Full Load Eff.	DIMENSIONS Inch. Overall (H x W x D)	Net Wt. (Lbs.)	Ship Wt. (Lbs.
250 G-12-24-60	250	125	3 - 25	1.5-12.5	80%	8¾ x 19 x 4½	20	36
250-GD-12-24-60	250	125	3 - 25	1.5-12.5	80%	4½ x 8½ x 10	20	36
500 G-12-24-60	500	125	6 - 50	3 -25	84%	5¼ x 19 x 11	40	59
500 GD-12-24-60	500	125	6 - 50	3 -25	84%	5¼ x 19 x 11	40	59

50 Hz OUTPUT

200 G-12-24-50	200	125/250	3 - 25	1.5-12.5	78%	8¾ x 19 x 4½	25	40
200 GD-12-24-50	200	125/250	3 - 25	1.5-12.5	78%	4½ x 8½ x 10	25	40
400 G-12-24-50	400	125/250	6 - 50	3 -25	81%	5¼ x 19 x 11	50	65
400 GD-12-24-50	400	125/250	6 - 50	3 -25	81%	5¼ x 17 x 11	50	65

GENERAL SPECIFICATIONS

FREQUENCY STABILITY:	±1% as listed; Mods "A" and "C" available.
TEMPERATURE:	Operating −20°C. to +50°C. Storage −40°C. to +80°C.
PROTECTION: (Circuits included)	Input reverse polarity, Overload and short circuit. (current limiting)
OUTPUT REGULATION:	Line: Proportional to input DC Load: Less than 10%
PACKAGING:	Dimensions listed in tables. "GD" mobile mount pictured.
AVAILABLE OPTIONS:	Frequency Stability: ±0.05% (see note 8, page 7), add "Mod C" after model number. External Synchronization: By pulse or sine wave (see page 7), add "Mod E" after model number.

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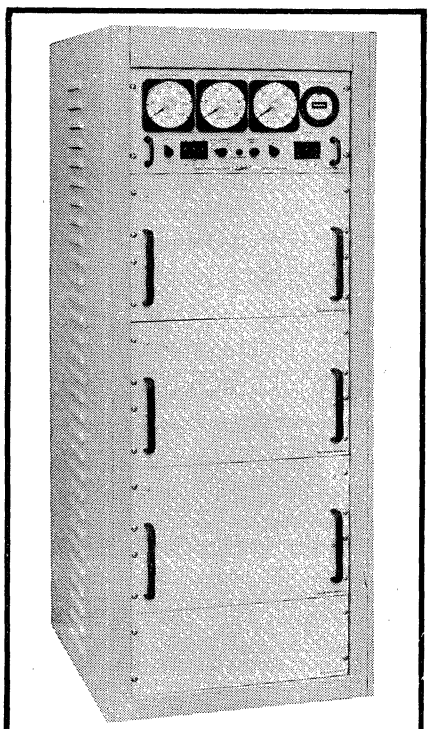
TOPAZ ELECTRONICS

3855 RUFFIN ROAD, SAN DIEGO, CALIFORNIA 92123 • TELEPHONE (714) 279-0111

"X" SERIES • SCR HIGH POWER SINGLE AND THREE PHASE, SINE WAVE INVERTERS AND FREQUENCY CHANGERS

The new TOPAZ "X" series equipment represents an important advance in the state-of-the-art of off-the-shelf FREQUENCY CHANGERS and INVERTERS. The "X" series circuit uses SCR's to quasi--square wave commutate input DC into a patented harmonic suppressing (sine wave output) transformer.

Voltage regulation is accomplished by pulse width modulation of each half of the quasi-square wave. Because this is a time domain control, a high gain feedback loop can be used to achieve very tight regulation at extremely high electrical efficiencies. SCR switching noise is suppressed and filtered and the resulting FREQUENCY CHANGERS and INVERTERS are rugged, compact and very reliable.



7.5 KVA FREQUENCY CHANGER

GENERAL SPECIFICATIONS

AMBIENT TEMPERATURE:	−20° to 55°C
HUMIDITY:	100%
ALTITUDE:	20,000 Feet
SHOCK & VIBRATION:	MIL-E-5400 Curve II
OUTPUT REGULATION:	±2% all conditions — line, load and p. f.
POWER FACTOR:	±0.7 (as an option, any constant-load power factor can be corrected for within the unit).
TOT. HARMONIC DISTORTION:	(5% max. all conditions) 3% at full load nominal line
RECOVERY TIME:	50 ms. 10 to 90% load change
OVERSHOOT & UNDERSHOOT:	±10%
PHASE ANGLE:	120° ±2° for balanced load
EFFICIENCY:	$\frac{P\text{-}out}{P\text{-}in}$ = 70% min. for FX, 75% min. for GX at nominal line and full load.

STANDARD PACKAGE AND FEATURES "X" SERIES

Commercial 19" rack mounted modules • Modules on slides for ease of maintenance • Input and output on rear rail • Indicator lights and circuit breaker on input and output • Thermal switch and indicator light • Reverse input polarity protection.

OPTIONS

Current limiting — Adjustable where unit becomes a constant source.

Meters — ±3% (a) Input and/or output voltage; (b) running time meter 0-9999 hrs.

Output connected in 120 VAC or 240 VAC 3-wire delta for balanced loads.

Input or output of 240 VAC single phase.

Three-phase input 240 VAC delta, 480 VAC delta, or 277/480 Y.

Close relay alarm contacts for loss of input and/or output or overload. Other standard Topaz modifications Mods A, C, E, R.

Filter S-1 — Reduces noise level at battery input to less than 30 dbrn.

Filter S-2 — Protects unit from spikes on input of 1000 V. for up to 5 microseconds.

Filter S-3 — Protects unit from spikes on input of 3000 V. for up to 1 millisecond.

FREQUENCY CHANGERS "FX" MODELS				DATA PERTAINING TO BOTH					INVERTERS "GX" MODELS		
				OUTPUT							
Model No.	Input VAC 45-500 Hz	WT. (Lbs.)	Price 1-4 Pcs.	Power (KVA)	No. φ	VAC	Freq. (Hz)	Rack Ht. (In.)*	Model No. (All are 105-140 VAC In)	Wt. (Lbs.)	Price 1-4 Pcs.
2.5 FX-60		180	$ 3,100	2.5	1		60	14"	2.5 GX-125-60	145	$ 2,800
2.5 FX-400		130	$ 3,100	2.5	1		400	14"	2.5 GX-125-400	115	$ 2,800
2 FX-50		180	$ 3,100	2	1		400	14"	2 GX-125-50	145	$ 2,800
5 FX-60	120/1φ	270	$ 4,700	5	1		50	21"	5 GX-125-60	215	$ 4,200
5 FX-400	or	200	$ 4,700	5	1		400	21"	5 GX-125-400	160	$ 4,200
4 FX-50	240/1φ	270	$ 4,700	4	1		50	21"	4 GX-125-50	215	$ 4,200
10 FX-60	or	550	$ 9,900	10	1		60	42"	10 GX-125-60	440	$ 9,000
10 FX-400	208/3φ	410	$ 9,900	10	1		400	42"	10 GX-125-400	330	$ 9,000
8 FX-50	or	550	$ 9,900	8	1	120 or 240 1φ	50	42"	8 GX-125-50	440	$ 9,000
7.5 FX-60-3	240/3φ	550	$ 9,500	7.5	3		60	49"	7.5 GX-125-60-3	440	$ 8,500
7.5 GX-400-3		400	$ 9,500	7.5	3		400	49"	7.5 GX-125-400-3	355	$ 8,500
6 FX-50-3		550	$ 9,500	6	3		50	49"	6 GX-125-50-3	440	$ 8,500
15 FX-60-3		820	$14,000	15	3		60	72"	15 GX-125-60-3	655	$12,500
15 FX-400-3		610	$14,000	15	3		400	72"	15 GX-125-400-3	490	$12,500
12 FX-50-3	240/3φ	820	$14,000	12	3		50	72"	12 GX-125-50-3	655	$12,500
30 FX-60-3	or	1660	$25,000	30	3		60	2 pcs. 72"	30 GX125-60-3	1320	$22,500
30 FX-400-3	208/3φ	1220	$25,000	30	3	120/208 Y 3φ or 240 Δ	400	2 pcs. 72"	30 GX-125-400-3	980	$22,500
24 FX-50-3	or 277/480/3φ	1660	$25,000	24	3		50	2 pcs. 72"	24 GX-125-30-3	1320	$22,500
1 FX-50-3	120/1φ	60	$ 2,000	1	1	115	400	7"	—	—	—
1 FX-400 3 FX-400-3	120/1φ or/3φ	190	$ 5,500	3	3	115	400	27"	—	—	—

* All units are 19" wide (rack mount) and 21" deep. Note: 48 and 250 VDC inputs available on special order.

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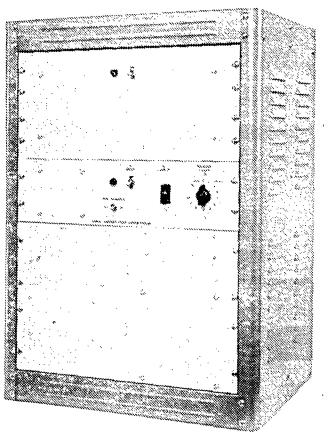
UNINTERRUPTIBLE POWER SYSTEMS (UPS)

NEW

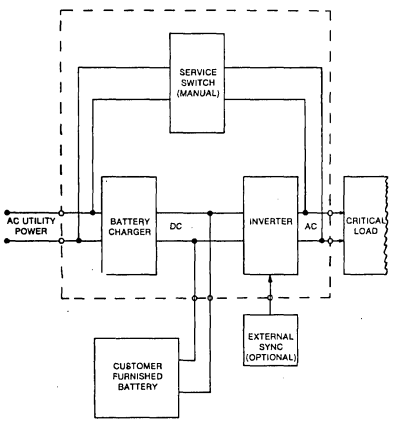
New Standard Systems Provide Continuous Power for Critical Loads if Utility Supply Fails Completely



No transfer time — critical loads operate continuously from the Topaz inverter which also provides voltage and frequency regulation and noise suppression.

All systems provide ±1% frequency stability under all conditions of line, load, and temperature (±0.05% available with Mod C for $200 extra). Output frequency can be exactly synced to input utility power or other frequency source for accurate operation of clocks (for external sync Mode E add $200).

You supply any 24 volt lead-acid battery (model 2.5 GX UPS and 3 GX UPS use 125 VDC battery and will accommodate lead acid, Ni-Cad, or other type). Topaz supplies all the rest: Charger, manual service transfer/ switch (automatic 1-cycle service/transfer relay available for $100 extra).



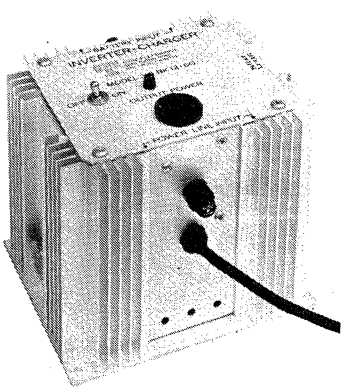
UNINTERRUPTIBLE POWER SYSTEM

Model No.	Output VA	Output Wave Shape Sine	Output Wave Shape Square	Voltage Regulation Reg.	Voltage Regulation Unreg.	Battery Voltage VDC	Charging Amps (1)	Wt. Lbs.	Height Inches (3)	1-4 Qty. Price
250 G UPS[4]	250		X		X	24[2]	10	125	19 3/16	$ 950
500 G UPS[4]	500		X		X	24[2]	20	185	19 3/16	1250
250 GW UPS[5]	250	X		X		24[2]	7	145	19 3/16	1350
500 GW UPS[5]	250	X		X		24[2]	20	220	31 1/2	1650
1000 GW UPS[5]	1000	X		X		24	15	325	42 1/16	2350
1500 GW UPS[5]	1500	X		X		24	10	425	66 9/16	3450
2.5 GX UPS[6]	2500	X		X		125	15	425	36 1/2	4650
3 GX UPS[6]	3000	X		X		125	10	450	36 1/2	4950
5 GX UPS[6]	5000	X		X		125	25	575	52 1/4	7550

NOTES:

1. In excess of DC required to run inverter at full load.
2. 12 VDC available.
3. All except GX UPS are 22″ wide and 17⅛″ deep. The GX UPS is 23″ wide and 25⅝″ deep. Or all modules can be mounted in your 19″ relay rack.
4. Voltage is regulated approximately 10% when power line is present. Unregulated on batteries.
5. Sine wave total harmonic distortion less than 5%. Voltage regulation is ±2% line, ±3% load.
6. Voltage regulation is ±2% line and load. Battery voltage and charging amps are at 125 VDC. Total harmonic distortion < 5%.

AUTOMATIC POWER SYSTEM 315-BK-12-60



Provides 250 VA of AC "back-up" power in the event of power line failure. Automatically senses and transfers from power line to battery-inverter output in less than one cycle (15 ms). Includes battery charger with controlled charging rate so that sealed lead-acid or "gel-cells" can be used without overcharging.

Charger, transfer switch and inverter all housed in a compact unit less than 6″ x 6½″ x 7″.

GENERAL SPECIFICATIONS

- **Normal Mode (Power-Line Voltage Present)**
  AC INPUT AND OUTPUT: 115 ±7% VAC, 60 ±2% Hz, 300 watts max., sine wave.
  CHARGER OUTPUT: 12 VDC @ 3 amps max. tapering to 14.5 VDC @ 1 amp max. for fully charged 24 A-H sealed lead-acid battery.
  OPERATING TIME: Continuous.
- **Inverter Mode (Power-Line Voltage Interrupted)**
  DC INPUT: 13 ±2 VDC, 30 amps max.
  AC OUTPUT: 105-130 VAC rms, 50-63 Hz square wave at 250 VA, 11.5-13.5 VDC.
  95-155 VAC rms, 48-68 Hz square wave at 0-300 watts, 11-15 VDC.

OPERATING TIME: Up to 30 minutes from 24 A-H battery.

POWER TRANSFER TIME: Power Line Interruption: 15 ms. max.
Power Line Return: 10 ms. max.

PROTECTION: Inverter input protected by fuse. Input reverse polarity protection provided. Inverter inherently protected from output overloads and short circuits. AC power line input protected by fuse.

UNIT PRICE $250

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NOISE-SUPPRESSING ULTRA ISOLATION TRANSFORMERS

GENERAL SPECIFICATIONS

ISOLATION — *Three categories of guaranteed interwinding capacitance are available as listed below. Leakage resistance from either winding to the other or to ground greater than 10,000 megohms.*

COMMON MODE REJECTION — *Greater than 125 DB (for .005 pf) to more than 145 DB (for .0005 pf). Transverse noise rejection greater than 40 DB.*

CONSTRUCTION — *Class B (130° C. operating) materials used throughout. Hi-Pot 1000 volts (RMS) winding to winding or ground.*

60 Hertz Single Phase Models

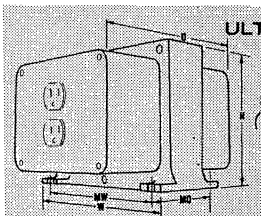
POWER	MODEL NUMBER GUAR. INTERWINDING CAPACITANCE ≤.005 pf	≤.001 pf	≤.0005 pf	PRIMARY (VAC) 60 Hz.	SECONDARY (VAC)	STYLE See Diagrams	% REGULATION NO LOAD TO FULL LOAD	TEMP. RISE °C. FULL LOAD	TERMINATIONS	See drawings, DIMENSIONS (Inches) CASE H	HT	W	D	MOUNTING MW	MD	WT. (Lbs.)
125 VA	1/811T25SR	1/811T21SR	1/811T35SR	120	120	R	4.5	25	Single	4-1/2		5-1/4	7-9/16	4-3/8	2-1/8	9-3/4
125 VA	1/811T25ST	1/811T21ST	1/811T35ST	120	120	T	4.5	25		4-1/2		5-1/4	5-11/16	4-3/8	2-1/8	9
500 VA	1/211T25SR	1/211T21SR	1/211T35SR	120	120	R	4	50	Single	4-1/2		5-1/4	8-13/16	4-3/8	3-3/8	18
500 VA	1/211T25ST	1/211T21ST	1/211T35ST	120	120	T	4	50		4-1/2		5-1/4	6-15/16	4-3/8	3-3/8	17
1.0 KVA	0111T25SR	0111T21SR	0111T35SR	120	120	R	4	55	Duplex	6-5/16		8-5/32	10-1/8	6-27/32	3-3/8	31
1.0	0131T25SR	0131T21SR	0131T35SR	240	120	R	4	55	Duplex	6-5/16		8-5/32	10-1/8	6-27/32	3-3/8	31
1.0	0111T25ST	0111T21ST	0111T35ST	120	120	T	4	55	Terminals	6-5/16		8-5/32	8-1/4	6-27/32	3-3/8	29
1.0	0131T25ST	0131T21ST	0131T35ST	240	120	T	4	55	Terminals	6-5/16		8-5/32	8-1/4	6-27/32	3-3/8	29
1.0	0155T25FT	0155T21FT	0155T35FT	125/250*	115/230	F	5.5	42	Terminals	2-1/2	3-3/4	15-1/8	12-5/8	13-7/8	11-3/8	57
1.0	0111T25FT	0111T21FT	0111T35FT	120	120	F	5.5	42	Terminals	2-1/2	3-3/4	15-1/8	12-5/8	13-7/8	11-3/8	57
	*Consists of (2) 125 volt coils with taps at 102, 110, and 118 volts															
2.5 KVA	0211T25SR	0211T21SR	0211T35SR	120	120	R	4.5	50	Duplex	6-5/16		8-5/32	11-1/8	6-27/32	4-3/8	43
2.5	0231T25SR	0231T21SR	0231T35SR	240	120	R	4.5	50	Duplex	6-5/16		8-5/32	11-1/8	6-27/32	4-3/8	43
2.5	0211T25ST	0211T21ST	0211T35ST	120	120	T	4.5	50	Terminals	6-5/16		8-5/32	9-1/4	6-27/32	4-3/8	42
2.5	0231T25ST	0231T21ST	0231T35ST	240	120	T	4.5	50	Terminals	6-5/16		8-5/32	9-1/4	6-27/32	4-3/8	42
5.0 KVA	0511T25FT	0511T21FT	0511T35FT	120	120	F	5.5	38	Terminals	3-3/4	5-1/2	15-1/8	12-5/8	13-7/8	11-3/8	112
5.0	0511T25ST	0511T21ST	0511T35ST	120	120	T	6.5	65	Terminals	6-5/16		8-5/32	11	6-27/32	6-1/8	62
5.0	0531T25ST	0531T21ST	0531T35ST	240	120	T	6.5	65	Terminals	6-5/16		8-5/32	11	6-27/32	6-1/8	62
5.0	0541T25ST	0541T21ST	0541T35ST	480	120	T	6.5	65	Terminals	6-5/16		8-5/32	11	6-27/32	6-1/8	62
10.0 KVA	1065T25ST	1065T21ST	1065T35ST	240 or 480	120 or 240	T	5	60	Terminals	8		9-1/2	18-1/4	8	7-3/4	125
15.0 KVA	1565T25ST	1565T21ST	1565T35ST	240 or 480	120 or 240	T	5	65	Terminals	8		9-1/2	21-1/4	8	10-3/4	187
20.0 KVA	2065T25ST	2065T21ST	2065T35ST	240 or 480	120 or 240	T	3	65	Terminals	8		9-1/2	24-1/4	8	13-3/4	250

60 Hertz Three Phase Models

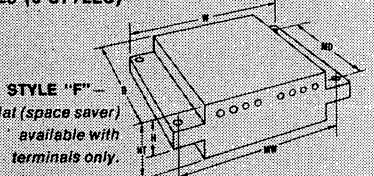
POWER	MODEL NO. GUAR. INTERWINDING CAPACITANCE ≤.005 pf	≤.001 pf	≤.0005 pf	PRIMARY (VAC) Δ	or Y	SECONDARY (VAC) Δ	or Y	% REGULATION NO LOAD TO FULL LOAD	TEMP. RISE °C. FULL LOAD	DIMENSIONS (Inches) H	L	D	CL	MOUNTING DIM. ON CENTERS (±1/16) CD	ML	MD	HOLE DIA.	WT. (Lbs.)
3 KVA	0311T25T	0311T21T	0311T35T	120	120/208	120	120/208	4	55	7-13/16	25	13-1/4	29	6-1/4	27	3-1/4	7/16	92
3	0331T25T	0331T21T	0331T35T	240	*	120	120/208	4	55	7-13/16	25	13-1/4	29	6-1/4	27	3-1/4	7/16	92
7.5 KVA	0711T25T	0711T21T	0711T35T	120	120/208	120	120/208	4.5	50	7-13/16	25	14-1/4	29	7-1/4	27	4-1/4	7/16	136
7.5	0731T25T	0731T21T	0731T35T	240	*	120	120/208	4.5	50	7-13/16	25	14-1/4	29	7-1/4	27	4-1/4	7/16	136
15 KVA	1511T25T	1511T21T	1511T35T	120	120/208	120	120/208	6.5	65	7-13/16	25	16	29	9	27	6	7/16	196
15	1531T25T	1531T21T	1531T35T	240	*	120	120/208	6.5	65	7-13/16	25	16	29	9	27	6	7/16	196
15	1541T25T	1541T21T	1541T35T	480	**	120	120/208	6.5	65	7-13/16	25	16	29	9	27	6	7/16	196
30 KVA	3065T25T	3065T21T	3065T35T	240 or 480	*/**	120 or 240	120/208 or*	5	60	9-1/2	29	28-1/4	33	10-1/2	31	7-3/4	9/16	386
45 KVA	4565T25T	4575T21T	4565T35T	240 or 480	*/**	120 or 240	120/208 or*	5	65	9-1/2	29	31-1/4	33	10-1/2	31	10-3/4	9/16	575
60 KVA	6065T25T	6065T21T	6065T35T	240 or 480	*/**	120 or 240	120/208 or*	3	65	9-1/2	29	34-1/4	33	10-1/2	31	13-3/4	9/16	765

Note: A. A 277/480 volt Y connection is available for either primary or secondary on 3 phase units of 15 KVA or larger.
B. A 208 volt Δ connection is available for either primary or secondary on 3 phase units of 15 KVA or larger.
C. Other voltages or taps are available on special order. For information call or write the factory.
D. All input and output connections are made with screw terminals.
*Denotes 240/416 Y is available but not generally used.
**Denotes 480/832 Y is available but not generally used.

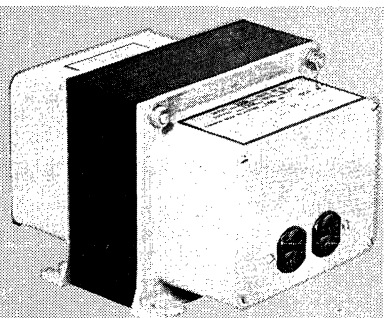
ULTRA-ISOLATION TRANSFORMER — MECHANICAL OUTLINES
SINGLE-PHASE MODELS (3 STYLES)

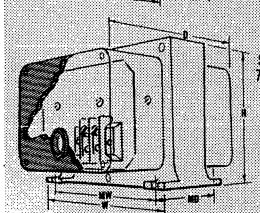


STYLE "R" — *Receptacle (125 & 500 VA — SINGLE 1 & 2.5 KVA — DUPLEX) Not available for 5KVA or higher power*

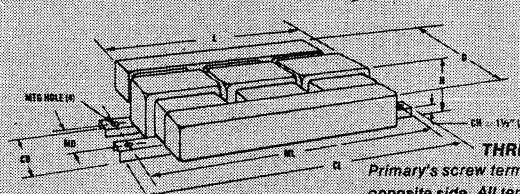


STYLE "F" — *Flat (space saver) available with terminals only.*





STYLE "T" *Terminals*



THREE-PHASE MODELS

Primary's screw terminals are on one side; secondary's are on opposite side. All terminals are covered and electrostatically shielded.

"IF IT'S NOT ALREADY A TOPAZ STANDARD, LET US DESIGN A UNIT FOR YOU."

Technipower offers the largest selection of all-silicon power modules for commercial and mil-spec applications.

Over 4,000 standard modular power supplies plus custom specifications to order. Many most-used models maintained in deep shelf inventory for immediate shipment.

AC-DC Regulated & Unregulated Modules
(including MIL-SPEC qualified units)
Modular DC-DC Converters
Modular DC-DC Series Regulators
Modular DC-AC Inverters*
AC-DC Laboratory Power Supplies*
Overvoltage Control Modules*
Heat Sinks* • Application & Design Data*
Rack Mounts*

All Technipower Power Modules Are Backed By A Full 5-Year Warranty

WARRANTY: Technipower, Inc., warrants each product manufactured by it to be free from defects in material and workmanship. Technipower's liability under this warranty is limited to servicing, or replacing at its option such product or any part thereof which is returned to Technipower with transportation charges prepaid within five years from the original date of delivery to the original purchaser, where Technipower's examination discloses a defect within the limits of this warranty. In no case shall Technipower's liability exceed the original purchase price.
Technipower reserves the right to discontinue or modify any item in its product line, without notice. In the event of modification.

* For full information on these items, and on the entire Technipower line, see the complete Technipower Catalog #701. Your rep has a copy for you, or call us direct.

TECHNIPOWER, INC.
A **BENRUS** SUBSIDIARY
BENRUS CENTER • RIDGEFIELD, CONNECTICUT 06877
PHONE: (203) 438-0333 • TWX: 710-467-0666

TECHNIPOWER, INC.
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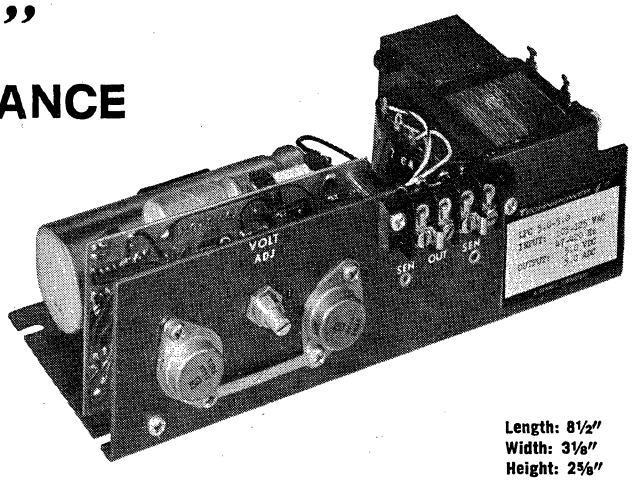
NEW *"The Practicals"*

LOW COST, HIGH PERFORMANCE AC-DC REGULATED OPEN CONSTRUCTION POWER SUPPLIES

In Single and Dual Output Models



Length: 8½"
Width: 3⅛"
Height: 2⅝"

They make systems engineers cost-efficiency experts!

Out-Specs All Comparatively Priced Units

SPECIFICATIONS

Input voltage range: 105-125 volts.

Input frequency range: 47-420 Hz.

Regulation-Line and Load Combined: ±.5%.

Ripple (RMS): (with either positive or negative terminal grounded): 10 mV

Temperature Coefficient: (TYP.) 0.05%°C or 5 mv/°C whichever is greater.

Polarity: May be used positive or negative.

Output voltage and current: See model listings.

Output adjustment range: See model listings.

Short circuit protection: Automatic circuit protects the power supply if the output is shorted continuously. Automatic return upon removal of short circuit.

Remote sensing: Provisions are made for remote sensing to eliminate effects of lead resistance on dc regulation.

Operating temperature: 0°C to +55°C for current ratings specified in model listings.

Storage temperature: −20°C to +85°C.

Recovery time: (TYP.) Less than 50 usec, ½ L to FL.

Ambient temperature rated: to 55°C.

"THE PRACTICALS" LP SINGLE OUTPUT SERIES Designed For Broad Commercial Applications

$39.75 All Models

10 or more combined units

VOLTAGE AND CURRENT RATINGS

Adjustable Output Voltage	Output Current	Standard Model No.	Price 1-4 Units	Price 5-9 Units
5.0 ±5%	5.0	LP5.0-5.0	$49.75	$44.75
6.0 ±5%	4.5	LP6.0-4.5	49.75	44.75
12.0 ±5%	2.5	LP12.0-2.5	49.75	44.75
15.0 ±5%	2.0	LP15.0-2.0	49.75	44.75
24.0 ±5%	1.5	LP24.0-1.5	49.75	44.75
28.0 ±5%	1.2	LP28.0-1.2	49.75	44.75

All Models available with overvoltage protection, add $5.00. Prices for large quantities quoted upon request. Custom specifications to order.

"THE PRACTICALS" LPDT DUAL OUTPUT TRACKING SERIES Designed For OP-AMP And Other Commercial Applications

$74.75 All Models

10 or more combined units

VOLTAGE AND CURRENT RATINGS

Adjustable Output Voltage	Output Current	Standard Model Number	Price 1-4 Units	Price 5-9 Units
±12.0 ±5%	1.2	LPDT-12.0-1.2	$89.75	$79.75
±15.0 ±5%	1.0	LPDT-15.0-1.0	$89.75	$79.75

Modification of standard output voltages can be provided over the range of ±5 to ±28 volts at slight additional cost. Voltages below ±7 volts not available in Tracking models.

Independent output adjustment provided at slight additional cost.

FOR TRIPLE AND QUADRUPLE OUTPUT MODELS CONSULT FACTORY

TECHNIPOWER, INC.
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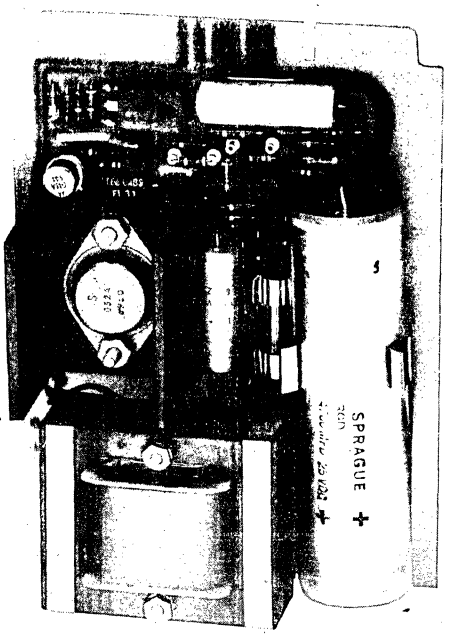
LCS 5.0-1.0

LOW COST LOGIC CARD REGULATED AC-DC POWER SUPPLIES WITH BUILT-IN OVERVOLTAGE PROTECTION

5 VDC at 1 ADC



NEW LOW PRICE

Reduced to $29.75 up to 10 units

OEM Discounts Available. Consult Factory.

CUSTOM CAPABILITY

Other Card and Custom Supplies are available to meet Special Requirements

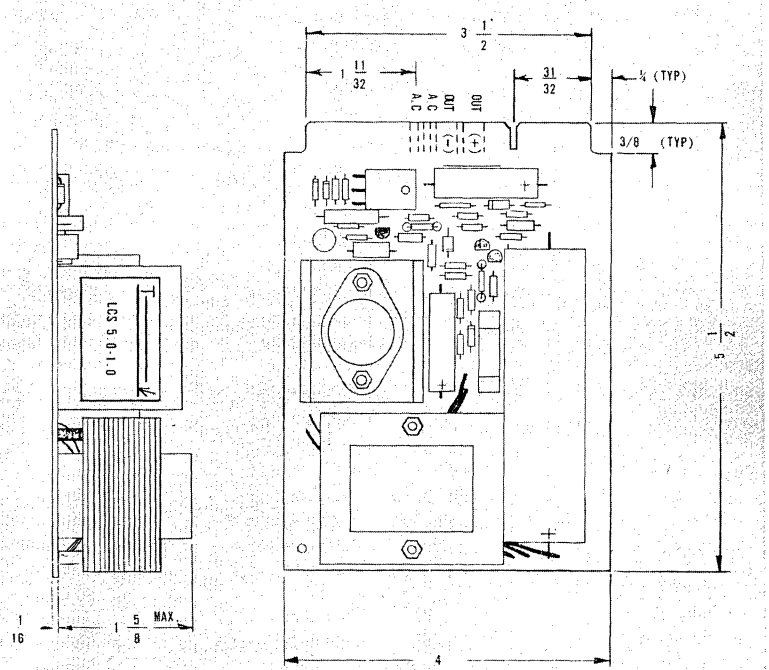
SPECIFICATIONS

Input voltage range: 105-125 VAC.
Input frequency range: 47 - 440 Hz.
Output voltage: Fixed at 5.0 VDC ±1%.
Output current: 1 ampere.
Regulation —Line & load combined: ±0.5%.
Ripple: Less than 10 mV rms.
Temperature ambient: Operating: 0 to +55°C.
Storage: —20 to +85°C.
Short circuit protected.
Overvoltage protected from both transient and power supply failure.

DESIGN PARAMETERS (Typical)

Temperature coefficient: 0.05%/°C.
Recovery time: Less than 50 μsec 1/2L to FL.
Overvoltage trip point: 7.5 VDC (nominal).
Designed for 5¼" basket mounting.

MECHANICAL DATA



Designed for use with Cinch-Jones Connector #5044A30 or equivalent.

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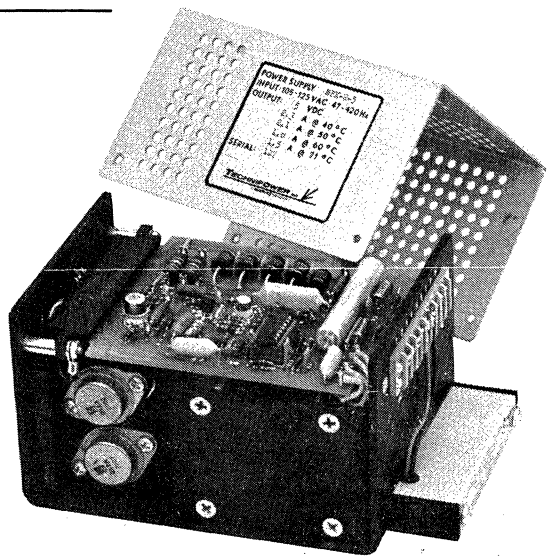
PK

"The Sophisticates"

SINGLE, DUAL, TRACKING and WIDE RANGE OUTPUT SERIES REGULATED MODULAR POWER SUPPLIES

0 to 32 VDC, up to 80 Watts
Ambient Temperature Rated to 71°C



The Ultimate in Precise Open Construction Power Supply Performance

- Designed for digital, op amps, and analog systems
- Exact voltage regulation under temperature, line and load conditions
- Meets military environment specifications
- Remote programming
- IC Control circuitry
- Convection cooled
- Multi-Surface Mounting

DESIGN PARAMETERS (Typical)

Recovery time: Less than 50 μsec, 1/2 L to FL.

M.T.B.F. for product line: 60,000 hrs. per MIL-HBK-217A with module stressed at 71°C and rated load.

Designed to meet MIL environmental specifications:

Vibration MIL-STD-202 Test Method 210A;
Shock: MIL-STD-202 Test Method 205C;
Moisture Resistance: MIL-STD-202 Test Method 103;
RFI: (Radiated & Conducted) — MIL-STD-461.

OPTIONAL FEATURES

Details in Technipower Catalog #701

	Suffix
Fixed output voltage	F
Lower temperature co-efficient	T
Wide input range	W
208 and 230 VAC input available	Consult factory
Fungus proofing	Consult factory

SPECIFICATIONS

Input voltage range: 105-125 volts.
Input frequency range: 47-420 Hz.
Regulation-Line and Load Combined: 0.05% + 2 mv.
Ripple (RMS): (with either positive or negative terminal grounded): 1 mv
Temperature Coefficient: 0.03%/°C or 2 mv/°C whichever is greater.
Polarity: May be used positive or negative.
Output voltage and current: See model listings.
Output adjustment range: See model listings.
Remote programming resistance: 350 ohms/volt nominal.
Short circuit protection: Automatic circuit protects the power supply if the output is shorted continuously. Automatic return upon removal of the short circuit.
Characteristic curve for short circuit protection: See Catalog #701, page 2.
DC output control:
NPK and WPK models: Screw driver adjustment over voltage range specified in model listings.
DPK models: Each output can be adjusted independently by dual screw driver adjustments.
TDPK models: Both outputs adjusted simultaneously by single screw driver adjustment.
Remote sensing: Provisions are made for remote sensing to eliminate effects of lead resistance on DC regulation.
Series operation: The series starting circuitry employed requires that input AC voltage be applied at a rate greater than 150V rms/sec. Consult factory if slow rising input is anticipated.
Operating temperature: −20°C to +71°C for maximum load current ratings specified in model listings.
Storage temperature: −62° to +85°C.
Overvoltage protection: Available for all models as an accessory. Provides both transient and power supply malfunction protection.
Tracking accuracy (TDPK models): Each output will be factory set within 1.0% of the other. Outputs will track within 20.0 mv or ±0.05% (whichever is greater) of each other during pot adjustment.

TECHNIPOWER, INC.
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Ridgefield, Conn.
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PK

PK SERIES — VOLTAGE AND CURRENT RATINGS

PRICES FOR LARGE QUANTITIES QUOTED ON REQUEST
CUSTOM SPECIFICATIONS TO ORDER

Case Size 1 5 7/16 x 3 15/16 x 2 23/32

Narrow Range Models

Model Number	Adjustable voltage range	Maximum current at an ambient temperature of 40°C	50°C	60°C	71°C	Price
NPK-1-5	5.0±5%	1.1	1.0	0.90	0.75	95
NPK-1-6	6.0±5%	1.0	0.90	0.80	0.67	95
NPK-1-10	10.0±5%	0.85	0.76	0.68	0.57	95
NPK-1-12	12.0±5%	0.75	0.67	0.60	0.50	95
NPK-1-15	15.0±5%	0.70	0.63	0.56	0.47	95
NPK-1-18	18.0±5%	0.65	0.60	0.50	0.44	95
NPK-1-20	20.0±5%	0.60	0.55	0.48	0.40	95
NPK-1-24	24.0±5%	0.50	0.45	0.40	0.34	95
NPK-1-28	28.0±5%	0.45	0.40	0.36	0.30	95
NPK-1-32	32.0±5%	0.40	0.36	0.32	0.27	95
Wide range models						
WPK-1-7	0-7	0.55	0.49	0.44	0.37	95
Dual output models						
Non Tracking						
DPK-1-16	±9-16	0.15	0.13	0.12	0.10	130
Tracking						
TDPK-1-16	±9-16	0.15	0.13	0.12	0.10	135

Case Size 2 5 7/16 x 3 15/16 x 3 3/32

Narrow Range Models

Model Number	Adjustable voltage range	Maximum current at an ambient temperature of 40°C	50°C	60°C	71°C	Price
NPK-2-5	5.0±5%	2.3	2.1	1.8	1.5	105
NPK-2-6	6.0±5%	2.0	1.8	1.6	1.3	105
NPK-2-10	10.0±5%	1.7	1.5	1.4	1.1	105
NPK-2-12	12.0±5%	1.5	1.4	1.2	1.0	105
NPK-2-15	15.0±5%	1.4	1.3	1.1	0.94	105
NPK-2-18	18.0±5%	1.3	1.2	1.0	0.87	105
NPK-2-20	20.0±5%	1.2	1.1	0.96	0.80	105
NPK-2-24	24.0±5%	1.0	0.90	0.80	0.67	105
NPK-2-28	28.0±5%	0.90	0.81	0.72	0.61	105
NPK-2-32	32.0±5%	0.80	0.72	0.64	0.54	105
Wide range models						
WPK-2-7	0-7	1.1	1.0	0.88	0.73	105
Dual output models						
Non Tracking						
DPK-2-16	±9-16	0.50	0.45	0.40	0.33	145
Tracking						
TDPK-2-16	±9-16	0.50	0.45	0.40	0.33	150

Case Size 3 6 7/16 x 6 3/32 x 3 1/2

Narrow Range Models

Model Number	Adjustable voltage range	Maximum current at an ambient temperature of 40°C	50°C	60°C	71°C	Price
NPK-3-5	5.0±5%	5.0	4.5	4.0	3.3	140
NPK-3-6	6.0±5%	4.6	4.1	3.7	3.1	140
NPK-3-10	10.0±5%	3.9	3.5	3.1	2.6	140
NPK-3-12	12.0±5%	3.7	3.3	3.0	2.5	140
NPK-3-15	15.0±5%	3.3	3.0	2.6	2.2	140
NPK-3-18	18.0±5%	3.0	2.7	2.4	2.0	140
NPK-3-20	20.0±5%	2.9	2.6	2.3	1.9	140
NPK-3-24	24.0±5%	2.4	2.2	1.9	1.6	140
NPK-3-28	28.0±5%	2.2	2.0	1.8	1.5	140
NPK-3-32	32.0±5%	1.9	1.7	1.5	1.3	140
Wide range models						
WPK-3-7	0-7	2.2	2.0	1.8	1.5	140

Case Size 4 7 1/8 x 7 1/8 x 3 7/8

Narrow Range Models

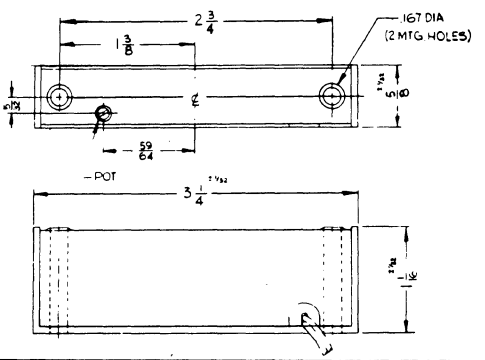
Model Number	Adjustable voltage range	Maximum current at an ambient temperature of 40°C	50°C	60°C	71°C	Price
NPK-4-5	5.0±5%	7.7	6.9	6.2	5.2	160
NPK-4-6	6.0±5%	7.0	6.3	5.6	4.7	160
NPK-4-10	10.0±5%	5.7	5.1	4.6	3.8	160
NPK-4-12	12.0±5%	5.2	4.7	4.2	3.5	160
NPK-4-15	15.0±5%	4.8	4.3	3.8	3.2	160
NPK-4-18	18.0±5%	4.3	3.9	3.4	2.9	160
NPK-4-20	20.0±5%	4.0	3.6	3.2	2.7	160
NPK-4-24	24.0±5%	3.3	3.0	2.6	2.2	160
NPK-4-28	28.0±5%	2.9	2.6	2.3	1.9	160
NPK-4-32	32.0±5%	2.5	2.3	2.0	1.7	160
Wide range models						
WPK-4-7	0-7	3.4	3.1	2.7	2.3	160
Dual output models						
Non Tracking						
DPK-4-16	±9-16	1.5	1.4	1.2	1.0	210
Tracking						
TDPK-4-16	±9-16	1.5	1.4	1.2	1.0	215

OVERVOLTAGE OPTION:

MODEL OP-1 OVERVOLTAGE PROTECTOR
PRICE $25

- Miniature size (5/8x1 1/16x3 1/4)
- One model fits cases 1, 2, 3, 4
- Mounts conveniently to PK supply
- Adjustable overvoltage trip point

Complete overvoltage protection for all models of case sizes 1, 2, 3, and 4 of the PK series. Installed on a PK series supply, the OP-1 offers full overvoltage protection from both transients and power supply malfunctions.



TECHNIPOWER, INC.
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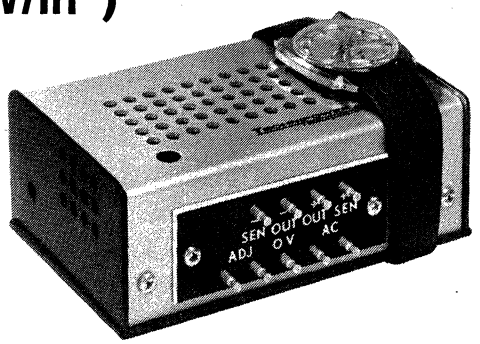
New!

Low Profile, High Power Density (W/in^3) Wide Range Regulated AC-DC MINIATURIZED HIGH FREQUENCY TRANSFORMATION POWER SUPPLIES



Actual dimensions:
Length 4 1/32" Height 1 1/32" Width 2 3/4"

Regulated AC-DC, 3 to 30 VDC, to 60W
Ambient Temperature Rated to 71°C

Maximum Performance in a Mini Size Thru State of the Art Circuitry

GREATER EFFICIENCY — Maximum watts per cubic inch by minimizing heat dissipation.

MORE ECONOMICAL — Greater efficiency reduces cooling requirements and eliminates need for special heat sinks.

WIDER APPLICATION — Designed for use in compact electronic equipment using integrated and hybrid circuits or other miniaturized applications. Can also be used in place of conventional series regulator type units where thermal problems exist. Ideal for Card Rack mounting.

SPECIFICATIONS

Source voltage range: 105-125 VAC
Source frequency range: 47-420 Hz
Line Effect (105-125V): ±(0.02% +2mV)
Load Effect (N.L.-F.L.): ±(0.05% +5mV)
PARD (ripple, in rms): 0.1% +10mV*
Ambient Temperature, Operating: −20°C to +71°C
Ambient Temperature, Storage: −62°C to +125°C
Polarity: May be used positive or negative.
Output volts & amps: See specific model listings.
Series Operation: May be operated with conventional or complex loads provided total voltage in series connection does not exceed 350V.
Overload Protection: Automatic current limiting type, protects against momentary overloads and continuous shorts. Restores to normal operation after short is removed.
Overvoltage Protection: MHFC models incorporate internal circuitry to protect load against possible overvoltage condition in event of power supply failure. Trip points are set at factory 25% ±5% above maximum rated output voltage; it may be reduced externally by inserting a selected resistor between two terminals. (5 volts is minimum). The output voltage will never exceed the trip point more than 5% of maximum output voltage +0.5 volt. To reenergize after an O.V. condition, turn input power off, then on again after a short delay.
Remote Sensing: Terminals provided.
External Voltage Adjustment: Terminals provided.
* Increases typically to 0.3% +30mV @ −20°C

DESIGN PARAMETERS (Typical)

PARD (ripple, in pk to pk): 0.3% +30mV
Transient Recovery Time (for ½ to F.L.): 2m sec.
Efficiency: Up to 75%
Temperature Effect: .02%/°C
M.T.B.F.: 55,000 hours average per MIL-HNBK-217A, with module at 71°C ambient temp.
Designed to meet MIL environmental specifications:
Vibration: MIL-STD-202, Method 201A
Shock: MIL-STD-202, Method 205C, Condition A
Moisture: MIL-STD-202, Method 103, Condition B
EMI: MIL-I-6181D (Consult factory if full qualification is required)

OPTIONAL FEATURES

See pages 46 and 48 of Technipower Catalog No. 701

	SUFFIX
Fixed Output Voltage	F
Wide Input Range	W

MODELS AND PRICES More watts per cubic inch . . . more power per dollar

Overvoltage Protection Models Available With No Increase In Size

Output Volts	Amps	Case Size	MHF Model	Price	MHFC Model*	Price
3.0-6.0	1.0	AA	MHF 6.0-1.0	$130	MHFC 6.0-1.0	$155
	2.0	BB	MHF 6.0-2.0	145	MHFC 6.0-2.0	170
	4.0	CC	MHF 6.0-4.0	165	MHFC 6.0-4.0	190
	8.0	DD	MHF 6.0-8.0	215	MHFC 6.0-8.0	240
7.5-15.0	0.5	AA	MHF 15.0-0.5	130	MHFC 15.0-0.5	155
	1.0	BB	MHF 15.0-1.0	145	MHFC 15.0-1.0	170
	2.0	CC	MHF 15.0-2.0	165	MHFC 15.0-2.0	190
	4.0	DD	MHF 15.0-4.0	215	MHFC 15.0-4.0	240
15.0-30.0	0.25	AA	MHF 30.0-0.25	130	MHFC 30.0-0.25	155
	0.5	BB	MHF 30.0-0.5	145	MHFC 30.0-0.5	170
	1.0	CC	MHF 30.0-1.0	165	MHFC 30.0-1.0	190
	2.0	DD	MHF 30.0-2.0	215	MHFC 30.0-2.0	240

* Overvoltage Protection Models available with no increase in size.

Prices for large quantities quoted upon request. Custom specifications to order.

OUTPUT CURRENT VS. AMBIENT TEMPERATURE AND COOLING METHOD

COOLING BY CONVECTION

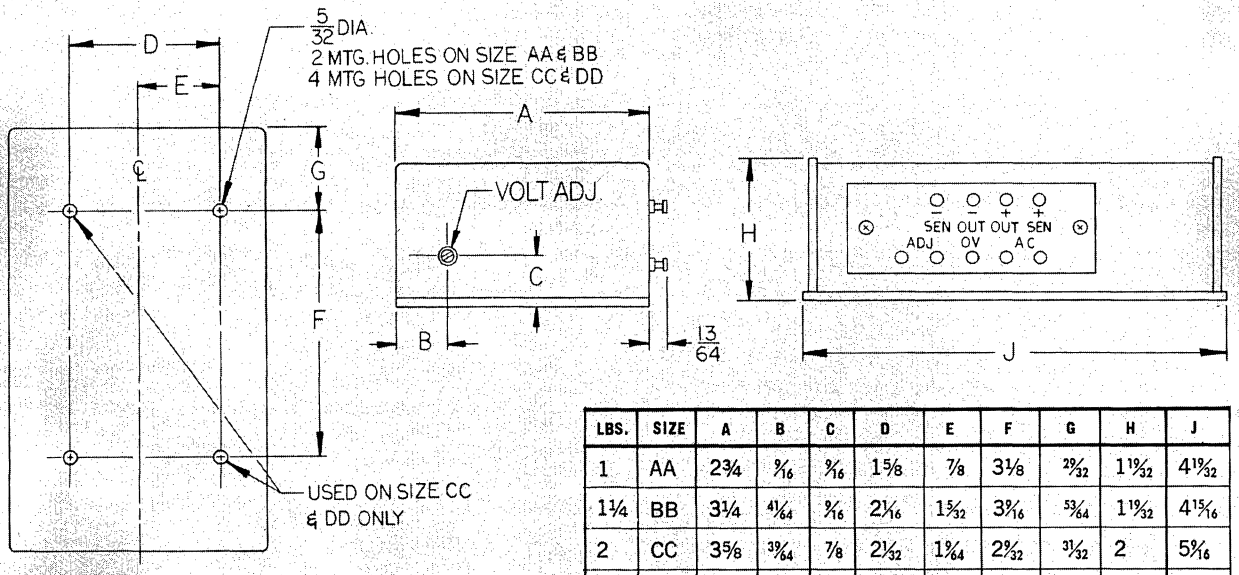
MHF or MHFC Model	Max. Rated Amps	Maximum Permissible Amps With Vertical Mounting on Chassis* @ 40°C	@ 50°C	@ 60°C	@ 71°C	Maximum Permissible Amps With Horizontal Mounting on Chassis* @ 40°C	@ 50°C	@ 60°C	@ 71°C
6.0-1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
6.0-2.0	2.0	2.0	2.0	2.0	1.9	2.0	2.0	2.0	1.9
6.0-4.0	4.0	4.0	3.8	3.3	2.8	4.0	3.7	3.2	2.7
6.0-8.0	8.0	8.0	7.0	6.2	5.4	6.8	6.2	5.5	4.7
15.0-0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
15.0-1.0	1.0	1.0	1.0	1.0	0.9	1.0	1.0	1.0	0.9
15.0-2.0	2.0	2.0	2.0	1.8	1.6	2.0	1.9	1.7	1.5
15.0-4.0	4.0	4.0	4.0	3.5	2.9	3.8	3.3	2.8	2.4
30.0-0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
30.0-0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
30.0-1.0	1.0	1.0	1.0	1.0	0.9	1.0	1.0	1.0	0.8
30.0-2.0	2.0	2.0	2.0	1.9	1.5	2.0	1.7	1.5	1.3

* Chassis refers to a flat aluminum plate, at least ¼" thick, extending at least 3" beyond each dimension of the base plate. Where a chassis is not available for mounting and the permissible current shown in the table is less than the maximum rated current, further derate the maximum permissible current by 10% of the derated value. (Further derating is unnecessary where the tables do not show any.)

COOLING BY FORCED AIR

All models can be operated up to their maximum rated current at 71°C ambient with 200 LFM minimum airflow directed at any one of the two longer sides or 400 LFM minimum airflow directed at any one of the two shorter sides.

MHF SERIES MECHANICAL DATA



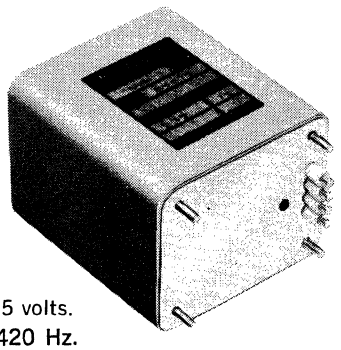
LBS.	SIZE	A	B	C	D	E	F	G	H	J
1	AA	2¾	9/16	9/16	1⅝	⅞	3⅛	29/32	1 19/32	4 19/32
1¼	BB	3¼	41/64	9/16	2 1/16	1 5/32	3 9/16	53/64	1 19/32	4 15/16
2	CC	3⅝	39/64	⅞	2 1/32	1 17/64	2 29/32	31/32	2	5 9/16
2½	DD	4⅜	⅝	31/32	2 29/32	1⅝	3⅛	1 15/32	2 1/16	7 1/32

TECHNIPOWER, INC.
A BENRUS SUBSIDIARY
Ridgefield, Conn.
06877

P-80

Widest Line of Low Cost, All-Purpose Encapsulated SERIES REGULATED AC-DC MODULAR POWER SUPPLIES

3.0 to 325 VDC up to 800 Watts Base Temperature Rated to 80°C



STANDARD OF THE INDUSTRY

DESIGN PARAMETERS (Typical)

Temperature coefficient: 0.015%/°C or 1 mv/°C, whichever is greater.

Recovery time: Less than 50 μsec, 1/2L to FL.

Designed to meet MIL environmental specifications:
RFI: MIL-I-6181D;
Shock — MIL-STD-202C, Method 205C;
Vibration — MIL-STD-202C, Method 201A;
Hi-temp — MIL-E-5400, Classes 1 & 1A;
Humidity — MIL-STD-202C, Method 103B.

M.T.B.F. for Product Line: 50,000 hours, per MIL-HBK-217A, with module stressed at 80°C base temperature.

Output impedance: See curve.

OPTIONAL FEATURES

Details in Technipower Catalog #701

	SUFFIX
Closer regulation	AA
Reduced size and weight, 400 Hz input	D
Operation with lamp loads	E
Fixed output voltage	F
Shock and vibration mounts	G, V
External output adjust	H
Fully epoxy encapsulated	K
Sealed internal potentiometer	P
Remote sensing	R, Y
Lower temperature coefficient	T, TT
Off-ground operation	U
Wide input range	W

Special cases, shapes and finishes

SPECIFICATIONS

Input voltage range: 105-125 volts.

Input frequency range: 47-420 Hz.

Regulation — Line ±0.05% — "A" models.
and load combined: ±0.5% — standard models.

Ripple: "A" models — 0.002% or 1 mv rms, whichever is greater, with 60 Hz input; 0.004% or 3 mv rms whichever is greater, with 400 Hz input.
Standard models — 0.01% or 5 mv, rms, whichever is greater, with 60 Hz input; 0.04% or 10 mv, rms, whichever is greater, with 400 Hz input.

Output adjustment range: 10% (screwdriver adj. in base). At 80% of rated load the output may be adjusted a full 20% (±10%) of nominal.

Operating temperature: —20°C to +80°C (max base temp.)

Storage temperature: —62°C to +85°C.

Polarity: May be used positive or negative.

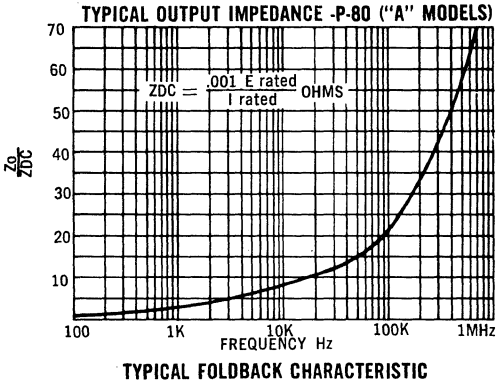
Output voltage and current: See specific model listings.

Series operation:
Series starting circuitry employed requires that input AC voltage be applied at a rate greater than 150 v rms/second. Consult factory if slow rising input is anticipated.

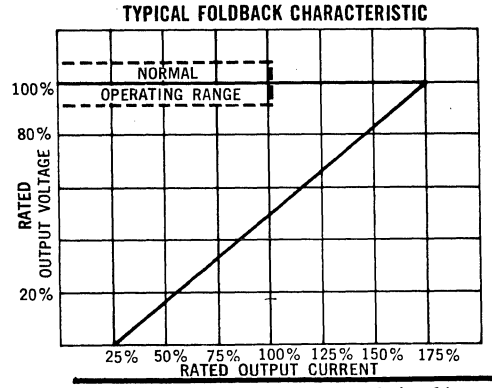
Short circuit protection: Unique foldback circuitry (see curve) protects each module if output should be shorted continuously. Automatic return after short removal.

Overvoltage protection: See model listings.

TYPICAL OUTPUT IMPEDANCE -P-80 ("A" MODELS)

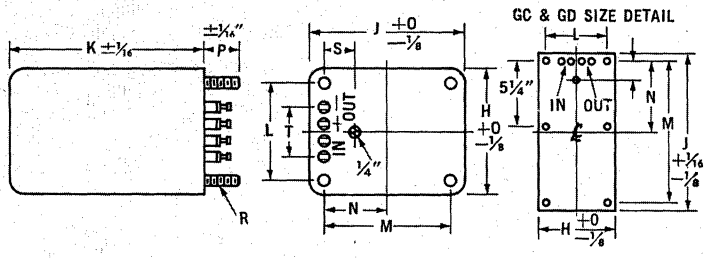


TYPICAL FOLDBACK CHARACTERISTIC



MECHANICAL DATA

(Case size is called out in list of models and prices)



Case Size	MODULE DIMENSIONS H	J	K	L	M	N	P	R	S	T	Tolerances L,M,N,S	Recommended Clearance Terminal Cutouts	Terminal Height ±1/16
A	2 3/8	2 3/4	3 13/16	1 3/4	2 1/8	1 1/16	11/32	6-32	19/32	15/16	±1/64	3/8x1 5/16	19/32
B	2 5/8	3 1/16	4 1/4	1 55/64	2 13/64	1 5/32	11/32	8-32	19/32	15/16	±1/64	3/8x1 5/16	19/32
C	3 1/16	3 5/16	4 7/8	2 1/8	2 5/8	1 5/16	11/32	8-32	19/32	15/16	±1/64	3/8x1 5/16	19/32
D	3 3/8	3 15/16	5 1/4	2 7/16	3	1 1/2	15/32	10-32	19/32	15/16	±1/32	3/4x1 5/16	19/32
E	3 11/16	4 5/16	5 5/16	2 11/16	3 5/16	1 21/32	7/16	10-32	19/32	15/16	±1/32	3/8x1 5/16	19/32
F	4	4 11/16	6	3	3 11/16	1 27/32	9/16	1/4-20	19/32	15/16	±3/64	3/4x1 5/16	19/32
G	4 5/16	5 1/16	6 13/16	3 5/16	4 1/16	2 1/32	9/16	1/4-20	19/32	15/16	±3/64	3/8x1 5/16	19/32
GA	4 15/16	6 9/16	7	3 5/8	5 1/4	2 5/8	21/32	5/16-18	3/4	1 1/2	±3/64	1/2x2	5/8
GB	6 9/16	6 3/4	7	5 1/4	5 7/16	2 23/32	21/32	5/16-18	3/4	1 1/2	±3/64	1/2x2	5/8
GC*	4 15/16	13 1/16	7	3 5/8	11 13/16	5 29/32	21/32	5/16-18	3/4	1 7/8	±3/64	5/8x2 1/2	5/8
GD*	6 9/16	13 1/16	7	5 1/16	11 13/16	5 29/32	21/32	5/16-18	3/4	1 7/8	±3/64	5/8x2 1/2	5/8

*See detail

TECHNIPOWER, INC.

A BENRUS SUBSIDIARY

Ridgefield, Conn. 06877

MODELS AND PRICES

Output Voltage Adjust. Range	Output Current (amps)	Case Size (see dwg)	"A" Models ±0.05% Accuracy Model	Price	Standard Models ±0.5% Accuracy Model	Price	Thermal Ref. No.	O.V. Ref.
2.8-3.2	0.375	B	P-3.0-0.375A	95	P-3.0-0.375	90	1	A
2.8-3.2	0.750	C	P-3.0-0.750A	100	P-3.0-0.750	95	3	A
2.8-3.2	1.5	E	P-3.0-1.5A	105	P-3.0-1.5	100	5	A
2.8-3.2	3.0	F	P-3.0-3.0A	110	P-3.0-3.0	105	6A	B
2.8-3.2	6.0	G	P-3.0-6.0A	140	P-3.0-6.0	135	7A	B
2.8-3.2	12.0	GB	P-3.0-12.0A	200	P-3.0-12.0	195	8A	D
2.8-3.2	25.0	GC	P-3.0-25.0A	290	P-3.0-25.0	285	9A	D
3.2-3.5	0.375	B	P-3.3-0.375A	95	P-3.3-0.375	90	1	A
3.2-3.5	0.750	C	P-3.3-0.750A	100	P-3.3-0.750	95	3	A
3.2-3.5	1.5	E	P-3.3-1.5A	105	P-3.3-1.5	100	5	A
3.2-3.5	3.0	F	P-3.3-3.0A	110	P-3.3-3.0	105	6A	B
3.2-3.5	6.0	G	P-3.3-6.0A	145	P-3.3-6.0	140	7A	B
3.2-3.5	12.0	GB	P-3.3-12.0A	205	P-3.3-12.0	200	8A	D
3.2-3.5	25.0	GC	P-3.3-25.0A	300	P-3.3-25.0	295	9A	D
3.5-3.9	0.375	B	P-3.7-0.375A	95	P-3.7-0.375	90	1	A
3.5-3.9	0.750	C	P-3.7-0.750A	100	P-3.7-0.750	95	3	A
3.5-3.9	1.5	E	P-3.7-1.5A	105	P-3.7-1.5	100	5	A
3.5-3.9	3.0	F	P-3.7-3.0A	115	P-3.7-3.0	110	6A	B
3.5-3.9	6.0	G	P-3.7-6.0A	150	P-3.7-6.0	145	7A	B
3.5-3.9	12.0	GB	P-3.7-12.0A	215	P-3.7-12.0	210	8A	D
3.5-3.9	25.0	GC	P-3.7-25.0A	310	P-3.7-25.0	305	9A	D
3.9-4.3	0.375	B	P-4.1-0.375A	95	P-4.1-0.375	90	1	A
3.9-4.3	0.750	C	P-4.1-0.750A	100	P-4.1-0.750	95	3	A
3.9-4.3	1.5	E	P-4.1-1.5A	105	P-4.1-1.5	100	5	A
3.9-4.3	3.0	F	P-4.1-3.0A	115	P-4.1-3.0	110	6A	B
3.9-4.3	6.0	G	P-4.1-6.0A	155	P-4.1-6.0	150	7A	B
3.9-4.3	12.0	GB	P-4.1-12.0A	220	P-4.1-12.0	215	8A	D
3.9-4.3	25.0	GC	P-4.1-25.0A	310	P-4.1-25.0	305	9A	D
4.3-4.7	0.375	B	P-4.5-0.375A	95	P-4.5-0.375	90	1	A
4.3-4.7	0.750	C	P-4.5-0.750A	100	P-4.5-0.750	95	3	A
4.3-4.7	1.5	E	P-4.5-1.5A	105	P-4.5-1.5	100	5	A
4.3-4.7	3.0	F	P-4.5-3.0A	115	P-4.5-3.0	110	6A	B
4.3-4.7	6.0	G	P-4.5-6.0A	160	P-4.5-6.0	155	7A	B
4.3-4.7	12.0	GB	P-4.5-12.0A	225	P-4.5-12.0	220	8A	D
4.3-4.7	25.0	GC	P-4.5-25.0A	325	P-4.5-25.0	320	9A	D
4.7-5.3	0.375	B	P-5.1-0.375A	95	P-5.1-0.375	90	1	A
4.7-5.3	0.750	C	P-5.1-0.750A	100	P-5.1-0.750	95	3	A
4.7-5.3	1.5	E	P-5.1-1.5A	105	P-5.1-1.5	100	5	A
4.7-5.3	3.0	F	P-5.1-3.0A	120	P-5.1-3.0	115	6A	B
4.7-5.3	6.0	G	P-5.1-6.0A	165	P-5.1-6.0	160	7A	B
4.7-5.3	12.0	GB	P-5.1-12.0A	235	P-5.1-12.0	230	8A	D
4.7-5.3	25.0	GC	P-5.1-25.0A	335	P-5.1-25.0	330	9A	D
5.3-5.8	0.375	B	P-5.5-0.375A	95	P-5.5-0.375	90	1	A
5.3-5.8	0.750	C	P-5.5-0.750A	100	P-5.5-0.750	95	3	A
5.3-5.8	1.5	E	P-5.5-1.5A	105	P-5.5-1.5	100	5	A
5.3-5.8	3.0	F	P-5.5-3.0A	120	P-5.5-3.0	115	6A	B
5.3-5.8	6.0	G	P-5.5-6.0A	170	P-5.5-6.0	165	7A	B
5.3-5.8	12.0	GB	P-5.5-12.0A	240	P-5.5-12.0	235	8A	D
5.3-5.8	25.0	GC	P-5.5-25.0A	335	P-5.5-25.0	330	9A	D
5.8-6.3	0.375	B	P-6.0-0.375A	95	P-6.0-0.375	90	1	A
5.8-6.3	0.750	C	P-6.0-0.750A	100	P-6.0-0.750	95	3	A
5.8-6.3	1.5	E	P-6.0-1.5A	105	P-6.0-1.5	100	5	A
5.8-6.3	3.0	F	P-6.0-3.0A	125	P-6.0-3.0	120	6A	B
5.8-6.3	6.0	G	P-6.0-6.0A	170	P-6.0-6.0	165	7A	B
5.8-6.3	12.0	GB	P-6.0-12.0A	250	P-6.0-12.0	245	8A	D
5.8-6.3	25.0	GC	P-6.0-25.0A	345	P-6.0-25.0	340	9A	D
6.3-6.9	0.200	A	P-6.6-0.200A	90	P-6.6-0.200	85	1	A
6.3-6.9	0.375	B	P-6.6-0.375A	95	P-6.6-0.375	90	2	A
6.3-6.9	0.750	C	P-6.6-0.750A	100	P-6.6-0.750	95	3	A
6.3-6.9	1.5	E	P-6.6-1.5A	105	P-6.6-1.5	100	5	A
6.3-6.9	3.0	G	P-6.6-3.0A	145	P-6.6-3.0	140	6A	B
6.3-6.9	6.0	GA	P-6.6-6.0A	170	P-6.6-6.0	165	7A	B
6.3-6.9	12.0	GB	P-6.6-12.0A	250	P-6.6-12.0	245	8A	D
6.3-6.9	25.0	GC	P-6.6-25.0A	350	P-6.6-25.0	345	9A	D
6.9-7.6	0.200	A	P-7.3-0.200A	90	P-7.3-0.200	85	1	A
6.9-7.6	0.375	B	P-7.3-0.375A	95	P-7.3-0.375	90	2	A
6.9-7.6	0.750	C	P-7.3-0.750A	100	P-7.3-0.750	95	3	A
6.9-7.6	1.5	E	P-7.3-1.5A	105	P-7.3-1.5	100	5	A
6.9-7.6	3.0	G	P-7.3-3.0A	145	P-7.3-3.0	140	6A	B
6.9-7.6	6.0	GA	P-7.3-6.0A	180	P-7.3-6.0	175	7A	B
6.9-7.6	12.0	GB	P-7.3-12.0A	250	P-7.3-12.0	245	8A	D
6.9-7.6	25.0	GC	P-7.3-25.0A	365	P-7.3-25.0	360	9A	D
7.6-8.5	0.200	A	P-8.1-0.200A	90	P-8.1-0.200	85	1	A
7.6-8.5	0.375	B	P-8.1-0.375A	95	P-8.1-0.375	90	2	A
7.6-8.5	0.750	C	P-8.1-0.750A	100	P-8.1-0.750	95	3	A
7.6-8.5	1.5	E	P-8.1-1.5A	110	P-8.1-1.5	105	5	A
7.6-8.5	3.0	G	P-8.1-3.0A	150	P-8.1-3.0	145	6A	B
7.6-8.5	6.0	GA	P-8.1-6.0A	185	P-8.1-6.0	180	7A	B
7.6-8.5	12.0	GB	P-8.1-12.0A	250	P-8.1-12.0	245	8A	D
7.6-8.5	25.0	GC	P-8.1-25.0A	375	P-8.1-25.0	370	9A	D
8.5-9.3	0.200	A	P-8.9-0.200A	90	P-8.9-0.200	85	1	A
8.5-9.3	0.375	B	P-8.9-0.375A	95	P-8.9-0.375	90	2	A
8.5-9.3	0.750	C	P-8.9-0.750A	100	P-8.9-0.750	95	3	A
8.5-9.3	1.5	E	P-8.9-1.5A	110	P-8.9-1.5	105	5	A
8.5-9.3	3.0	G	P-8.9-3.0A	150	P-8.9-3.0	145	6A	B
8.5-9.3	6.0	GA	P-8.9-6.0A	195	P-8.9-6.0	190	7A	B
8.5-9.3	12.0	GB	P-8.9-12.0A	250	P-8.9-12.0	245	8A	D
8.5-9.3	25.0	GC	P-8.9-25.0A	375	P-8.9-25.0	370	10	D
9.3-10.3	0.200	A	P-9.8-0.200A	95	P-9.8-0.200	90	1	A
9.3-10.3	0.375	B	P-9.8-0.375A	100	P-9.8-0.375	95	2	A
9.3-10.3	0.750	D	P-9.8-0.750A	105	P-9.8-0.750	100	3	A
9.3-10.3	1.5	E	P-9.8-1.5A	110	P-9.8-1.5	105	6	A
9.3-10.3	3.0	G	P-9.8-3.0A	155	P-9.8-3.0	150	6A	B
9.3-10.3	6.0	GA	P-9.8-6.0A	195	P-9.8-6.0	190	8	B
9.3-10.3	12.0	GB	P-9.8-12.0A	260	P-9.8-12.0	255	9	D
9.3-10.3	25.0	GC	P-9.8-25.0A	395	P-9.8-25.0	390	10	D
10.3-11.4	0.200	A	P-10.8-0.200A	95	P-10.8-0.200	90	1	A
10.3-11.4	0.375	B	P-10.8-0.375A	100	P-10.8-0.375	95	2	A
10.3-11.4	0.750	D	P-10.8-0.750A	105	P-10.8-0.750	100	3	A
10.3-11.4	1.5	F	P-10.8-1.5A	115	P-10.8-1.5	110	6	A
10.3-11.4	3.0	G	P-10.8-3.0A	160	P-10.8-3.0	155	7	C
10.3-11.4	6.0	GA	P-10.8-6.0A	205	P-10.8-6.0	200	8	C
10.3-11.4	12.0	GB	P-10.8-12.0A	270	P-10.8-12.0	265	9	D
10.3-11.4	25.0	GC	P-10.8-25.0A	400	P-10.8-25.0	395	10	D
11.4-12.5	0.200	B	P-12.0-0.200A	95	P-12.0-0.200	90	1	A
11.4-12.5	0.375	B	P-12.0-0.375A	100	P-12.0-0.375	95	2	A
11.4-12.5	0.750	D	P-12.0-0.750A	105	P-12.0-0.750	100	3	A
11.4-12.5	1.5	F	P-12.0-1.5A	115	P-12.0-1.5	110	6	A
11.4-12.5	3.0	G	P-12.0-3.0A	160	P-12.0-3.0	155	7	C
11.4-12.5	6.0	GA	P-12.0-6.0A	210	P-12.0-6.0	205	8	C
11.4-12.5	12.0	GB	P-12.0-12.0A	275	P-12.0-12.0	270	9	D
11.4-12.5	25.0	GC	P-12.0-25.0A	410	P-12.0-25.0	405	10	D
12.5-13.7	0.100	A	P-13.1-0.100A	90	P-13.1-0.100	85	1	A
12.5-13.7	0.200	B	P-13.1-0.200A	95	P-13.1-0.200	90	1	A
12.5-13.7	0.375	B	P-13.1-0.375A	100	P-13.1-0.375	95	2	A
12.5-13.7	0.750	C	P-13.1-0.750A	105	P-13.1-0.750	100	3	A
12.5-13.7	1.5	F	P-13.1-1.5A	115	P-13.1-1.5	110	6	A
12.5-13.7	3.0	GA	P-13.1-3.0A	165	P-13.1-3.0	160	7	C
12.5-13.7	6.0	GB	P-13.1-6.0A	210	P-13.1-6.0	205	8	C
12.5-13.7	12.0	GC	P-13.1-12.0A	300	P-13.1-12.0	295	9	D
12.5-13.7	25.0	GD	P-13.1-25.0A	410	P-13.1-25.0	405	10	D
13.7-15.2	0.100	A	P-14.5-0.100A	90	P-14.5-0.100	85	1	A
13.7-15.2	0.200	B	P-14.5-0.200A	95	P-14.5-0.200	90	1	A
13.7-15.2	0.375	C	P-14.5-0.375A	100	P-14.5-0.375	95	2	A
13.7-15.2	0.750	D	P-14.5-0.750A	105	P-14.5-0.750	100	3	A
13.7-15.2	1.5	F	P-14.5-1.5A	120	P-14.5-1.5	115	6	A
13.7-15.2	3.0	GA	P-14.5-3.0A	165	P-14.5-3.0	160	7	C
13.7-15.2	6.0	GB	P-14.5-6.0A	215	P-14.5-6.0	210	8	C
13.7-15.2	12.0	GC	P-14.5-12.0A	305	P-14.5-12.0	300	9	D
13.7-15.2	25.0	GD	P-14.5-25.0A	415	P-14.5-25.0	410	10	D

See Catalog #701 for models up to 325 VDC

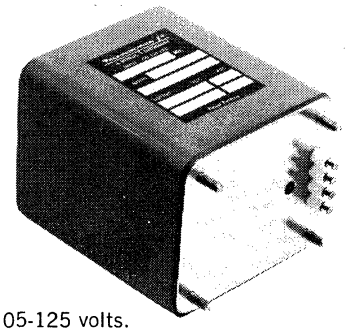
TECHNIPOWER, INC.
A BENRUS SUBSIDIARY
Ridgefield, Conn.
06877

PL-80

LOW COST HIGH DENSITY SERIES REGULATED AC-DC MODULAR POWER SUPPLIES

AC-DC 3.0 to 152 VDC, up to 75 Watts

Base Temp. Rated to 80°C



DESIGN PARAMETERS (Typical)

Temperature coefficient: 0.015%/°C or 1 mv/°C, whichever is greater.

Recovery time: Less than 50 μsec, 1/2L to FL.

Designed to meet MIL environmental specifications:
RFI — MIL-I-6181D
Shock — MIL-STD-202C, Method 205C;
Vibration — MIL-STD-202C, Method 201A
Hi-temp — MIL-E-5400, Classes 1 & 1A;
Humidity — MIL-STD-202C, Method 103B.

M.T.B.F. For Product Line: 60,000 hours, per MIL-HBK-217A, with module stressed at 80°C base temperature.

Output impedance: See curve.

OPTIONAL FEATURES

Details in Technipower Catalog #701

	SUFFIX
Fixed output voltage	**F**
External output adjust	**H**

SPECIFICATIONS

Input voltage range: 105-125 volts.

Input frequency range: 47-420 Hz.

Regulation-Line and Load Combined: ±0.05% — "A" models. ±0.5% — standard models.

Ripple: "A" models — 0.002% or 1 mv rms, whichever is greater, with 60 Hz input; 0.004% or 3 mv rms whichever is greater, with 400 Hz input.
Standard models — 0.01% or 5 mv rms, whichever is greater, with 60 Hz input; 0.04% or 10 mv, rms, whichever is greater, with 400 Hz input.

Output adjustment range: 10% (screwdriver adj. in base). At 80% of rated load the output may be adjusted 20% (±10%) of nominal.

Operating temperature: —20°C to +80°C (max. base temp.).

Storage temperature: —62°C to +85°C.

Polarity: May be used positive or negative.

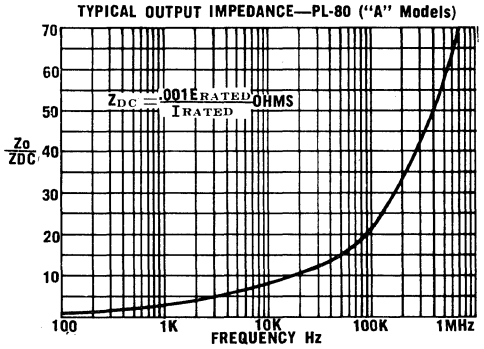
Output voltage and current: See specific model listings.

Series operation: Series starting circuitry employed requires that input AC voltage be applied at a rate greater than 150 v rms/second. Consult factory if slow rising input is anticipated.

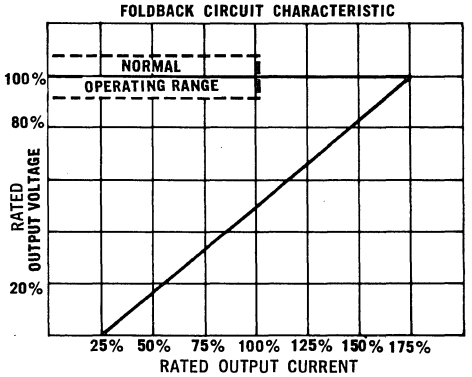
Short circuit protection: Unique foldback circuitry (see curve) protects each module if output should be shorted continuously. Automatic return after short removal.

Overvoltage protection: See model listings.

TYPICAL OUTPUT IMPEDANCE—PL-80 ("A" Models)

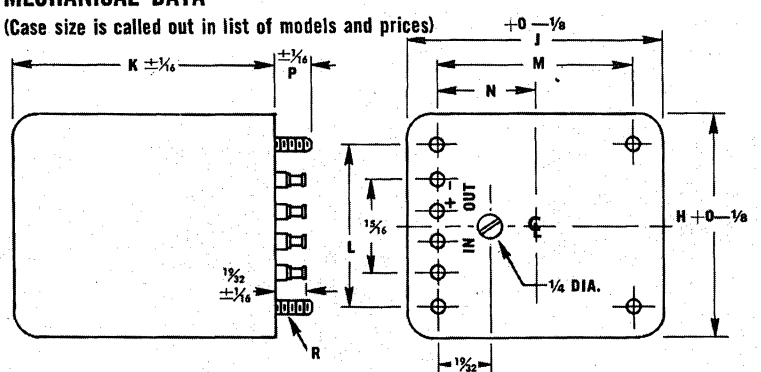


FOLDBACK CIRCUIT CHARACTERISTIC



MECHANICAL DATA

(Case size is called out in list of models and prices)



CASE SIZE	MODULE DIMENSIONS H	J	K	L	M	N	P	R	CASE SIZE	TOLERANCES L M N S
AL	2 3/8	2 3/4	2 13/16	1 3/4	2 1/8	1 1/16	11/32	6-32	AL	±1/64
BL	2 5/8	3 1/16	3 3/16	1 55/64	2 19/64	1 5/32	11/32	8-32	BL	±1/64
CL	3 1/16	3 3/16	3 7/8	2 1/8	2 5/8	1 5/16	11/32	8-32	CL	±1/64
DL	3 3/8	3 15/16	4 5/16	2 7/16	3	1 1/2	15/32	10-32	DL	±1/32
EL	3 11/16	4 5/16	4 3/4	2 11/16	3 5/16	1 21/32	7/16	10-32	EL	±1/32
FL	4	4 11/16	5 3/16	3	3 11/16	1 27/32	9/16	1/4-20	FL	±3/64
GL	4 5/16	5 1/16	5 1/2	3 5/16	4 1/16	2 1/32	9/16	1/4-20	GL	±3/64

RECOMMENDED CLEARANCE TERMINAL CUTOUT 3/8 x 1 5/16

PL-80

TECHNIPOWER, INC.

A BENRUS SUBSIDIARY

Ridgefield, Conn.
06877

MODELS AND PRICES

Output Voltage Adjust Range	Output Current (amps)	Case Size (see dwg)	"A" Models ±0.05% Accuracy Model	Price	Standard Models ±0.5% Accuracy Model	Price	Thermal Ref. No.	O.V. Ref.
2.8-3.2	0.375	AL	PL-3.0-0.375A	90	PL-3.0-0.375	85	1	A
2.8-3.2	0.750	BL	PL-3.0-0.750A	95	PL-3.0-0.750	90	3	A
2.8-3.2	1.5	DL	PL-3.0-1.5A	100	PL-3.0-1.5	95	5	A
2.8-3.2	3.0	EL	PL-3.0-3.0A	105	PL-3.0-3.0	100	6A	B
2.8-3.2	6.0	FL	PL-3.0-6.0A	135	PL-3.0-6.0	130	7A	B
3.2-3.5	0.375	AL	PL-3.3-0.375A	90	PL-3.3-0.375	85	1	A
3.2-3.5	0.750	BL	PL-3.3-0.750A	95	PL-3.3-0.750	90	3	A
3.2-3.5	1.5	DL	PL-3.3-1.5A	100	PL-3.3-1.5	95	5	A
3.2-3.5	3.0	EL	PL-3.3-3.0A	110	PL-3.3-3.0	105	6A	B
3.2-3.5	6.0	FL	PL-3.3-6.0A	140	PL-3.3-6.0	135	7A	B
3.5-3.9	0.375	AL	PL-3.7-0.375A	90	PL-3.7-0.375	85	1	A
3.5-3.9	0.750	BL	PL-3.7-0.750A	95	PL-3.7-0.750	90	3	A
3.5-3.9	1.5	DL	PL-3.7-1.5A	100	PL-3.7-1.5	95	5	A
3.5-3.9	3.0	EL	PL-3.7-3.0A	110	PL-3.7-3.0	105	6A	B
3.5-3.9	6.0	FL	PL-3.7-6.0A	150	PL-3.7-6.0	145	7A	B
3.9-4.3	0.375	AL	PL-4.1-0.375A	90	PL-4.1-0.375	85	1	A
3.9-4.3	0.750	BL	PL-4.1-0.750A	95	PL-4.1-0.750	90	3	A
3.9-4.3	1.5	DL	PL-4.1-1.5A	100	PL-4.1-1.5	95	5	A
3.9-4.3	3.0	EL	PL-4.1-3.0A	110	PL-4.1-3.0	105	6A	B
3.9-4.3	6.0	FL	PL-4.1-6.0A	150	PL-4.1-6.0	145	7A	B
4.3-4.7	0.375	AL	PL-4.5-0.375A	90	PL-4.5-0.375	85	1	A
4.3-4.7	0.750	BL	PL-4.5-0.750A	95	PL-4.5-0.750	90	3	A
4.3-4.7	1.5	DL	PL-4.5-1.5A	100	PL-4.5-1.5	95	5	A
4.3-4.7	3.0	EL	PL-4.5-3.0A	110	PL-4.5-3.0	105	6A	B
4.3-4.7	6.0	FL	PL-4.5-6.0A	150	PL-4.5-6.0	145	7A	B
4.7-5.3	0.375	AL	PL-5.1-0.375A	90	PL-5.1-0.375	85	1	A
4.7-5.3	0.750	BL	PL-5.1-0.750A	95	PL-5.1-0.750	90	3	A
4.7-5.3	1.5	DL	PL-5.1-1.5A	100	PL-5.1-1.5	95	5	A
4.7-5.3	3.0	EL	PL-5.1-3.0A	110	PL-5.1-3.0	105	6A	B
4.7-5.3	6.0	FL	PL-5.1-6.0A	155	PL-5.1-6.0	150	7A	B
5.3-5.8	0.375	AL	PL-5.5-0.375A	90	PL-5.5-0.375	85	1	A
5.3-5.8	0.750	BL	PL-5.5-0.750A	95	PL-5.5-0.750	90	3	A
5.3-5.8	1.5	DL	PL-5.5-1.5A	100	PL-5.5-1.5	95	5	A
5.3-5.8	3.0	EL	PL-5.5-3.0A	110	PL-5.5-3.0	105	6A	B
5.3-5.8	6.0	FL	PL-5.5-6.0A	160	PL-5.5-6.0	155	7A	B
5.8-6.3	0.375	AL	PL-6.0-0.375A	90	PL-6.0-0.375	85	1	A
5.8-6.3	0.750	BL	PL-6.0-0.750A	95	PL-6.0-0.750	90	3	A
5.8-6.3	1.5	DL	PL-6.0-1.5A	100	PL-6.0-1.5	95	5	A
5.8-6.3	3.0	EL	PL-6.0-3.0A	110	PL-6.0-3.0	105	6A	B
5.8-6.3	6.0	FL	PL-6.0-6.0A	165	PL-6.0-6.0	160	8	B
6.3-6.9	0.200	AL	PL-6.6-0.200A	90	PL-6.6-0.200	85	1	A
6.3-6.9	0.375	AL	PL-6.6-0.375A	95	PL-6.6-0.375	90	1	A
6.3-6.9	0.750	BL	PL-6.6-0.750A	100	PL-6.6-0.750	95	3	A
6.3-6.9	1.5	DL	PL-6.6-1.5A	110	PL-6.6-1.5	105	5	A
6.3-6.9	3.0	FL	PL-6.6-3.0A	120	PL-6.6-3.0	115	6A	B
6.3-6.9	6.0	GL	PL-6.6-6.0A	165	PL-6.6-6.0	160	8	B
6.9-7.6	0.200	AL	PL-7.3-0.200A	90	PL-7.3-0.200	85	1	A
6.9-7.6	0.375	AL	PL-7.3-0.375A	95	PL-7.3-0.375	90	1	A
6.9-7.6	0.750	BL	PL-7.3-0.750A	100	PL-7.3-0.750	95	3	A
6.9-7.6	1.5	DL	PL-7.3-1.5A	110	PL-7.3-1.5	105	5	A
6.9-7.6	3.0	FL	PL-7.3-3.0A	145	PL-7.3-3.0	140	6A	B
6.9-7.6	6.0	GL	PL-7.3-6.0A	165	PL-7.3-6.0	160	8	B
7.6-8.5	0.200	AL	PL-8.1-0.200A	90	PL-8.1-0.200	85	1	A
7.6-8.5	0.375	AL	PL-8.1-0.375A	95	PL-8.1-0.375	90	1	A
7.6-8.5	0.750	BL	PL-8.1-0.750A	100	PL-8.1-0.750	95	3	A
7.6-8.5	1.5	DL	PL-8.1-1.5A	110	PL-8.1-1.5	105	5	A
7.6-8.5	3.0	FL	PL-8.1-3.0A	145	PL-8.1-3.0	140	6A	B
7.6-8.5	6.0	GL	PL-8.1-6.0A	170	PL-8.1-6.0	165	8	B
8.5-9.3	0.200	AL	PL-8.9-0.200A	90	PL-8.9-0.200	85	1	A
8.5-9.3	0.375	AL	PL-8.9-0.375A	95	PL-8.9-0.375	90	1	A
8.5-9.3	0.750	BL	PL-8.9-0.750A	100	PL-8.9-0.750	95	3	A
8.5-9.3	1.5	DL	PL-8.9-1.5A	110	PL-8.9-1.5	105	5	A
8.5-9.3	3.0	FL	PL-8.9-3.0A	150	PL-8.9-3.0	145	6A	B
8.5-9.3	6.0	GL	PL-8.9-6.0A	170	PL-8.9-6.0	165	8	B
9.3-10.3	0.200	AL	PL-9.8-0.200A	90	PL-9.8-0.200	85	1	A
9.3-10.3	0.375	AL	PL-9.8-0.375A	95	PL-9.8-0.375	90	2	A
9.3-10.3	0.750	CL	PL-9.8-0.750A	100	PL-9.8-0.750	95	3	A
9.3-10.3	1.5	DL	PL-9.8-1.5A	110	PL-9.8-1.5	105	5	A
9.3-10.3	3.0	FL	PL-9.8-3.0A	150	PL-9.8-3.0	145	6A	B
9.3-10.3	6.0	GL	PL-9.8-6.0A	170	PL-9.8-6.0	165	8	B
10.3-11.4	0.200	AL	PL-10.8-0.200A	90	PL-10.8-0.200	85	1	A
10.3-11.4	0.375	AL	PL-10.8-0.375A	95	PL-10.8-0.375	90	2	A
10.3-11.4	0.750	CL	PL-10.8-0.750A	100	PL-10.8-0.750	95	3	A
10.3-11.4	1.5	EL	PL-10.8-1.5A	110	PL-10.8-1.5	105	5	A
10.3-11.4	3.0	FL	PL-10.8-3.0A	150	PL-10.8-3.0	145	6A	C
10.3-11.4	6.0	GL	PL-10.8-6.0A	175	PL-10.8-6.0	170	8	C
11.4-12.5	0.200	AL	PL-12.0-0.200A	90	PL-12.0-0.200	85	1	A
11.4-12.5	0.375	BL	PL-12.0-0.375A	95	PL-12.0-0.375	90	2	A
11.4-12.5	0.750	CL	PL-12.0-0.750A	105	PL-12.0-0.750	100	3	A
11.4-12.5	1.5	EL	PL-12.0-1.5A	110	PL-12.0-1.5	105	5	A
11.4-12.5	3.0	FL	PL-12.0-3.0A	150	PL-12.0-3.0	145	6A	C
11.4-12.5	6.0	GL	PL-12.0-6.0A	175	PL-12.0-6.0	170	8	C
12.5-13.7	0.100	AL	PL-13.1-0.100A	90	PL-13.1-0.100	85	1	A
12.5-13.7	0.200	AL	PL-13.1-0.200A	95	PL-13.1-0.200	90	1	A
12.5-13.7	0.375	BL	PL-13.1-0.375A	100	PL-13.1-0.375	95	2	A
12.5-13.7	0.750	CL	PL-13.1-0.750A	105	PL-13.1-0.750	100	3	A
12.5-13.7	1.5	EL	PL-13.1-1.5A	115	PL-13.1-1.5	110	6	A
12.5-13.7	3.0	GL	PL-13.1-3.0A	155	PL-13.1-3.0	150	6A	C
13.7-15.2	0.100	AL	PL-14.5-0.100A	90	PL-14.5-0.100	85	1	A
13.7-15.2	0.200	AL	PL-14.5-0.200A	95	PL-14.5-0.200	90	1	A
13.7-15.2	0.375	BL	PL-14.5-0.375A	100	PL-14.5-0.375	95	2	A
13.7-15.2	0.750	CL	PL-14.5-0.750A	105	PL-14.5-0.750	100	3	A
13.7-15.2	1.5	EL	PL-14.5-1.5A	140	PL-14.5-1.5	135	6	A
13.7-15.2	3.0	GL	PL-14.5-3.0A	155	PL-14.5-3.0	150	7	C
15.2-16.5	0.100	AL	PL-15.8-0.100A	90	PL-15.8-0.100	85	1	A
15.2-16.5	0.200	AL	PL-15.8-0.200A	95	PL-15.8-0.200	90	1	A
15.2-16.5	0.375	BL	PL-15.8-0.375A	100	PL-15.8-0.375	95	2	A
15.2-16.5	0.750	CL	PL-15.8-0.750A	105	PL-15.8-0.750	100	4	A
15.2-16.5	1.5	EL	PL-15.8-1.5A	140	PL-15.8-1.5	135	6	A
15.2-16.5	3.0	GL	PL-15.8-3.0A	155	PL-15.8-3.0	150	7	C
16.5-18.5	0.100	AL	PL-17.5-0.100A	90	PL-17.5-0.100	85	1	A
16.5-18.5	0.200	AL	PL-17.5-0.200A	95	PL-17.5-0.200	90	1	A
16.5-18.5	0.375	BL	PL-17.5-0.375A	100	PL-17.5-0.375	95	2	A
16.5-18.5	0.750	CL	PL-17.5-0.750A	105	PL-17.5-0.750	100	4	A
16.5-18.5	1.5	FL	PL-17.5-1.5A	140	PL-17.5-1.5	135	6	A
16.5-18.5	3.0	GL	PL-17.5-3.0A	155	PL-17.5-3.0	150	7	C

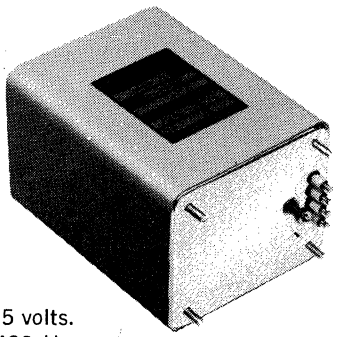
See Catalog #701 for models up to 152 VDC

TECHNIPOWER, INC.
A BENRUS SUBSIDIARY
Ridgefield, Conn.
06877

PM-95

REGULATED AC-DC MODULAR POWER SUPPLIES QUALIFIED FOR EXTREME MIL ENVIRONMENTS

3.0 to 325 VDC, up to 800 Watts
Base Temperature Rated to 95°C



DESIGN PARAMETERS (Typical)

Temperature coefficient: 0.015%/°C or 1 mv/°C, whichever is greater.

Recovery time: Less than 50 μsec, 1/2L to FL.

Qualified for MIL environmental operation: See Catalog #701, pages 16-17.

M.T.B.F. for Product Line: 40,000 hours per MIL-HBK-217A, with module stressed at 95°C base temperature.

Output impedance: See curve

OPTIONAL FEATURES

Details in Technipower Catalog #701

	SUFFIX
Closer regulation	AA
Reduced size and weight, 400 Hz input	D
Operation with lamp loads	E
Fixed output voltage	F
Shock and vibration mounts	G
External output adjust	H
Remote sensing	R, Y
Lower temperature coefficient	T, TT
Off ground operation	U
Wide input range	W
Multiple outputs	
Special cases, shapes and finishes	

SPECIFICATIONS

Input voltage range: 105-125 volts.

Input frequency range: 47-420 Hz.

Regulation-Line and Load Combined: ±0.05% — "A" models. ±0.5% — standard models.

Ripple: "A" models—0.002% or 1 mv rms, whichever is greater, with 60 Hz input; 0.004% or 3 mv rms, whichever is greater, with 400 Hz input.

Standard models — 0.01% or 5 mv rms, whichever is greater, with 60 Hz input; 0.04% or 10 mv rms, whichever is greater, with 400 Hz input.

Output adjustment range: 10% (screwdriver adj. in base). At 80% of rated load the output may be adjusted a full 20% (±10%) of nominal.

Operating temperature: —55°C to +95°C. (max. base temp.)

Storage temperature: —62°C to +105°C.

Polarity: May be used positive or negative.

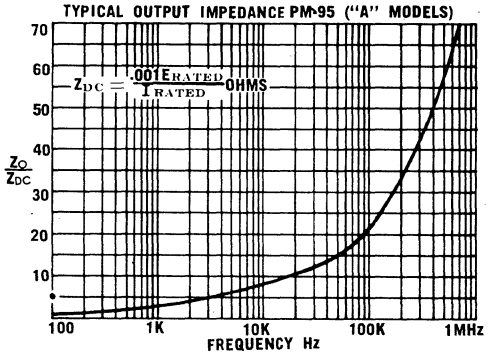
Output voltage and current: See specific model listings.

Series operation: Either conventionally or with complex loads. Series starting circuitry employed requires that input AC voltage be applied at a rate greater than 150 v rms/sec. Consult factory if slow rising input is anticipated.

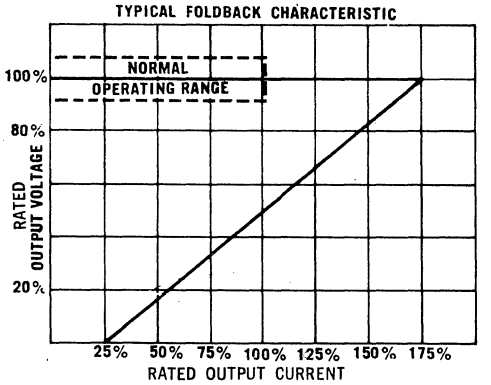
Short circuit protection: Unique foldback circuitry (see curve) protects each module if output should be shorted continuously. Automatic return after short removal.

Overvoltage protection: See model listings.

TYPICAL OUTPUT IMPEDANCE PM-95 ("A" MODELS)



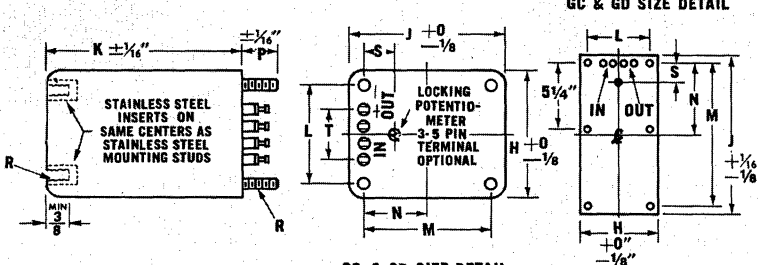
TYPICAL FOLDBACK CHARACTERISTIC



MECHANICAL DATA

(Case size is called out in list of models and prices)

GC & GD SIZE DETAIL



GC & GD SIZE DETAIL

Case Size	MODULE DIMENSIONS H	J	K	L	M	N	P	R	S	T	Tolerances L,M,N,S	Recommended Clearance Terminal Cutouts	Terminal Height ±1/16
A	2 3/8	2 3/4	3 13/16	1 3/4	2 1/8	1 1/16	11/32	6-32	19/32	15/16	±1/64	3/8x1 5/16	19/32
B	2 5/8	3 1/16	4 1/4	1 55/64	2 19/64	1 5/32	11/32	8-32	19/32	15/16	±1/64	3/8x1 5/16	19/32
C	3 1/16	3 9/16	4 7/8	2 1/8	2 5/8	1 5/16	11/32	8-32	19/32	15/16	±1/64	3/8x1 5/16	19/32
D	3 3/8	3 15/16	5 1/4	2 7/16	3	1 1/2	15/32	10-32	19/32	15/16	±1/32	3/8x1 5/16	19/32
E	3 11/16	4 5/16	5 9/16	2 11/16	3 5/16	1 21/32	7/16	10-32	19/32	15/16	±1/32	3/8x1 5/16	19/32
F	4	4 11/16	6	3	3 11/16	1 27/32	9/16	1/4-20	19/32	15/16	±3/64	3/8x1 5/16	19/32
G	4 5/16	5 1/16	6 13/16	3 5/16	4 1/16	2 21/32	9/16	1/4-20	19/32	15/16	±3/64	3/8x1 5/16	19/32
GA	4 15/16	6 5/16	7	3 5/8	5 1/4	2 5/8	21/32	5/16-18	3/4	1 1/2	±3/64	1/2x2	5/8
GB	6 5/16	6 3/4	7	5 1/4	5 7/16	2 23/32	21/32	5/16-18	3/4	1 1/2	±3/64	1/2x2	5/8
GC*	4 15/16	13 1/16	7	3 5/8	11 13/16	5 29/32	21/32	5/16-18	3/4	1 7/8	±3/64	5/8x2 1/2	5/8
GD*	6 5/16	13 1/16	7	5 7/16	11 13/16	5 29/32	21/32	5/16-18	3/4	1 7/8	±3/64	5/8x2 1/2	5/8

*See detail

TECHNIPOWER, INC.

A BENRUS SUBSIDIARY

Ridgefield, Conn. 06877

PM-95

MODELS AND PRICES

Output Voltage Adjust. Range	Output Current (amps)	Case Size (see dwg)	"A" Models ±0.05% Accuracy Model	Price	Standard Models ±0.5% Accuracy Model	Price	Thermal Ref. No.	O.V. Ref.
2.8-3.2	0.375	D	PM-3.0-0.375A	100	PM-3.0-0.375	95	1	C
2.8-3.2	0.750	D	PM-3.0-0.750A	110	PM-3.0-0.750	105	3	C
2.8-3.2	1.5	E	PM-3.0-1.5A	120	PM-3.0-1.5	115	5	C
2.8-3.2	3.0	G	PM-3.0-3.0A	130	PM-3.0-3.0	125	6A	C
2.8-3.2	6.0	GA	PM-3.0-6.0A	160	PM-3.0-6.0	155	7A	C
2.8-3.2	12.0	GB	PM-3.0-12.0A	250	PM-3.0-12.0	245	8A	D
2.8-3.2	25.0	GC	PM-3.0-25.0A	335	PM-3.0-25.0	330	9A	D
3.2-3.5	0.375	D	PM-3.3-0.375A	100	PM-3.3-0.375	95	1	C
3.2-3.5	0.750	D	PM-3.3-0.750A	110	PM-3.3-0.750	105	3	C
3.2-3.5	1.5	E	PM-3.3-1.5A	120	PM-3.3-1.5	115	5	C
3.2-3.5	3.0	G	PM-3.3-3.0A	135	PM-3.3-3.0	130	6A	C
3.2-3.5	6.0	GA	PM-3.3-6.0A	165	PM-3.3-6.0	160	7A	C
3.2-3.5	12.0	GB	PM-3.3-12.0A	250	PM-3.3-12.0	245	8A	D
3.2-3.5	25.0	GC	PM-3.3-25.0A	345	PM-3.3-25.0	340	9A	D
3.5-3.9	0.375	D	PM-3.7-0.375A	100	PM-3.7-0.375	95	1	C
3.5-3.9	0.750	D	PM-3.7-0.750A	110	PM-3.7-0.750	105	3	C
3.5-3.9	1.5	E	PM-3.7-1.5A	120	PM-3.7-1.5	115	5	C
3.5-3.9	3.0	G	PM-3.7-3.0A	140	PM-3.7-3.0	135	6A	C
3.5-3.9	6.0	GA	PM-3.7-6.0A	200	PM-3.7-6.0	195	7A	C
3.5-3.9	12.0	GB	PM-3.7-12.0A	260	PM-3.7-12.0	255	8A	D
3.5-3.9	25.0	GC	PM-3.7-25.0A	365	PM-3.7-25.0	360	9A	D
3.9-4.3	0.375	D	PM-4.1-0.375A	105	PM-4.1-0.375	100	1	C
3.9-4.3	0.750	D	PM-4.1-0.750A	110	PM-4.1-0.750	105	3	C
3.9-4.3	1.5	E	PM-4.1-1.5A	120	PM-4.1-1.5	115	5	C
3.9-4.3	3.0	G	PM-4.1-3.0A	145	PM-4.1-3.0	140	6A	C
3.9-4.3	6.0	GA	PM-4.1-6.0A	205	PM-4.1-6.0	200	7A	C
3.9-4.3	12.0	GB	PM-4.1-12.0A	270	PM-4.1-12.0	265	8A	D
3.9-4.3	25.0	GC	PM-4.1-25.0A	380	PM-4.1-25.0	375	9A	D
4.3-4.7	0.375	C	PM-4.5-0.375A	105	PM-4.5-0.375	100	1	C
4.3-4.7	0.750	C	PM-4.5-0.750A	115	PM-4.5-0.750	110	3	C
4.3-4.7	1.5	E	PM-4.5-1.5A	120	PM-4.5-1.5	115	5	C
4.3-4.7	3.0	F	PM-4.5-3.0A	135	PM-4.5-3.0	130	6A	C
4.3-4.7	6.0	G	PM-4.5-6.0A	210	PM-4.5-3.0	205	7A	C
4.3-4.7	12.0	GB	PM-4.5-12.0A	275	PM-4.5-12.0	270	8A	F
4.3-4.7	25.0	GC	PM-4.5-25.0A	405	PM-4.5-25.0	400	9A	F
4.7-5.3	0.375	C	PM-5.1-0.375A	105	PM-5.1-0.375	100	1	C
4.7-5.3	0.750	C	PM-5.1-0.750A	115	PM-5.1-0.750	110	3	C
4.7-5.3	1.5	E	PM-5.1-1.5A	120	PM-5.1-1.5	115	5	C
4.7-5.3	3.0	F	PM-5.1-3.0A	145	PM-5.1-3.0	140	6A	C
4.7-5.3	6.0	G	PM-5.1-6.0A	225	PM-5.1-6.0	220	7A	C
4.7-5.3	12.0	GB	PM-5.1-12.0A	280	PM-5.1-12.0	275	8A	F
4.7-5.3	25.0	GC	PM-5.1-25.0A	405	PM-5.1-25.0	400	9A	F
5.3-5.8	0.375	C	PM-5.5-0.375A	105	PM-5.5-0.375	100	1	C
5.3-5.8	0.750	C	PM-5.5-0.750A	115	PM-5.5-0.750	110	3	C
5.3-5.8	1.5	E	PM-5.5-1.5A	125	PM-5.5-1.5	120	5	C
5.3-5.8	3.0	F	PM-5.5-3.0A	145	PM-5.5-3.0	140	6A	C
5.3-5.8	6.0	G	PM-5.5-6.0A	230	PM-5.5-6.0	225	7A	C
5.3-5.8	12.0	GB	PM-5.5-12.0A	280	PM-5.5-12.0	275	8A	F
5.3-5.8	25.0	GC	PM-5.5-25.0A	410	PM-5.5-25.0	405	9A	F
5.8-6.3	0.375	C	PM-6.0-0.375A	105	PM-6.0-0.375	100	1	C
5.8-6.3	0.750	C	PM-6.0-0.750A	115	PM-6.0-0.750	110	3	C
5.8-6.3	1.5	E	PM-6.0-1.5A	125	PM-6.0-1.5	120	5	C
5.8-6.3	3.0	G	PM-6.0-3.0A	150	PM-6.0-3.0	145	6A	C
5.8-6.3	6.0	GA	PM-6.0-6.0A	235	PM-6.0-6.0	230	7A	C
5.8-6.3	12.0	GB	PM-6.0-12.0A	290	PM-6.0-12.0	285	8A	F
5.8-6.3	25.0	GC	PM-6.0-25.0A	420	PM-6.0-25.0	415	9A	F
6.3-6.9	0.200	B	PM-6.6-0.200A	105	PM-6.6-0.200	100	1	C
6.3-6.9	0.375	B	PM-6.6-0.375A	110	PM-6.6-0.375	105	2	C
6.3-6.9	0.750	C	PM-6.6-0.750A	120	PM-6.6-0.750	115	3	C
6.3-6.9	1.5	E	PM-6.6-1.5A	130	PM-6.6-1.5	125	5	C
6.3-6.9	3.0	G	PM-6.6-3.0A	155	PM-6.6-3.0	150	6A	C
6.3-6.9	6.0	GA	PM-6.6-6.0A	225	PM-6.6-6.0	220	7A	C
6.3-6.9	12.0	GB	PM-6.6-12.0A	280	PM-6.6-12.0	275	8A	H
6.3-6.9	25.0	GC	PM-6.6-25.0A	430	PM-6.6-25.0	425	9A	H
6.9-7.6	0.200	B	PM-7.3-0.200A	105	PM-7.3-0.200	100	1	C
6.9-7.6	0.375	B	PM-7.3-0.375A	110	PM-7.3-0.375	105	2	C
6.9-7.6	0.750	C	PM-7.3-0.750A	120	PM-7.3-0.750	115	3	C
6.9-7.6	1.5	E	PM-7.3-1.5A	130	PM-7.3-1.5	125	5	C
6.9-7.6	3.0	G	PM-7.3-3.0A	185	PM-7.3-3.0	180	6A	C
6.9-7.6	6.0	GA	PM-7.3-6.0A	225	PM-7.3-6.0	220	7A	C
6.9-7.6	12.0	GB	PM-7.3-12.0A	285	PM-7.3-12.0	280	8A	H
6.9-7.6	25.0	GC	PM-7.3-25.0A	435	PM-7.3-25.0	430	9A	H
7.6-8.5	0.200	B	PM-8.1-0.200A	105	PM-8.1-0.200	100	1	C
7.6-8.5	0.375	B	PM-8.1-0.375A	110	PM-8.1-0.375	105	2	C
7.6-8.5	0.750	C	PM-8.1-0.750A	120	PM-8.1-0.750	115	3	C
7.6-8.5	1.5	E	PM-8.1-1.5A	130	PM-8.1-1.5	125	5	C
7.6-8.5	3.0	G	PM-8.1-3.0A	190	PM-8.1-3.0	185	6A	C
7.6-8.5	6.0	GA	PM-8.1-6.0A	230	PM-8.1-6.0	225	7A	C
7.6-8.5	12.0	GB	PM-8.1-12.0A	295	PM-8.1-12.0	290	8A	H
7.6-8.5	25.0	GC	PM-8.1-25.0A	445	PM-8.1-25.0	440	9A	H
8.5-9.3	0.200	B	PM-8.9-0.200A	105	PM-8.9-0.200	100	1	C
8.5-9.3	0.375	C	PM-8.9-0.375A	110	PM-8.9-0.375	105	2	C
8.5-9.3	0.750	D	PM-8.9-0.750A	120	PM-8.9-0.750	115	3	C
8.5-9.3	1.5	F	PM-8.9-1.5A	135	PM-8.9-1.5	130	5	C
8.5-9.3	3.0	G	PM-8.9-3.0A	190	PM-8.9-3.0	185	6A	C
8.5-9.3	6.0	GA	PM-8.9-6.0A	235	PM-8.9-6.0	230	7A	C
8.5-9.3	12.0	GB	PM-8.9-12.0A	300	PM-8.9-12.0	295	8A	H
8.5-9.3	25.0	GC	PM-8.9-25.0A	450	PM-8.9-25.0	445	10	H
9.3-10.3	0.200	B	PM-9.8-0.200A	105	PM-9.8-0.200	100	1	C
9.3-10.3	0.375	C	PM-9.8-0.375A	110	PM-9.8-0.375	105	2	C
9.3-10.3	0.750	D	PM-9.8-0.750A	120	PM-9.8-0.750	115	3	C
9.3-10.3	1.5	F	PM-9.8-1.5A	135	PM-9.8-1.5	130	6	C
9.3-10.3	3.0	G	PM-9.8-3.0A	195	PM-9.8-3.0	190	6A	C
9.3-10.3	6.0	GA	PM-9.8-6.0A	240	PM-9.8-6.0	235	8	C
9.3-10.3	12.0	GB	PM-9.8-12.0A	315	PM-9.8-12.0	310	9	H
9.3-10.3	25.0	GC	PM-9.8-25.0A	455	PM-9.8-25.0	450	10	H
10.3-11.4	0.200	B	PM-10.8-0.200A	105	PM-10.8-0.200	100	1	C
10.3-11.4	0.375	C	PM-10.8-0.375A	115	PM-10.8-0.375	110	2	C
10.3-11.4	0.750	D	PM-10.8-0.750A	120	PM-10.8-0.750	115	3	C
10.3-11.4	1.5	F	PM-10.8-1.5A	135	PM-10.8-1.5	130	6	C
10.3-11.4	3.0	GA	PM-10.8-3.0A	195	PM-10.8-3.0	190	7	C
10.3-11.4	6.0	GB	PM-10.8-6.0A	240	PM-10.8-6.0	235	8	C
10.3-11.4	12.0	GC	PM-10.8-12.0A	315	PM-10.8-12.0	310	9	H
10.3-11.4	25.0	GD	PM-10.8-25.0A	455	PM-10.8-25.0	450	10	H
11.4-12.5	0.200	B	PM-12.0-0.200A	105	PM-12.0-0.200	100	1	C
11.4-12.5	0.375	C	PM-12.0-0.375A	115	PM-12.0-0.375	110	2	C
11.4-12.5	0.750	D	PM-12.0-0.750A	120	PM-12.0-0.750	115	3	C
11.4-12.5	1.5	F	PM-12.0-1.5A	140	PM-12.0-1.5	135	6	C
11.4-12.5	3.0	GA	PM-12.0-3.0A	205	PM-12.0-3.0	200	7	C
11.4-12.5	6.0	GB	PM-12.0-6.0A	250	PM-12.0-6.0	245	8	C
11.4-12.5	12.0	GC	PM-12.0-12.0A	360	PM-12.0-12.0	355	9	H
11.4-12.5	25.0	GD	PM-12.0-25.0A	480	PM-12.0-25.0	475	10	H
12.5-13.7	0.100	A	PM-13.1-0.100A	100	PM-13.1-0.100	95	1	C
12.5-13.7	0.200	B	PM-13.1-0.200A	105	PM-13.1-0.200	100	1	C
12.5-13.7	0.375	C	PM-13.1-0.375A	115	PM-13.1-0.375	110	2	C
12.5-13.7	0.750	C	PM-13.1-0.750A	120	PM-13.1-0.750	115	3	C
12.5-13.7	1.5	F	PM-13.1-1.5A	140	PM-13.1-1.5	135	6	C
12.5-13.7	3.0	GA	PM-13.1-3.0A	200	PM-13.1-3.0	195	7	C
12.5-13.7	6.0	GB	PM-13.1-6.0A	250	PM-13.1-6.0	245	8	C
12.5-13.7	12.0	GC	PM-13.1-12.0A	345	PM-13.1-12.0	340	9	H
12.5-13.7	25.0	GD	PM-13.1-25.0A	480	PM-13.1-25.0	475	10	H
13.7-15.2	0.100	A	PM-14.5-0.100A	100	PM-14.5-0.100	95	1	C
13.7-15.2	0.200	B	PM-14.5-0.200A	105	PM-14.5-0.200	100	1	C
13.7-15.2	0.375	C	PM-14.5-0.375A	115	PM-14.5-0.375	110	2	C
13.7-15.2	0.750	D	PM-14.5-0.750A	120	PM-14.5-0.750	115	3	C
13.7-15.2	1.5	F	PM-14.5-1.5A	170	PM-14.5-1.5	165	6	C
13.7-15.2	3.0	GA	PM-14.5-3.0A	205	PM-14.5-3.0	200	7	C
13.7-15.2	6.0	GB	PM-14.5-6.0A	255	PM-14.5-6.0	250	8	C
13.7-15.2	12.0	GC	PM-14.5-12.0A	355	PM-14.5-12.0	350	9	H
13.7-15.2	25.0	GD	PM-14.5-25.0A	480	PM-14.5-25.0	475	10	H

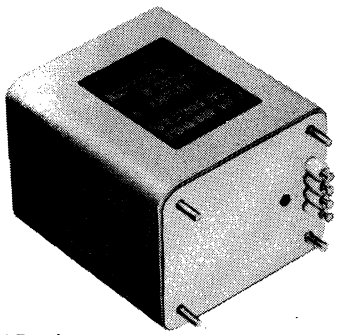
See Catalog #701 for models up to 325 VDC

TECHNIPOWER, INC.
A BENRUS SUBSIDIARY
Ridgefield, Conn.
06877

MC-MCS 65

Size For Size 25% More Current... More Watts Per Dollar REGULATED AC-DC MODULAR POWER SUPPLIES

3.0 to 152 VDC, up to 750 Watts Base Temperature Rated to 65°C



DESIGN PARAMETERS (Typical)

Temperature coefficient: 0.015%/°C or 1 mv/°C, whichever is greater.

Recovery time: Less than 50 μsec, 1/2L to FL.

Designed to meet MIL environmental specifications:
RFI — MIL-I-6181D;
Shock — MIL-STD-202C, Method 205C;
Vibration — MIL-STD-202C, Method 201A;
Humidity — MIL-STD-202C, Method 103B.

M.T.B.F. For Product Line: 50,000 hours, per MIL-HBK-217A, stressed at 65°C base temperature.

Output impedance: See curve.

OPTIONAL FEATURES

Details in Technipower Catalog #701

	SUFFIX
Closer regulation	AA
Operation with lamp loads	E
Fixed output voltage	F
Shock and vibration mounts	G, V
External output adjustment	H
Fully epoxy encapsulated	K
Sealed internal potentiometer	P
Remote sensing	R, Y,
Lower temperature coefficient	T, TT
Off ground operation	U
Wide input range	W
Special cases, shapes and finishes	

SPECIFICATIONS

Input voltage range: 105-125 volts.

Input frequency range: 47-420 Hz.

Regulation: ±0.05% — MC models.
Line & Load Combined: ±0.5% — MCS models.

Ripple: MC models — 0.004% or 2 mv, rms, whichever is greater, with 60 Hz input; to 0.008% or 4 mv, rms, whichever is greater, with 400 Hz input.

MCS models — 0.01% or 5 mv, rms, whichever is greater, with 60 Hz input; 0.04% or 10 mv, rms, whichever is greater, with 400 Hz input.

Output adjustment range: 10% (screwdriver adj. in base). At 80% of rated load the output may be adjusted 20% (±10%) of nominal.

Operating temperature: —20°C to +65°C (max. base temp.).

Storage temperature: —62°C to +85°C

Polarity: May be used positive or negative.

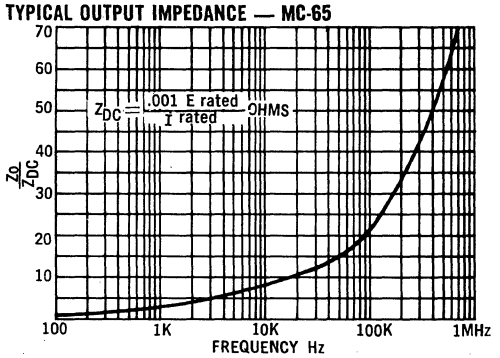
Output voltage and current: See specific model listings

Series operation: Series starting circuitry employed requires that input AC voltage be applied at a rate greater than 150 v rms/sec. Consult factory if slow rising input is anticipated.

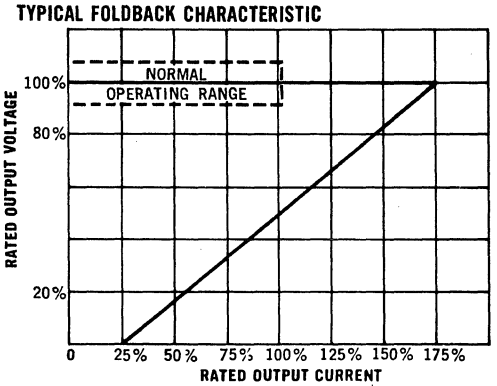
Short circuit protection: Unique foldback circuitry (see curve) protects each module if output should be shorted continuously. Automatic return after short removal.

Overvoltage protection: See model listings.

TYPICAL OUTPUT IMPEDANCE — MC-65

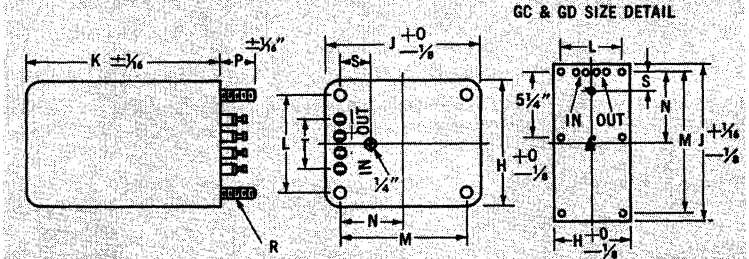


TYPICAL FOLDBACK CHARACTERISTIC



MECHANICAL DATA

(case size is called out in list of models and prices)



Case Size	MODULE DIMENSIONS H	J	K	L	M	N	P	R	S	T	Toler-ances L,M,N,S	Recom-mended Clearance Terminal Cutouts	Terminal Height ±1/64
A	2 3/8	2 3/4	3 13/16	1 3/4	2 1/8	1 1/16	11/32	6-32	19/32	15/16	±1/64	3/8x1 5/16	19/32
B	2 5/8	3 1/16	4 1/4	1 55/64	2 1/64	1 3/32	11/32	8-32	19/32	15/16	±1/64	3/8x1 5/16	19/32
C	3 1/16	3 5/16	4 7/8	2 1/8	2 5/8	1 5/16	11/32	8-32	19/32	15/16	±1/64	3/8x1 5/16	19/32
D	3 3/8	3 15/16	5 1/4	2 7/16	3	1 1/2	15/32	10-32	19/32	15/16	±1/32	3/8x1 5/16	19/32
E	3 11/16	4 5/16	5 5/16	2 11/16	3 5/16	1 53/32	7/16	10-32	19/32	15/16	±1/32	3/8x1 5/16	19/32
F	4	4 11/16	6	3	3 11/16	1 27/32	5/16	1/4-20	19/32	15/16	±3/64	3/8x1 5/16	19/32
G	4 5/16	5 1/16	6 13/16	3 5/16	4 1/16	2 1/32	5/16	1/4-20	19/32	15/16	±3/64	3/8x1 5/16	19/32
GA	4 15/16	6 5/16	7	3 5/8	5 1/4	2 5/8	21/32	5/16-18	3/4	1 1/2	±3/64	1/2x2	5/8
GB	6 5/16	6 3/4	7	5 1/4	5 7/16	2 23/32	21/32	5/16-18	3/4	1 1/2	±3/64	1/2x2	5/8
GC*	4 15/16	13 1/16	7	3 5/8	11 13/16	5 29/32	21/32	5/16-18	3/4	1 7/8	±3/64	5/8x2 1/2	5/8
GD*	6 5/16	13 1/16	7	5 3/16	11 13/16	5 29/32	21/32	5/16-18	3/4	1 7/8	±3/64	5/8x2 1/2	5/8

*See detail

MC-MCS 65

TECHNIPOWER, INC.
A BENRUS SUBSIDIARY
Ridgefield, Conn.
06877

MODELS AND PRICES

Output Voltage Adjust. Range	Output Current (amps)	Case Size (see dwg.)	MC MODELS ±0.05% Accuracy Model No.	Price	MCS MODELS ±0.5% Accuracy Model No.	Price	Thermal Ref. No.	O.V. Ref.
2.8-3.2	0.500	B	MC- 3.0- 0.500	100	MCS- 3.0- 0.500	95	2	A
2.8-3.2	1.0	C	MC- 3.0- 1.0	105	MCS- 3.0- 1.0	100	4	A
2.8-3.2	2.0	E	MC- 3.0- 2.0	110	MCS- 3.0- 2.0	105	6	A
2.8-3.2	4.0	F	MC- 3.0- 4.0	115	MCS- 3.0- 4.0	110	7	B
2.8-3.2	8.0	G	MC- 3.0- 8.0	150	MCS- 3.0- 8.0	145	8	B
2.8-3.2	15.0	GB	MC- 3.0-15.0	210	MCS- 3.0-15.0	205	9	D
2.8-3.2	30.0	GC	MC- 3.0-30.0	305	MCS- 3.0-30.0	300	10	D
3.2-3.5	0.500	B	MC- 3.3- 0.500	100	MCS- 3.3- 0.500	95	2	A
3.2-3.5	1.0	C	MC- 3.3- 1.0	105	MCS- 3.3- 1.0	100	4	A
3.2-3.5	2.0	E	MC- 3.3- 2.0	110	MCS- 3.3- 2.0	105	6	A
3.2-3.5	4.0	F	MC- 3.3- 4.0	115	MCS- 3.3- 4.0	110	7	B
3.2-3.5	8.0	G	MC- 3.3- 8.0	150	MCS- 3.3- 8.0	145	8	B
3.2-3.5	15.0	GB	MC- 3.3-15.0	215	MCS- 3.3-15.0	210	9	D
3.2-3.5	30.0	GC	MC- 3.3-30.0	315	MCS- 3.3-30.0	310	10	D
3.5-3.9	0.500	B	MC- 3.7- 0.500	100	MCS- 3.7- 0.500	95	2	A
3.5-3.9	1.0	C	MC- 3.7- 1.0	105	MCS- 3.7- 1.0	100	4	A
3.5-3.9	2.0	E	MC- 3.7- 2.0	110	MCS- 3.7- 2.0	105	6	A
3.5-3.9	4.0	F	MC- 3.7- 4.0	120	MCS- 3.7- 4.0	115	7	B
3.5-3.9	8.0	G	MC- 3.7- 8.0	155	MCS- 3.7- 8.0	150	8	B
3.5-3.9	15.0	GB	MC- 3.7-15.0	225	MCS- 3.7-15.0	220	9	D
3.5-3.9	30.0	GC	MC- 3.7-30.0	325	MCS- 3.7-30.0	320	10	D
3.9-4.3	0.500	B	MC- 4.1- 0.500	100	MCS- 4.1- 0.500	95	2	A
3.9-4.3	1.0	C	MC- 4.1- 1.0	105	MCS- 4.1- 1.0	100	4	A
3.9-4.3	2.0	E	MC- 4.1- 2.0	110	MCS- 4.1- 2.0	105	6	A
3.9-4.3	4.0	F	MC- 4.1- 4.0	120	MCS- 4.1- 4.0	115	7	B
3.9-4.3	8.0	G	MC- 4.1- 8.0	165	MCS- 4.1- 8.0	160	8	B
3.9-4.3	15.0	GB	MC- 4.1-15.0	230	MCS- 4.1-15.0	225	9	D
3.9-4.3	30.0	GC	MC- 4.1-30.0	325	MCS- 4.1-30.0	320	10	D
4.3-4.7	0.500	B	MC- 4.5- 0.500	100	MCS- 4.5- 0.500	95	2	A
4.3-4.7	1.0	C	MC- 4.5- 1.0	105	MCS- 4.5- 1.0	100	4	A
4.3-4.7	2.0	E	MC- 4.5- 2.0	110	MCS- 4.5- 2.0	105	6	A
4.3-4.7	4.0	F	MC- 4.5- 4.0	120	MCS- 4.5- 4.0	115	7	B
4.3-4.7	8.0	G	MC- 4.5- 8.0	170	MCS- 4.5- 8.0	165	8	B
4.3-4.7	15.0	GB	MC- 4.5-15.0	235	MCS- 4.5-15.0	230	9	D
4.3-4.7	30.0	GC	MC- 4.5-30.0	340	MCS- 4.5-30.0	335	10	D
4.7-5.3	0.500	B	MC- 5.1- 0.500	100	MCS- 5.1- 0.500	95	2	A
4.7-5.3	1.0	C	MC- 5.1- 1.0	105	MCS- 5.1- 1.0	100	4	A
4.7-5.3	2.0	E	MC- 5.1- 2.0	110	MCS- 5.1- 2.0	105	6	A
4.7-5.3	4.0	F	MC- 5.1- 4.0	125	MCS- 5.1- 4.0	120	7	B
4.7-5.3	8.0	G	MC- 5.1- 8.0	175	MCS- 5.1- 8.0	170	8	B
4.7-5.3	15.0	GB	MC- 5.1-15.0	245	MCS- 5.1-15.0	240	9	D
4.7-5.3	30.0	GC	MC- 5.1-30.0	350	MCS- 5.1-30.0	345	10	D
5.3-5.8	0.500	B	MC- 5.5- 0.500	100	MCS- 5.5- 0.500	95	2	A
5.3-5.8	1.0	C	MC- 5.5- 1.0	105	MCS- 5.5- 1.0	100	4	A
5.3-5.8	2.0	E	MC- 5.5- 2.0	110	MCS- 5.5- 2.0	105	6	A
5.3-5.8	4.0	F	MC- 5.5- 4.0	125	MCS- 5.5- 4.0	120	7	B
5.3-5.8	8.0	G	MC- 5.5- 8.0	180	MCS- 5.5- 8.0	175	8	B
5.3-5.8	15.0	GB	MC- 5.5-15.0	250	MCS- 5.5-15.0	245	9	D
5.3-5.8	30.0	GC	MC- 5.5-30.0	350	MCS- 5.5-30.0	345	10	D
5.8-6.3	0.500	B	MC- 6.0- 0.500	100	MCS- 6.0- 0.500	95	2	A
5.8-6.3	1.0	C	MC- 6.0- 1.0	105	MCS- 6.0- 1.0	100	4	A
5.8-6.3	2.0	E	MC- 6.0- 2.0	110	MCS- 6.0- 2.0	105	6	A
5.8-6.3	4.0	F	MC- 6.0- 4.0	130	MCS- 6.0- 4.0	125	7	B
5.8-6.3	8.0	G	MC- 6.0- 8.0	180	MCS- 6.0- 8.0	175	8	B
5.8-6.3	15.0	GB	MC- 6.0-15.0	260	MCS- 6.0-15.0	255	9	D
5.8-6.3	30.0	GC	MC- 6.0-30.0	365	MCS- 6.0-30.0	360	10	D
6.3-6.9	0.250	A	MC- 6.6- 0.250	95	MCS- 6.6- 0.250	90	1	A
6.3-6.9	0.500	B	MC- 6.6- 0.500	100	MCS- 6.6- 0.500	95	2	A
6.3-6.9	1.0	C	MC- 6.6- 1.0	105	MCS- 6.6- 1.0	100	4	A
6.3-6.9	2.0	E	MC- 6.6- 2.0	110	MCS- 6.6- 2.0	105	6	A
6.3-6.9	4.0	G	MC- 6.6- 4.0	150	MCS- 6.6- 4.0	145	7A	B
6.3-6.9	8.0	GA	MC- 6.6- 8.0	180	MCS- 6.6- 8.0	175	8	B
6.3-6.9	15.0	GB	MC- 6.6-15.0	260	MCS- 6.6-15.0	255	9	D
6.3-6.9	30.0	GC	MC- 6.6-30.0	385	MCS- 6.6-30.0	380	10	D
6.9-7.6	0.250	A	MC- 7.3- 0.250	95	MCS- 7.3- 0.250	90	1	A
6.9-7.6	0.500	B	MC- 7.3- 0.500	100	MCS- 7.3- 0.500	95	2	A
6.9-7.6	1.0	C	MC- 7.3- 1.0	105	MCS- 7.3- 1.0	100	4	A
6.9-7.6	2.0	E	MC- 7.3- 2.0	110	MCS- 7.3- 2.0	105	6	A
6.9-7.6	4.0	G	MC- 7.3- 4.0	150	MCS- 7.3- 4.0	145	7A	B
6.9-7.6	8.0	GA	MC- 7.3- 8.0	190	MCS- 7.3- 8.0	185	8	B
6.9-7.6	15.0	GB	MC- 7.3-15.0	260	MCS- 7.3-15.0	255	9	D
6.9-7.6	30.0	GC	MC- 7.3-30.0	385	MCS- 7.3-30.0	380	10	D
7.6-8.5	0.250	A	MC- 8.1- 0.250	95	MCS- 8.1- 0.250	90	1	A
7.6-8.5	0.500	B	MC- 8.1- 0.500	100	MCS- 8.1- 0.500	95	2	A
7.6-8.5	1.0	C	MC- 8.1- 1.0	105	MCS- 8.1- 1.0	100	4	A
7.6-8.5	2.0	E	MC- 8.1- 2.0	115	MCS- 8.1- 2.0	110	6	A
7.6-8.5	4.0	G	MC- 8.1- 4.0	155	MCS- 8.1- 4.0	150	7A	B
7.6-8.5	8.0	GA	MC- 8.1- 8.0	195	MCS- 8.1- 8.0	190	8	B
7.6-8.5	15.0	GB	MC- 8.1-15.0	260	MCS- 8.1-15.0	255	9	D
7.6-8.5	30.0	GC	MC- 8.1-30.0	395	MCS- 8.1-30.0	390	10	D
8.5-9.3	0.250	A	MC- 8.9- 0.250	95	MCS- 8.9- 0.250	90	1	A
8.5-9.3	0.500	B	MC- 8.9- 0.500	100	MCS- 8.9- 0.500	95	2	A
8.5-9.3	1.0	C	MC- 8.9- 1.0	105	MCS- 8.9- 1.0	100	4	A
8.5-9.3	2.0	E	MC- 8.9- 2.0	115	MCS- 8.9- 2.0	110	6	A
8.5-9.3	4.0	G	MC- 8.9- 4.0	155	MCS- 8.9- 4.0	150	7A	B
8.5-9.3	8.0	GA	MC- 8.9- 8.0	205	MCS- 8.9- 8.0	200	8	B
8.5-9.3	15.0	GB	MC- 8.9-15.0	260	MCS- 8.9-15.0	255	9	D
8.5-9.3	30.0	GC	MC- 8.9-30.0	395	MCS- 8.9-30.0	390	10	D
9.3-10.3	0.250	A	MC- 9.8- 0.250	100	MCS- 9.8- 0.250	95	1	A
9.3-10.3	0.500	B	MC- 9.8- 0.500	105	MCS- 9.8- 0.500	100	2	A
9.3-10.3	1.0	D	MC- 9.8- 1.0	110	MCS- 9.8- 1.0	105	4	A
9.3-10.3	2.0	E	MC- 9.8- 2.0	115	MCS- 9.8- 2.0	110	6	A
9.3-10.3	4.0	G	MC- 9.8- 4.0	165	MCS- 9.8- 4.0	160	7A	B
9.3-10.3	8.0	GA	MC- 9.8- 8.0	205	MCS- 9.8- 8.0	200	8	B
9.3-10.3	15.0	GB	MC- 9.8-15.0	275	MCS- 9.8-15.0	270	9	D
9.3-10.3	30.0	GC	MC- 9.8-30.0	415	MCS- 9.8-30.0	410	10	D
10.3-11.4	0.250	A	MC-10.8- 0.250	100	MCS-10.8- 0.250	95	1	A
10.3-11.4	0.500	B	MC-10.8- 0.500	105	MCS-10.8- 0.500	100	2	A
10.3-11.4	1.0	D	MC-10.8- 1.0	110	MCS-10.8- 1.0	105	4	A
10.3-11.4	2.0	F	MC-10.8- 2.0	120	MCS-10.8- 2.0	115	6	A
10.3-11.4	4.0	G	MC-10.8- 4.0	170	MCS-10.8- 4.0	165	7A	B
10.3-11.4	8.0	GA	MC-10.8- 8.0	215	MCS-10.8- 8.0	210	8	B
10.3-11.4	15.0	GB	MC-10.8-15.0	285	MCS-10.8-15.0	280	9	D
10.3-11.4	30.0	GC	MC-10.8-30.0	420	MCS-10.8-30.0	415	10	D
11.4-12.5	0.250	B	MC-12.0- 0.250	100	MCS-12.0- 0.250	95	1	A
11.4-12.5	0.500	B	MC-12.0- 0.500	105	MCS-12.0- 0.500	100	2	A
11.4-12.5	1.0	D	MC-12.0- 1.0	110	MCS-12.0- 1.0	105	4	A
11.4-12.5	2.0	F	MC-12.0- 2.0	120	MCS-12.0- 2.0	115	6	A
11.4-12.5	4.0	G	MC-12.0- 4.0	170	MCS-12.0- 4.0	165	7A	B
11.4-12.5	8.0	GA	MC-12.0- 8.0	220	MCS-12.0- 8.0	215	8	B
11.4-12.5	15.0	GB	MC-12.0-15.0	290	MCS-12.0-15.0	285	9	D
11.4-12.5	30.0	GC	MC-12.0-30.0	430	MCS-12.0-30.0	425	10	D
12.5-13.7	0.125	A	MC-13.1- 0.125	95	MCS-13.1- 0.125	90	1	A
12.5-13.7	0.250	B	MC-13.1- 0.250	100	MCS-13.1- 0.250	95	1	A
12.5-13.7	0.500	B	MC-13.1- 0.500	105	MCS-13.1- 0.500	100	2	A
12.5-13.7	1.0	C	MC-13.1- 1.0	110	MCS-13.1- 1.0	105	4	A
12.5-13.7	2.0	F	MC-13.1- 2.0	120	MCS-13.1- 2.0	115	6	A
12.5-13.7	4.0	GA	MC-13.1- 4.0	175	MCS-13.1- 4.0	170	7A	B
12.5-13.7	8.0	GB	MC-13.1- 8.0	220	MCS-13.1- 8.0	215	8A	B
12.5-13.7	15.0	GC	MC-13.1-15.0	315	MCS-13.1-15.0	310	9	D
13.7-15.2	0.125	A	MC-14.5- 0.125	95	MCS-14.5- 0.125	90	1	A
13.7-15.2	0.250	B	MC-14.5- 0.250	100	MCS-14.5- 0.250	95	1	A
13.7-15.2	0.500	C	MC-14.5- 0.500	105	MCS-14.5- 0.500	100	3	A
13.7-15.2	1.0	D	MC-14.5- 1.0	110	MCS-14.5- 1.0	105	4	A
13.7-15.2	2.0	F	MC-14.5- 2.0	125	MCS-14.5- 2.0	120	6A	A
13.7-15.2	4.0	GA	MC-14.5- 4.0	175	MCS-14.5- 4.0	170	7A	B
13.7-15.2	8.0	GB	MC-14.5- 8.0	225	MCS-14.5- 8.0	220	8A	B
13.7-15.2	15.0	GC	MC-14.5-15.0	320	MCS-14.5-15.0	315	9A	D
15.2-16.5	0.125	A	MC-15.8- 0.125	95	MCS-15.8- 0.125	90	1	A
15.2-16.5	0.250	B	MC-15.8- 0.250	100	MCS-15.8- 0.250	95	1	A
15.2-16.5	0.500	C	MC-15.8- 0.500	105	MCS-15.8- 0.500	100	3	A
15.2-16.5	1.0	D	MC-15.8- 1.0	110	MCS-15.8- 1.0	105	5	A
15.2-16.5	2.0	F	MC-15.8- 2.0	130	MCS-15.8- 2.0	125	6A	A
15.2-16.5	4.0	GA	MC-15.8- 4.0	175	MCS-15.8- 4.0	170	7A	B
15.2-16.5	8.0	GB	MC-15.8- 8.0	225	MCS-15.8- 8.0	220	8A	B
15.2-16.5	15.0	GC	MC-15.8-15.0	320	MCS-15.8-15.0	315	9A	D
16.5-18.5	0.125	A	MC-17.5- 0.125	95	MCS-17.5- 0.125	90	1	A
16.5-18.5	0.250	B	MC-17.5- 0.250	100	MCS-17.5- 0.250	95	1	A
16.5-18.5	0.500	C	MC-17.5- 0.500	105	MCS-17.5- 0.500	100	3	A
16.5-18.5	1.0	D	MC-17.5- 1.0	110	MCS-17.5- 1.0	105	5	A
16.5-18.5	2.0	G	MC-17.5- 2.0	145	MCS-17.5- 2.0	140	6A	A
16.5-18.5	4.0	GA	MC-17.5- 4.0	180	MCS-17.5- 4.0	175	7A	C
16.5-18.5	8.0	GB	MC-17.5- 8.0	230	MCS-17.5- 8.0	225	8A	C
16.5-18.5	15.0	GC	MC-17.5-15.0	320	MCS-17.5-15.0	315	9A	

See Catalog #701 for models up to 152 VDC

TECHNIPOWER, INC.
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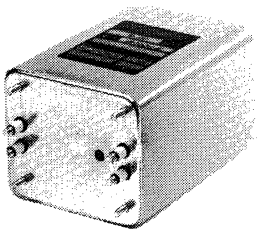
Ridgefield, Conn.
06877

HF-HFC 80

High Efficiency... Miniature Size WIDE RANGE, HIGH FREQUENCY AC-DC SWITCHING REGULATED MODULAR POWER SUPPLIES

2.8 to 1000 VDC, 10 to 375 Watts
Base Temperature Rated to 80°C



DESIGN PARAMETERS (Typical)

Ripple (p-p): 0.5% + 50 mv.

Recovery time: Less than 5 ms 1/2L to FL.

Efficiency: To 80%.

M.T.B.F.: 35,000 hours per MIL-HBK-217A, with module stressed at 80°C base temperature.

Temperature coefficient: 0.02%/°C.

E.M.I.: Suppression filters designed to meet MIL-I-6181D (Consult factory if full qualification is required).

OPTIONAL FEATURES

Details in Technipower Catalog #701

	SUFFIX
Fixed output voltage	F
Shock and vibration mounts	G, V
External output adjust	H
Fully epoxy encapsulated	K
Sealed internal potentiometer	P
Remote sensing	R
Wide input voltage range	W
Off-ground operation	U
External output adjustment with remote sensing	Y
Special shapes and finishes	

SPECIFICATIONS

Input voltage range: 105-125 VAC.

Input frequency range: 47-420 Hz.

Regulation accuracy: Line: ±(0.05% + 5 mv); Load: ±(0.1% + 5 mv).

Ripple (rms): 0.2% + 10 mv.*

Operating temperature range: —20°C to +80°C (max. base temp.)

Storage temperature range: —55°C to +85°C.

Polarity: May be used positive or negative.

Output voltage & current: See specific model listings.

Series operation: May be operated with conventional or complex loads provided total voltage in series connection does not exceed 350 v. Consult factory for operation of units above 350 v.

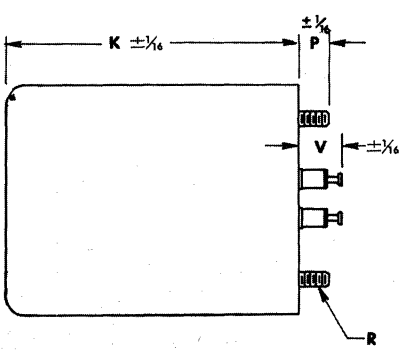
Short circuit protection: Automatic current limiting type, protects against momentary overloads and continuous shorts. Restores to normal operation after short is removed.

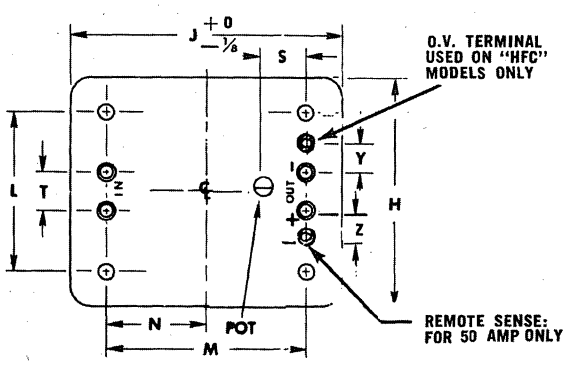
Overvoltage protection: HFC-80 model incorporates internal circuitry to protect load against possible overvoltage condition in event of power supply failure. Trip point set at factory 25 ± 5% above maximum rated output voltage; trip point may be adjusted downward (5 volts minimum) by inserting selected resistors between negative output terminal and terminal marked "O.V." Output voltage will never exceed trip point more than 5% of maximum output voltage + 0.5 volt. To re-energize after overvoltage condition, turn input power off, then on again after a short delay. Individual external overvoltage protectors (to 50.0 volts output) also available.

* Increases to 0.6% +20 mv at −20°C.

MECHANICAL DATA

(Case size is called out in list of models and prices)





CASE SIZE	MODULE DIMENSIONS H	J	K	L	M	N	P	R	S	T	V	Y	Z	Tolerances L, M, N, S	Recommended Terminal Clearance Cutouts INPUT	OUTPUT
CS	3 1/16	3 3/16	3 7/8	2 1/8	2 5/8	1 5/16	11/32	8-32	19/32	1/2	9/16	3/8	11/32	±1/64	CS thru F	CS thru F
C	3 1/16	3 3/16	4 7/8	2 1/8	2 5/8	1 5/16	11/32	8-32	19/32	1/2	9/16	3/8	11/32	±1/64	3/8 x 7/8	3/8 x 1 5/8
D	3 3/8	3 15/16	5 1/4	2 7/16	3	1 1/2	15/32	10-32	19/32	1/2	9/16	3/8	11/32	±1/32	G	G
E	3 11/16	4 5/16	5 9/16	2 11/16	3 5/16	1 21/32	7/16	10-32	19/32	1/2	9/16	3/8	11/32	±1/32	1/2 x 1"	1/2 x 2
F	4	4 11/16	6	3	3 11/16	1 27/32	9/16	1/4-20	19/32	1/2	9/16	3/8	11/32	±3/64		
G	4 5/16	5 1/16	6 13/16	3 5/16	4 1/16	2 1/32	9/16	1/4-20	19/32	1/2	5/8	1/2	1/2	±3/64	GA & GB	GA & GB
GA	4 15/16	6 9/16	7	3 5/8	5 1/4	2 5/8	21/32	5/16-18	3/4	3/4	5/8	1/2	1/2	±3/64[1]	1/2 x 1 1/4	1/2 x 2 1/4
GB	6 9/16	6 3/4	7	5 1/4	5 7/16	2 23/32	21/32	5/16-18	3/4	3/4	3/4	1/2	9/16	±3/64		

HF-HFC 80

TECHNIPOWER, INC.

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MODELS AND PRICES

Output Voltage Adjust. Range (VDC)	Output Current (Amps)	Case Size (see dwg)	Model	Price	Thermal Ref. No.
2.8-5.5	3.0	D	HF-5.5-3.0	$220	4
	6.0	E	HF-5.5-6.0	240	6A
	12.0	F	HF-5.5-12.0	285	8
	25.0	G	HF-5.5-25.0	345	8A
	50.0	GB	HF-5.5-50.0R*	485	9A
4.0-8.0	2.0	D	HF-8.0-2.0	215	4
	4.0	E	HF-8.0-4.0	235	6A
	8.0	F	HF-8.0-8.0	275	8
	15.0	G	HF-8.0-15.0	320	8A
	30.0	GB	HF-8.0-30.0	440	9A
5.5-11.0	2.0	D	HF-11.0-2.0	225	4
	4.0	E	HF-11.0-4.0	250	6
	8.0	F	HF-11.0-8.0	295	8
	15.0	G	HF-11.0-15.0	390	8A
	30.0	GB	HF-11.0-30.0	505	9A
7.5-15.0	1.5	D	HF-15.0-1.5	220	4
	3.0	E	HF-15.0-3.0	245	6
	6.0	F	HF-15.0-6.0	285	8
	12.0	G	HF-15.0-12.0	380	8A
	25.0	GB	HF-15.0-25.0	510	9A
11.3-22.5	1.0	C	HF-22.5-1.0	215	4
	2.0	D	HF-22.5-2.0	230	5
	4.0	E	HF-22.5-4.0	270	7
	8.0	G	HF-22.5-8.0	360	8
	15.0	GA	HF-22.5-15.0	455	9
15.0-30.0	0.750	C	HF-30.0-0.750	210	4
	1.5	D	HF-30.0-1.5	220	5
	3.0	E	HF-30.0-3.0	255	7
	6.0	F	HF-30.0-6.0	330	8
	12.0	GA	HF-30.0-12.0	445	9
22.5-45.0	0.500	C	HF-45.0-0.500	205	4
	1.0	D	HF-45.0-1.0	220	5
	2.0	E	HF-45.0-2.0	240	7
	4.0	F	HF-45.0-4.0	305	8
	8.0	GA	HF-45.0-8.0	415	9
30.0-60.0	0.375	C	HF-60.0-0.375	200	4
	0.750	D	HF-60.0-0.750	210	5
	1.5	E	HF-60.0-1.5	225	7
	3.0	F	HF-60.0-3.0	285	8
	6.0	GA	HF-60.0-6.0	385	9
70.0-120.0	0.200	C	HF-120.0-0.200	215	4
	0.375	D	HF-120.0-0.375	225	5
	0.750	E	HF-120.0-0.750	245	7
	1.5	F	HF-120.0-1.5	320	8
	3.0	GA	HF-120.0-3.0	385	9
150.0-250.0	0.050	CS	HF-250.0-0.050	215	2
	0.100	C	HF-250.0-0.100	225	4
	0.200	D	HF-250.0-0.200	240	5
	0.375	E	HF-250.0-0.375	260	7
	0.750	F	HF-250.0-0.750	340	8
	1.5	GA	HF-250.0-1.5	410	9
225.0-375.0	0.030	CS	HF-375.0-0.030	215	2
	0.065	C	HF-375.0-0.065	220	4
	0.125	D	HF-375.0-0.125	230	5
	0.250	E	HF-375.0-0.250	265	7
	0.500	F	HF-375.0-0.500	340	8
	1.0	GA	HF-375.0-1.0	415	9
300.0-500.0	0.020	CS	HF-500.0-0.020	220	2
	0.050	C	HF-500.0-0.050	235	4
	0.100	D	HF-500.0-0.100	250	5
	0.200	E	HF-500.0-0.200	270	7
	0.375	F	HF-500.0-0.375	350	8
	0.750	GA	HF-500.0-0.750	425	9
450.0-750.0	0.012	CS	HF-750.0-0.012	220	2
	0.030	C	HF-750.0-0.030	230	4
	0.065	D	HF-750.0-0.065	250	5
	0.125	E	HF-750.0-0.125	275	7
	0.250	F	HF-750.0-0.250	370	8
	0.500	GA	HF-750.0-0.500	465	9
600.0-1000.0	0.010	CS	HF-1000.0-0.010	225	2
	0.025	C	HF-1000.0-0.025	245	4
	0.050	D	HF-1000.0-0.050	265	5
	0.100	E	HF-1000.0-0.100	295	7
	0.200	F	HF-1000.0-0.200	400	8
	0.375	GA	HF-1000.0-0.375	505	9

Output Voltage Adjust. Range (VDC)	Output Current (Amps)	Case Size (see dwg)	Model	Price	Thermal Ref. No.
2.8-5.5	3.0	D	HFC-5.5-3.0	250	4
	6.0	E	HFC-5.5-6.0	270	6A
	12.0	F	HFC-5.5-12.0	315	8
	25.0	G	HFC-5.5-25.0	375	8A
	50.0	GB	HFC-5.5-50.0R*	515	9A
4.0-8.0	2.0	D	HFC-8.0-2.0	245	4
	4.0	E	HFC-8.0-4.0	265	6A
	8.0	F	HFC-8.0-8.0	305	8
	15.0	G	HFC-8.0-15.0	350	8A
	30.0	GB	HFC-8.0-30.0	470	9A
5.5-11.0	2.0	D	HFC-11.0-2.0	255	4
	4.0	E	HFC-11.0-4.0	280	6
	8.0	F	HFC-11.0-8.0	325	8
	15.0	G	HFC-11.0-15.0	420	8A
	30.0	GB	HFC-11.0-30.0	535	9A
7.5-15.0	1.5	D	HFC-15.0-1.5	250	4
	3.0	E	HFC-15.0-3.0	275	6
	6.0	F	HFC-15.0-6.0	315	8
	12.0	G	HFC-15.0-12.0	410	8A
	25.0	GB	HFC-15.0-25.0	540	9A
11.3-22.5	1.0	C	HFC-22.5-1.0	245	4
	2.0	D	HFC-22.5-2.0	260	5
	4.0	E	HFC-22.5-4.0	300	7
	8.0	G	HFC-22.5-8.0	390	8
	15.0	GA	HFC-22.5-15.0	485	9
15.0-30.0	0.750	C	HFC-30.0-0.750	240	4
	1.5	D	HFC-30.0-1.5	250	5
	3.0	E	HFC-30.0-3.0	285	7
	6.0	F	HFC-30.0-6.0	360	8
	12.0	GA	HFC-30.0-12.0	475	9
22.5-45.0	0.500	C	HFC-45.0-0.500	235	4
	1.0	D	HFC-45.0-1.0	250	5
	2.0	E	HFC-45.0-2.0	270	7
	4.0	F	HFC-45.0-4.0	335	8
	8.0	GA	HFC-45.0-8.0	445	9
30.0-60.0	0.375	C	HFC-60.0-0.375	$230	4
	0.750	D	HFC-60.0-0.750	240	5
	1.5	E	HFC-60.0-1.5	255	7
	3.0	F	HFC-60.0-3.0	315	8
	6.0	GA	HFC-60.0-6.0	415	9
70.0-120.0	0.200	C	HFC-120.0-0.200	245	4
	0.375	D	HFC-120.0-0.375	255	5
	0.750	E	HFC-120.0-0.750	275	7
	1.5	F	HFC-120.0-1.5	350	8
	3.0	GA	HFC-120.0-3.0	415	9
150.0-250.0	0.050	CS	HFC-250.0-0.050	245	2
	0.100	C	HFC-250.0-0.100	255	4
	0.200	D	HFC-250.0-0.200	270	5
	0.375	E	HFC-250.0-0.375	290	7
	0.750	F	HFC-250.0-0.750	370	8
	1.5	GA	HFC-250.0-1.5	440	9
225.0-375.0	0.030	CS	HFC-375.0-0.030	245	2
	0.065	C	HFC-375.0-0.065	250	4
	0.125	D	HFC-375.0-0.125	260	5
	0.250	E	HFC-375.0-0.250	295	7
	0.500	F	HFC-375.0-0.500	370	8
	1.0	GA	HFC-375.0-1.0	445	9
300.0-500.0	0.020	CS	HFC-500.0-0.020	250	2
	0.050	C	HFC-500.0-0.050	275	4
	0.100	D	HFC-500.0-0.100	280	5
	0.200	E	HFC-500.0-0.200	300	7
	0.375	F	HFC-500.0-0.375	380	8
	0.750	GA	HFC-500.0-0.750	455	9
450.0-750.0	0.012	CS	HFC-750.0-0.012	250	2
	0.030	C	HFC-750.0-0.030	260	4
	0.065	D	HFC-750.0-0.065	280	5
	0.125	E	HFC-750.0-0.125	305	7
	0.250	F	HFC-750.0-0.250	400	8
	0.500	GA	HFC-750.0-0.500	495	9
600.0-1000.0	0.010	CS	HFC-1000.0-0.010	255	2
	0.025	C	HFC-1000.0-0.025	275	4
	0.050	D	HFC-1000.0-0.050	295	5
	0.100	E	HFC-1000.0-0.100	325	7
	0.200	F	HFC-1000.0-0.200	430	8
	0.375	GA	HFC-1000.0-0.375	535	9

*50 Ampere Unit Supplied Only With Remote Sense Suffix (R) At No Extra Charge If Y Suffix is ordered, R Suffix Is Not Necessary

TECHNIPOWER, INC.
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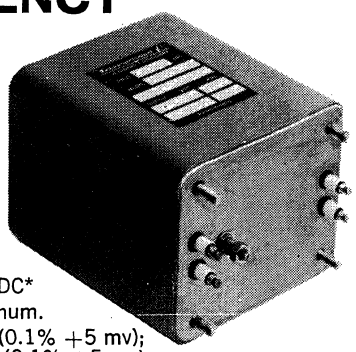
CD-CDC 95

MINIATURE WIDE RANGE, HIGH EFFICIENCY DC-DC CONVERTERS FOR DIRECT DC POWER LINE OR LOCAL SYSTEM REGULATION



As Low As 0.3% Overall Regulation, 0.2% RMS Ripple 5 Millisecond Response 2.8 to 1000 VDC, 6 to 280 Watts Base Temperature Rated to 95°C

DESIGN PARAMETERS (Typical)

Ripple (p-p): 0.5% + 50 mv.

Temperature coefficient: 0.02%/°C.

Recovery time: Less than 5 ms, ½L to FL.

Fully encapsulated. Designed to meet environmental requirements of MIL-E-16400 (all classes) and MIL-E-5400 (classes 1, 1A, and 2).

E.M.I.: Suppression filters designed to meet portions of MIL-I-6181D (Consult factory if full qualification is required).

Efficiency: To 80%.

Output fully isolated from input and case

M.T.B.F. For Product Line: 30,000 hours per MIL-HBK-217A

OPTIONAL FEATURES

Details in Technipower Catalog #701

	SUFFIX
Fixed output voltage	F
External output adjust	H
Remote sensing	R
Off-ground operation	U
External output adjustment with remote sensing	Y
Special shapes and finishes	

SPECIFICATIONS

Input voltage range: 21-30 VDC*

Input ripple (rms): 5% maximum.

Regulation accuracy-Line: ±(0.1% +5 mv);
Load: ±(0.1% +5 mv).

Output ripple (rms): 0.2% + 10 mv.**

Operating temperature range: —55°C to +95°C (max. base temp.).

Storage temperature range: —62°C to +105°C

Polarity: May be used positive or negative.

Short circuit protection: Automatic current limiting type, protects against momentary overloads and continuous shorts. Restores to normal operation after short is removed.

Series operation: May be operated with conventional or complex loads provided total voltage in series connection does not exceed 350 v. Consult factory for operation of unit above 350 v.

Output voltage & current: See specific model listings.

Overvoltage protection: CDC-95 model incorporates internal circuitry to protect load against possible overvoltage condition in event of power supply failure. Trip point set at factory 25±5% above maximum rated output voltage; trip point may be adjusted downward (5 volts minimum) by inserting selected resistors between negative output terminal and terminal marked "O.V." Output voltage will never exceed trip point more than 5% of maximum output voltage + 0.5 volt. To re-energize after overvoltage condition, turn input power off and then on after a short delay. Individual external overvoltage protectors are also available.

Reverse polarity protection: Protected against reversal of input voltage polarity.

*Protection against MIL-STD-704A type surges available at extra cost (consult factory) —

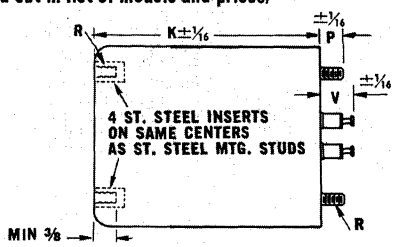
Input voltage may be reduced below 21 VDC (to 15.0 VDC minimum) provided that for every volt below 21 VDC, the allowable output current is reduced by 10% and regulation (line and load respectively) is deteriorated by 0.2%.

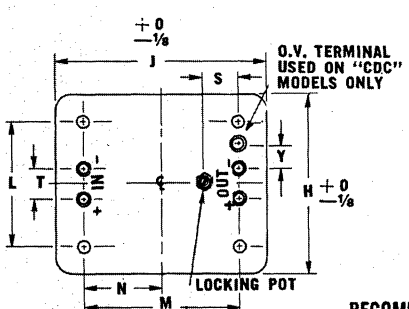
Input voltages up to 150 VDC are available on special request.

**Increases to 1.0% + 50 mv at —55°C.

MECHANICAL DATA

(Case size is called out in list of models and prices)





MODULE DIMENSIONS

CASE SIZE	H	J	K	L	M	N	P	R	S	T	V	Y	TOLERANCES L, M, N, S	RECOMMENDED CLEARANCE TERM. CUTOUTS INPUT	OUTPUT
CSS	3 1/16	3 9/16	3 1/4	2 1/8	2 5/8	1 5/16	11/32	8-32	19/32	1/2	9/16	3/8	±1/64		
CS	3 1/16	3 9/16	3 7/8	2 1/8	2 5/8	1 5/16	11/32	8-32	19/32	1/2	9/16	3/8	±1/64	CSS thru FS	CSS thru FS
DS	3 3/8	3 15/16	4 5/16	2 7/16	3	1 1/2	15/32	10-32	19/32	1/2	9/16	3/8	±1/32	3/8 x 7/8	½ x 1 5/8
ES	3 11/16	4 5/16	4 1/2	2 11/16	3 5/16	1 21/32	7/16	10-32	19/32	1/2	9/16	3/8	±1/32		
FS	4	4 11/16	4 15/16	3	3 11/16	1 27/32	9/16	1/4-20	19/32	1/2	9/16	3/8	±3/64	GS	GS
GS	4 5/16	5 1/16	5 1/2	3 5/16	4 1/16	2 1/32	9/16	1/4-20	19/32	1/2	5/8	1/2	±3/64	½ x 1	½ x 2
GAS	4 15/16	6 1/16	5 3/4	3 7/8	5 1/4	2 5/8	21/32	5/16-18	3/4	3/4	5/8	1/2	±3/64	GAS & GBS	GAS & GBS
GBS	6 1/16	6 3/4	5 3/4	5 1/4	5 7/16	2 23/32	21/32	5/16-18	3/4	3/4	3/4	1/2	±3/64	½ x 1 1/4	½ x 2 1/4

TECHNIPOWER, INC.
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MODELS AND PRICES

Output Voltage Adjust. Range (VDC)	Output Current (Amps)	Case Size (see dwg)	Model	Price	Thermal Ref. No.
2.8-5.5	1.0	CSS	CD-5.5-1.0	$215	4
	2.0	CS	CD-5.5-2.0	225	5
	4.0	DS	CD-5.5-4.0	240	6
	8.0	FS	CD-5.5-8.0	280	7
	15.0	GS	CD-5.5-15.0	330	8
	30.0	GBS	CD-5.5-30.0	485	9
4.0-8.0	0.750	CSS	CD-8.0-0.750	215	4
	1.5	CS	CD-8.0-1.5	225	5
	3.0	DS	CD-8.0-3.0	240	6
	6.0	FS	CD-8.0-6.0	280	7
	12.0	GS	CD-8.0-12.0	345	8
	25.0	GBS	CD-8.0-25.0	500	9
5.5-11.0	0.750	CSS	CD-11.0-0.750	215	4
	1.5	CS	CD-11.0-1.5	225	5
	3.0	DS	CD-11.0-3.0	250	6
	6.0	FS	CD-11.0-6.0	300	7
	12.0	GS	CD-11.0-12.0	370	8
	25.0	GBS	CD-11.0-25.0	530	9
7.5-15.0	0.500	CSS	CD-15.0-0.500	215	4
	1.0	CS	CD-15.0-1.0	225	4
	2.0	DS	CD-15.0-2.0	240	5
	4.0	FS	CD-15.0-4.0	285	7
	8.0	GS	CD-15.0-8.0	345	8
	15.0	GBS	CD-15.0-15.0	475	9
11.3-22.5	0.375	CSS	CD-22.5-0.375	215	3
	0.750	CS	CD-22.5-0.750	225	4
	1.5	DS	CD-22.5-1.5	240	5
	3.0	ES	CD-22.5-3.0	275	6A
	6.0	FS	CD-22.5-6.0	330	7A
	12.0	GAS	CD-22.5-12.0	450	8A
15.0-30.0	0.250	CSS	CD-30.0-0.250	210	3
	0.500	CS	CD-30.0-0.500	220	4
	1.0	DS	CD-30.0-1.0	230	5
	2.0	ES	CD-30.0-2.0	255	6A
	4.0	FS	CD-30.0-4.0	295	7A
	8.0	GAS	CD-30.0-8.0	400	8A
22.5-45.0	0.200	CSS	CD-45.0-0.200	210	3
	0.375	CS	CD-45.0-0.375	220	4
	0.750	DS	CD-45.0-0.750	230	5
	1.5	ES	CD-45.0-1.5	250	6A
	3.0	FS	CD-45.0-3.0	285	7A
	6.0	GAS	CD-45.0-6.0	380	8A
30.0-60.0	0.125	CSS	CD-60.0-0.125	210	3
	0.250	CS	CD-60.0-0.250	220	4
	0.500	DS	CD-60.0-0.500	230	5
	1.0	ES	CD-60.0-1.0	240	6A
	2.0	FS	CD-60.0-2.0	270	7A
	4.0	GAS	CD-60.0-4.0	360	8A
70.0-120.0	0.065	CSS	CD-120.0-0.065	220	3
	0.125	CS	CD-120.0-0.125	230	4
	0.250	DS	CD-120.0-0.250	240	5
	0.500	ES	CD-120.0-0.500	250	6A
	1.0	FS	CD-120.0-1.0	280	7A
	2.0	GAS	CD-120.0-2.0	360	8A
150.0-250.0	0.030	CSS	CD-250.0-0.030	220	3
	0.065	CS	CD-250.0-0.065	230	4
	0.125	DS	CD-250.0-0.125	240	5
	0.250	ES	CD-250.0-0.250	255	6A
	0.500	FS	CD-250.0-0.500	295	7A
	1.0	GAS	CD-250.0-1.0	375	8A
225.0-375.0	0.025	CSS	CD-375.0-0.025	225	3
	0.050	CS	CD-375.0-0.050	235	4
	0.100	DS	CD-375.0-0.100	245	5
	0.200	ES	CD-375.0-0.200	270	6A
	0.375	FS	CD-375.0-0.375	305	7A
	0.750	GAS	CD-375.0-0.750	395	8A
300.0-500.0	0.015	CSS	CD-500.0-0.015	225	3
	0.030	CS	CD-500.0-0.030	235	4
	0.065	DS	CD-500.0-0.065	245	5
	0.125	ES	CD-500.0-0.125	260	6A
	0.250	FS	CD-500.0-0.250	300	7A
	0.500	GAS	CD-500.0-0.500	390	8A
450.0-750.0	0.012	CSS	CD-750.0-0.012	230	3
	0.025	CS	CD-750.0-0.025	240	4
	0.050	DS	CD-750.0-0.050	250	5
	0.100	ES	CD-750.0-0.100	280	6A
	0.200	FS	CD-750.0-0.200	320	7A
	0.375	GAS	CD-750.0-0.375	420	8A
600.0-1000.0	0.008	CSS	CD-1000.0-0.008	230	3
	0.015	CS	CD-1000.0-0.015	240	4
	0.030	DS	CD-1000.0-0.030	250	5
	0.065	ES	CD-1000.0-0.065	275	6A
	0.125	FS	CD-1000.0-0.125	320	7A
	0.250	GAS	CD-1000.0-0.250	420	8A

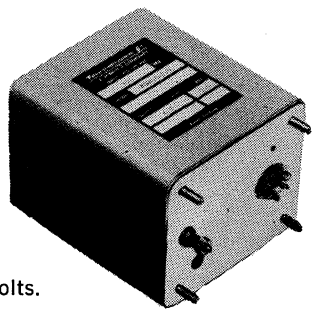
Output Voltage Adjust. Range (VDC)	Output Current (Amps)	Case Size (see dwg)	Model	Price	Thermal Ref. No.
2.8-5.5	1.0	CSS	CDC-5.5-1.0	245	4
	2.0	CS	CDC-5.5-2.0	255	5
	4.0	DS	CDC-5.5-4.0	270	6
	8.0	FS	CDC-5.5-8.0	310	7
	15.0	GS	CDC-5.5-15.0	360	8
	30.0	GBS	CDC-5.5-30.0	515	9
4.0-8.0	0.750	CSS	CDC-8.0-0.750	245	4
	1.5	CS	CDC-8.0-1.5	255	5
	3.0	DS	CDC-8.0-3.0	270	6
	6.0	FS	CDC-8.0-6.0	310	7
	12.0	GS	CDC-8.0-12.0	375	8
	25.0	GBS	CDC-8.0-25.0	530	9
5.5-11.0	0.750	CSS	CDC-11.0-0.750	245	4
	1.5	CS	CDC-11.0-1.5	255	5
	3.0	DS	CDC-11.0-3.0	280	6
	6.0	FS	CDC-11.0-6.0	330	7
	12.0	GS	CDC-11.0-12.0	400	8
	25.0	GBS	CDC-11.0-25.0	560	9
7.5-15.0	0.500	CSS	CDC-15.0-0.500	245	4
	1.0	CS	CDC-15.0-1.0	255	4
	2.0	DS	CDC-15.0-2.0	270	5
	4.0	FS	CDC-15.0-4.0	315	7
	8.0	GS	CDC-15.0-8.0	375	8
	15.0	GBS	CDC-15.0-15.0	505	9
11.3-22.5	0.375	CSS	CDC-22.5-0.375	245	3
	0.750	CS	CDC-22.5-0.750	255	4
	1.5	DS	CDC-22.5-1.5	270	5
	3.0	ES	CDC-22.5-3.0	305	6A
	6.0	FS	CDC-22.5-6.0	360	7A
	12.0	GAS	CDC-22.5-12.0	480	8A
15.0-30.0	0.250	CSS	CDC-30.0-0.250	240	3
	0.500	CS	CDC-30.0-0.500	250	4
	1.0	DS	CDC-30.0-1.0	260	5
	2.0	ES	CDC-30.0-2.0	285	6A
	4.0	FS	CDC-30.0-4.0	325	7A
	8.0	GAS	CDC-30.0-8.0	430	8A
22.5-45.0	0.200	CSS	CDC-45.0-0.200	240	3
	0.375	CS	CDC-45.0-0.375	250	4
	0.750	DS	CDC-45.0-0.750	260	5
	1.5	ES	CDC-45.0-1.5	280	6A
	3.0	FS	CDC-45.0-3.0	315	7A
	6.0	GAS	CDC-45.0-6.0	410	8A
30.0-60.0	0.125	CSS	CDC-60.0-0.125	240	3
	0.250	CS	CDC-60.0-0.250	250	4
	0.500	DS	CDC-60.0-0.500	260	5
	1.0	ES	CDC-60.0-1.0	270	6A
	2.0	FS	CDC-60.0-2.0	300	7A
	4.0	GAS	CDC-60.0-4.0	390	8A
70.0-120.0	0.065	CSS	CDC-120.0-0.065	250	3
	0.125	CS	CDC-120.0-0.125	260	4
	0.250	DS	CDC-120.0-0.250	270	5
	0.500	ES	CDC-120.0-0.500	280	6A
	1.0	FS	CDC-120.0-1.0	310	7A
	2.0	GAS	CDC-120.0-2.0	390	8A
150.0-250.0	0.030	CSS	CDC-250.0-0.030	250	3
	0.065	CS	CDC-250.0-0.065	260	4
	0.125	DS	CDC-250.0-0.125	270	5
	0.250	ES	CDC-250.0-0.250	285	6A
	0.500	FS	CDC-250.0-0.500	325	7A
	1.0	GAS	CDC-250.0-1.0	405	8A
225.0-375.0	0.025	CSS	CDC-375.0-0.025	255	3
	0.050	CS	CDC-375.0-0.050	265	4
	0.100	DS	CDC-375.0-0.100	275	5
	0.200	ES	CDC-375.0-0.200	300	6A
	0.375	FS	CDC-375.0-0.375	335	7A
	0.750	GAS	CDC-375.0-0.750	425	8A
300.0-500.0	0.015	CSS	CDC-500.0-0.015	255	3
	0.030	CS	CDC-500.0-0.030	265	4
	0.065	DS	CDC-500.0-0.065	275	5
	0.125	ES	CDC-500.0-0.125	290	6A
	0.250	FS	CDC-500.0-0.250	330	7A
	0.500	GAS	CDC-500.0-0.500	420	8A
450.0-750.0	0.012	CSS	CDC-750.0-0.012	260	3
	0.025	CS	CDC-750.0-0.025	270	4
	0.050	DS	CDC-750.0-0.050	280	5
	0.100	ES	CDC-750.0-0.100	310	6A
	0.200	FS	CDC-750.0-0.200	350	7A
	0.375	GAS	CDC-750.0-0.375	450	8A
600.0-1000.0	0.008	CSS	CDC-1000.0-0.008	260	3
	0.015	CS	CDC-1000.0-0.015	270	4
	0.030	DS	CDC-1000.0-0.030	280	5
	0.065	ES	CDC-1000.0-0.065	305	6A
	0.125	FS	CDC-1000.0-0.125	350	7A
	0.250	GAS	CDC-1000.0-0.250	450	8A

TECHNIPOWER, INC.
A BENRUS SUBSIDIARY
Ridgefield, Conn. 06877

F-FD 115

REGULATED AC-DC MODULAR POWER SUPPLIES QUALIFIED FOR EXTREME MIL ENVIRONMENTS

3 to 325 VDC, up to 500 Watts
Base Temperature Rated to 115°C



DESIGN PARAMETERS (Typical)

Temperature coefficient: 0.015%/°C or 1 mv/°C, whichever is greater.

Recovery time: Less than 50 μsec, 1/2L to FL.

Qualified for MIL environmental operation: See Catalog #701, pages 16-17.

Remote sensing: Connections provided for remote sensing of the output voltage so as to compensate for an IR drop of up to 0.5 volts total in the leads connecting the module to the load.

M.T.B.F. for product line: 25,000 hours, per MIL-HBK-217A, with module stressed at 115°C base temperature.

Output impedance: See curve.

OPTIONAL FEATURES

Details in Technipower Catalog #701

	SUFFIX
Closer regulation	AA
Operation with lamp loads	E
Fixed output	F
Shock and vibration mounts	G
External output adjust	H
Lower temperature coefficient	T, TT
Off ground operation	U
Wide input range	W
Special finishes	

SPECIFICATIONS

Input voltage range: 105-125 volts.

Input frequency range: 47-420 Hz (F-115 Series) 400 Hz (FD-115 Series).

Regulation-Line and Load Combined: ±0.05%.

Ripple: F-115 Series: 0.002% or 1 mv rms (whichever is greater)—0.004% or 3 mv rms with 400 Hz input.

FD-115 Series: 0.004% or 3 mv rms (whichever is greater).

Output adjustment range: 10%. At 80% of rated load the output may be adjusted 20% (±10%) of nominal.

Operating temperature: —62°C to +115°C (max. base temp.).

Storage temperature: —62°C to +125°C.

Polarity: May be used positive or negative.

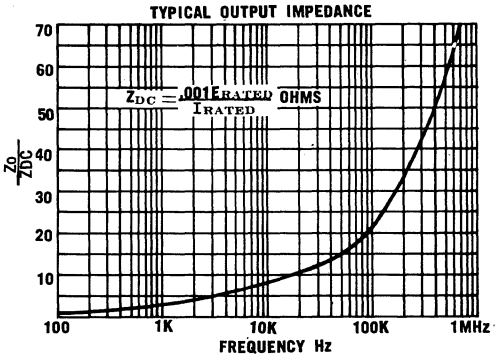
Output voltage and current: See specific model listings.

Series operation: Series starting circuitry employed requires that input AC voltage be applied at a rate greater than 150 v rms/sec. Consult factory if slow rising input is anticipated.

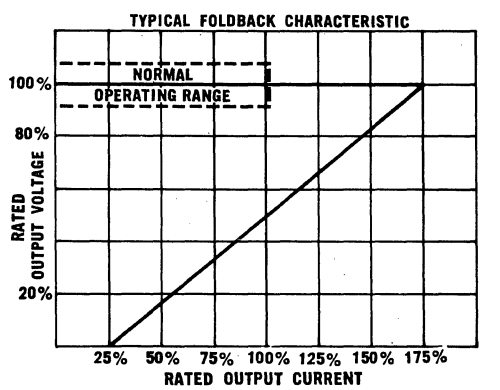
Short circuit protection: Unique foldback circuitry (see curve) protects each module if output should be shorted continuously. Automatic return after short removal.

Overvoltage protection: Consult factory.

TYPICAL OUTPUT IMPEDANCE

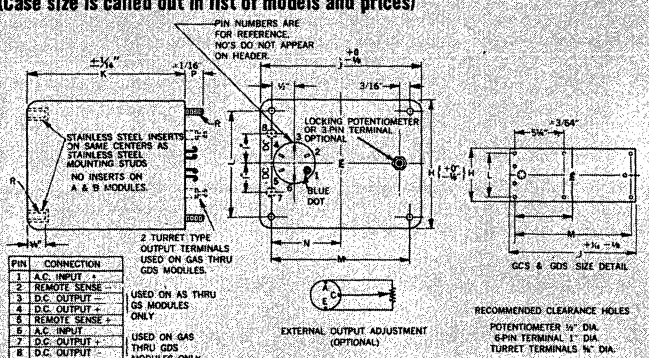


TYPICAL FOLDBACK CHARACTERISTIC



MECHANICAL DATA

(Case size is called out in list of models and prices)



PIN	CONNECTION
1	A.C. INPUT +
2	REMOTE SENSE +
3	D.C. OUTPUT −
4	D.C. OUTPUT −
5	REMOTE SENSE +
6	A.C. INPUT
7	D.C. OUTPUT +
8	D.C. OUTPUT +

CASE SIZE	MODULE DIMENSIONS H	J	K	L	M	N	P	R	TOLERANCES L, M, N	TERMINAL HEIGHT ±1/16
BS	2 5/8	3 1/16	3 3/16	1 55/64	2 19/64	1 5/32	11/32	8-32	±1/64	
CS	3 1/16	3 9/16	3 7/8	2 1/8	2 5/8	1 5/16	11/32	8-32	±1/64	
DS	3 3/8	3 15/16	4 5/16	2 7/16	3	1 1/2	15/32	10-32	±1/32	
ES	3 11/16	4 5/16	4 1/2	2 11/16	3 5/16	1 21/32	7/16	10-32	±1/32	
FS	4	4 11/16	4 15/16	3	3 11/16	1 27/32	9/16	1/4-20	±3/64	
GS	4 5/16	5 1/16	5 1/2	3 5/16	4 1/16	2 1/32	9/16	1/4-20	±3/64	
GAS	4 15/16	6 9/16	5 3/4	3 5/8	5 1/4	2 5/8	21/32	5/16-18	±3/64	5/8
GBS	6 9/16	6 3/4	5 3/4	5 1/4	5 7/16	2 23/32	21/32	5/16-18	±3/64	5/8
GCS*	4 15/16	13 1/16	5 3/4	3 5/8	11 13/16	5 29/32	21/32	5/16-18	±3/64	5/8
GDS*	6 9/16	13 1/16	5 3/4	5 7/16	11 13/16	5 29/32	21/32	5/16-18	±3/64	5/8

*See detail

F-FD 115

TECHNIPOWER, INC.
A BENRUS SUBSIDIARY

Ridgefield, Conn.
06877

MODELS AND PRICES

Output Voltage Adjust. Range	Output Current (amps)	50-400 Hz Model	Size (see dwg)	Price	400 Hz Model	Size (see dwg)	Price	Thermal Ref. No.
2.8-3.2	0.375	F-3.0-0.375	DS	115	FD-3.0-0.375	DS	95	1
2.8-3.2	0.750	F-3.0-0.750	ES	130	FD-3.0-0.750	DS	110	3
2.8-3.2	1.5	F-3.0-1.5	FS	150	FD-3.0-1.5	ES	125	5
2.8-3.2	3.0	F-3.0-3.0	GS	180	FD-3.0-3.0	FS	150	6A
2.8-3.2	6.0	F-3.0-6.0	GAS	235	FD-3.0-6.0	GS	195	7A
2.8-3.2	12.0	F-3.0-12.0	GBS	350	FD-3.0-12.0	GAS	290	8A
2.8-3.2	25.0	F-3.0-25.0	GDS	530	FD-3.0-25.0	GBS	440	9A
3.2-3.5	0.375	F-3.3-0.375	DS	115	FD-3.3-0.375	DS	95	1
3.2-3.5	0.750	F-3.3-0.750	ES	130	FD-3.3-0.750	DS	110	3
3.2-3.5	1.5	F-3.3-1.5	FS	155	FD-3.3-1.5	ES	130	5
3.2-3.5	3.0	F-3.3-3.0	GS	185	FD-3.3-3.0	FS	155	6A
3.2-3.5	6.0	F-3.3-6.0	GAS	250	FD-3.3-6.0	GS	210	7A
3.2-3.5	12.0	F-3.3-12.0	GBS	360	FD-3.3-12.0	GAS	300	8A
3.2-3.5	25.0	F-3.3-25.0	GDS	550	FD-3.3-25.0	GBS	460	9A
3.5-3.9	0.375	F-3.7-0.375	DS	120	FD-3.7-0.375	DS	100	1
3.5-3.9	0.750	F-3.7-0.750	ES	140	FD-3.7-0.750	DS	115	3
3.5-3.9	1.5	F-3.7-1.5	FS	155	FD-3.7-1.5	ES	130	5
3.5-3.9	3.0	F-3.7-3.0	GS	190	FD-3.7-3.0	ES	160	6A
3.5-3.9	6.0	F-3.7-6.0	GAS	265	FD-3.7-6.0	GS	220	7A
3.5-3.9	12.0	F-3.7-12.0	GBS	385	FD-3.7-12.0	GAS	320	8A
3.5-3.9	25.0	F-3.7-25.0	GDS	580	FD-3.7-25.0	GBS	485	9A
3.9-4.3	0.375	F-4.1-0.375	CS	120	FD-4.1-0.375	BS	100	1
3.9-4.3	0.750	F-4.1-0.750	DS	140	FD-4.1-0.750	CS	115	3
3.9-4.3	1.5	F-4.1-1.5	ES	160	FD-4.1-1.5	DS	135	5
3.9-4.3	3.0	F-4.1-3.0	GS	200	FD-4.1-3.0	ES	165	6A
3.9-4.3	6.0	F-4.1-6.0	GAS	275	FD-4.1-6.0	FS	230	7A
3.9-4.3	12.0	F-4.1-12.0	GBS	410	FD-4.1-12.0	GAS	340	8A
3.9-4.3	25.0	F-4.1-25.0	GDS	610	FD-4.1-25.0	GBS	510	9A
4.3-4.7	0.375	F-4.5-0.375	CS	125	FD-4.5-0.375	BS	105	1
4.3-4.7	0.750	F-4.5-0.750	DS	145	FD-4.5-0.750	CS	120	3
4.3-4.7	1.5	F-4.5-1.5	ES	160	FD-4.5-1.5	DS	135	5
4.3-4.7	3.0	F-4.5-3.0	GS	205	FD-4.5-3.0	ES	170	6A
4.3-4.7	6.0	F-4.5-6.0	GAS	290	FD-4.5-6.0	FS	240	7A
4.3-4.7	12.0	F-4.5-12.0	GBS	425	FD-4.5-12.0	GAS	355	8A
4.3-4.7	25.0	F-4.5-25.0	GDS	640	FD-4.5-25.0	GBS	535	9A
4.7-5.3	0.375	F-5.1-0.375	CS	125	FD-5.1-0.375	BS	105	1
4.7-5.3	0.750	F-5.1-0.750	DS	145	FD-5.1-0.750	CS	120	3
4.7-5.3	1.5	F-5.1-1.5	ES	170	FD-5.1-1.5	DS	140	5
4.7-5.3	3.0	F-5.1-3.0	GS	210	FD-5.1-3.0	ES	175	6A
4.7-5.3	6.0	F-5.1-6.0	GAS	305	FD-5.1-6.0	FS	255	7A
4.7-5.3	12.0	F-5.1-12.0	GBS	450	FD-5.1-12.0	GAS	375	8A
4.7-5.3	25.0	F-5.1-25.0	GDS	670	FD-5.1-25.0	GBS	560	9A
5.3-5.8	0.375	F-5.5-0.375	CS	125	FD-5.5-0.375	BS	105	1
5.3-5.8	0.750	F-5.5-0.750	DS	145	FD-5.5-0.750	CS	120	3
5.3-5.8	1.5	F-5.5-1.5	ES	170	FD-5.5-1.5	DS	140	5
5.3-5.8	3.0	F-5.5-3.0	GS	215	FD-5.5-3.0	ES	180	6A
5.3-5.8	6.0	F-5.5-6.0	GAS	320	FD-5.5-6.0	FS	265	7A
5.3-5.8	12.0	F-5.5-12.0	GBS	470	FD-5.5-12.0	GAS	390	8A
5.3-5.8	25.0	F-5.5-25.0	GDS	700	FD-5.5-25.0	GBS	585	9A
5.8-6.3	0.375	F-6.0-0.375	CS	130	FD-6.0-0.375	BS	110	1
5.8-6.3	0.750	F-6.0-0.750	DS	150	FD-6.0-0.750	CS	125	3
5.8-6.3	1.5	F-6.0-1.5	FS	170	FD-6.0-1.5	DS	140	5
5.8-6.3	3.0	F-6.0-3.0	GS	230	FD-6.0-3.0	ES	190	6A
5.8-6.3	6.0	F-6.0-6.0	GAS	325	FD-6.0-6.0	FS	270	7A
5.8-6.3	12.0	F-6.0-12.0	GCS	480	FD-6.0-12.0	GAS	400	8A
5.8-6.3	25.0	F-6.0-25.0	GDS	720	FD-6.0-25.0	GBS	600	9A
6.3-6.9	0.200	F-6.6-0.200	CS	115	FD-6.6-0.200	BS	95	1
6.3-6.9	0.375	F-6.6-0.375	CS	130	FD-6.6-0.375	BS	110	2
6.3-6.9	0.750	F-6.6-0.750	DS	150	FD-6.6-0.750	CS	125	3
6.3-6.9	1.5	F-6.6-1.5	FS	175	FD-6.6-1.5	DS	145	5
6.3-6.9	3.0	F-6.6-3.0	GS	240	FD-6.6-3.0	ES	200	6A
6.3-6.9	6.0	F-6.6-6.0	GAS	330	FD-6.6-6.0	FS	275	7A
6.3-6.9	12.0	F-6.6-12.0	GCS	490	FD-6.6-12.0	GAS	410	8A
6.3-6.9	25.0	F-6.6-25.0	GDS	740	FD-6.6-25.0	GBS	615	9A
6.9-7.6	0.200	F-7.3-0.200	CS	120	FD-7.3-0.200	BS	100	1
6.9-7.6	0.375	F-7.3-0.375	CS	130	FD-7.3-0.375	BS	110	2
6.9-7.6	0.750	F-7.3-0.750	DS	150	FD-7.3-0.750	CS	125	3
6.9-7.6	1.5	F-7.3-1.5	FS	175	FD-7.3-1.5	DS	145	5
6.9-7.6	3.0	F-7.3-3.0	GS	250	FD-7.3-3.0	ES	210	6A
6.9-7.6	6.0	F-7.3-6.0	GBS	335	FD-7.3-6.0	FS	280	7A
6.9-7.6	12.0	F-7.3-12.0	GCS	505	FD-7.3-12.0	GAS	420	8A
6.9-7.6	25.0	F-7.3-25.0	GDS	750	FD-7.3-25.0	GBS	625	9A
7.6-8.5	0.200	F-8.1-0.200	CS	120	FD-8.1-0.200	BS	100	1
7.6-8.5	0.375	F-8.1-0.375	CS	140	FD-8.1-0.375	BS	115	2
7.6-8.5	0.750	F-8.1-0.750	DS	155	FD-8.1-0.750	CS	130	3
7.6-8.5	1.5	F-8.1-1.5	FS	180	FD-8.1-1.5	DS	150	5
7.6-8.5	3.0	F-8.1-3.0	GS	260	FD-8.1-3.0	ES	215	6A
7.6-8.5	6.0	F-8.1-6.0	GBS	350	FD-8.1-6.0	GS	290	7A
7.6-8.5	12.0	F-8.1-12.0	GCS	515	FD-8.1-12.0	GAS	430	8A
7.6-8.5	25.0	F-8.1-25.0	GDS	775	FD-8.1-25.0	GBS	645	9A
8.5-9.3	0.200	F-8.9-0.200	CS	125	FD-8.9-0.200	BS	105	1
8.5-9.3	0.375	F-8.9-0.375	CS	140	FD-8.9-0.375	BS	115	2
8.5-9.3	0.750	F-8.9-0.750	DS	155	FD-8.9-0.750	CS	130	3
8.5-9.3	1.5	F-8.9-1.5	FS	180	FD-8.9-1.5	DS	150	5
8.5-9.3	3.0	F-8.9-3.0	GS	265	FD-8.9-3.0	ES	220	6A
8.5-9.3	6.0	F-8.9-6.0	GBS	360	FD-8.9-6.0	GS	300	7A
8.5-9.3	12.0	F-8.9-12.0	GCS	530	FD-8.9-12.0	GAS	440	8A
8.5-9.3	25.0	F-8.9-25.0	GDS	790	FD-8.9-25.0	GBS	660	10
9.3-10.3	0.200	F-9.8-0.200	CS	125	FD-9.8-0.200	BS	105	1
9.3-10.3	0.375	F-9.8-0.375	CS	140	FD-9.8-0.375	BS	115	2
9.3-10.3	0.750	F-9.8-0.750	DS	155	FD-9.8-0.750	CS	130	3
9.3-10.3	1.5	F-9.8-1.5	GS	180	FD-9.8-1.5	DS	150	6
9.3-10.3	3.0	F-9.8-3.0	GAS	270	FD-9.8-3.0	FS	225	6A
9.3-10.3	6.0	F-9.8-6.0	GBS	370	FD-9.8-6.0	GS	310	8
9.3-10.3	12.0	F-9.8-12.0	GCS	540	FD-9.8-12.0	GAS	450	9
9.3-10.3	25.0	F-9.8-25.0	GDS	810	FD-9.8-25.0	GBS	675	10
10.3-11.4	0.200	F-10.8-0.200	CS	125	FD-10.8-0.200	BS	105	1
10.3-11.4	0.375	F-10.8-0.375	CS	140	FD-10.8-0.375	BS	115	2
10.3-11.4	0.750	F-10.8-0.750	ES	160	FD-10.8-0.750	DS	135	3
10.3-11.4	1.5	F-10.8-1.5	GS	180	FD-10.8-1.5	DS	150	6
10.3-11.4	3.0	F-10.8-3.0	GAS	275	FD-10.8-3.0	FS	230	7
10.3-11.4	6.0	F-10.8-6.0	GBS	385	FD-10.8-6.0	GS	320	8
10.3-11.4	12.0	F-10.8-12.0	GCS	550	FD-10.8-12.0	GBS	460	9
10.3-11.4	25.0	F-10.8-25.0	GDS	830	FD-10.8-25.0	GBS	690	10
11.4-12.5	0.200	F-12.0-0.200	CS	125	FD-12.0-0.200	BS	105	1
11.4-12.5	0.375	F-12.0-0.375	CS	145	FD-12.0-0.375	BS	120	2
11.4-12.5	0.750	F-12.0-0.750	ES	160	FD-12.0-0.750	DS	135	3
11.4-12.5	1.5	F-12.0-1.5	GS	185	FD-12.0-1.5	ES	155	6
11.4-12.5	3.0	F-12.0-3.0	GAS	280	FD-12.0-3.0	FS	235	7
11.4-12.5	6.0	F-12.0-6.0	GBS	395	FD-12.0-6.0	GS	330	8
11.4-12.5	12.0	F-12.0-12.0	GCS	565	FD-12.0-12.0	GBS	470	9
11.4-12.5	25.0	F-12.0-25.0	GDS	850	FD-12.0-25.0	GBS	710	10
12.5-13.7	0.100	F-13.1-0.100	CS	115	FD-13.1-0.100	BS	95	1
12.5-13.7	0.200	F-13.1-0.200	CS	130	FD-13.1-0.200	BS	110	1
12.5-13.7	0.375	F-13.1-0.375	DS	145	FD-13.1-0.375	CS	120	2
12.5-13.7	0.750	F-13.1-0.750	ES	170	FD-13.1-0.750	DS	140	3
12.5-13.7	1.5	F-13.1-1.5	GS	190	FD-13.1-1.5	ES	160	6
12.5-13.7	3.0	F-13.1-3.0	GAS	295	FD-13.1-3.0	FS	245	7
12.5-13.7	6.0	F-13.1-6.0	GBS	410	FD-13.1-6.0	GS	340	8
12.5-13.7	12.0	F-13.1-12.0	GDS	600	FD-13.1-12.0	GBS	500	9
13.7-15.2	0.100	F-14.5-0.100	CS	120	FD-14.5-0.100	BS	100	1
13.7-15.2	0.200	F-14.5-0.200	CS	130	FD-14.5-0.200	BS	110	1
13.7-15.2	0.375	F-14.5-0.375	DS	150	FD-14.5-0.375	CS	125	2
13.7-15.2	0.750	F-14.5-0.750	ES	170	FD-14.5-0.750	DS	140	3
13.7-15.2	1.5	F-14.5-1.5	GS	220	FD-14.5-1.5	ES	185	6
13.7-15.2	3.0	F-14.5-3.0	GAS	305	FD-14.5-3.0	FS	255	7
13.7-15.2	6.0	F-14.5-6.0	GBS	420	FD-14.5-6.0	GS	350	8
13.7-15.2	12.0	F-14.5-12.0	GDS	625	FD-14.5-12.0	GBS	520	9

See Catalog #701 for models up to 325 VDC

TECHNIPOWER, INC.
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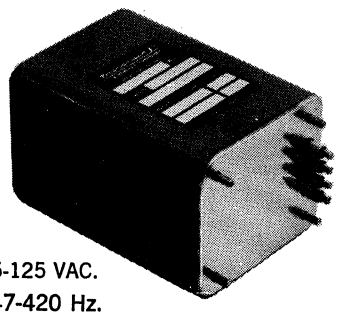
NP-80

LOW COST UNREGULATED AC-DC "BRUTE FORCE" MODULAR POWER SUPPLIES

3.0 to 1000 VDC, up to 975 Watts
Base Temperature Rated 80°C



DESIGN PARAMETERS (Typical)

Designed to meet MIL environmental specifications:
RFI — MIL-I-6181D;
Shock — MIL-STD-202C, Method 205C;
Vibration — MIL-STD-202C, Method 201A;
Hi-temp — MIL-E-5400, Classes 1 & 1A;
Humidity — MIL-STD-202C, Method 103B.

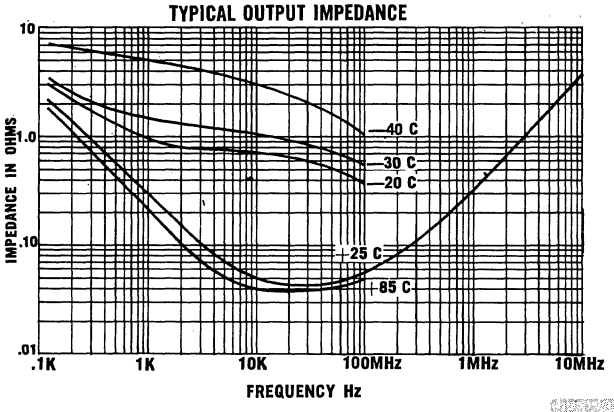
M.T.B.F.: 200,000 hours per Mil-HBK-217A, with module stressed at 80°C base temperature.

Output isolated from ground.

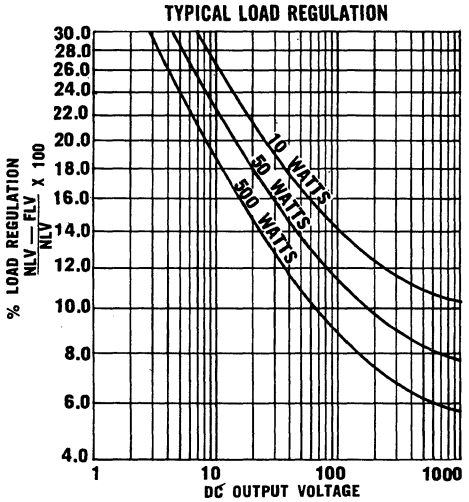
Sealed construction.

Output impedance: See curve.

TYPICAL OUTPUT IMPEDANCE



TYPICAL LOAD REGULATION



SPECIFICATIONS

Input voltage range: 105-125 VAC.

Input frequency range: 47-420 Hz.

Regulation Line: proportional to input voltage.
Load: refer to load regulation curve.

Operating temperature: —20°C to + 80°C (max. base temp.).*

Storage temperature: —62°C to +85°C.

Ripple: Less than 5% rms.**

Polarity: May be used positive or negative.

Output voltage and current: See specific model listings.

Voltage setting accuracy: ±5% under full load conditions with 115 v, 60 Hz input. Output voltage may vary 5% to 10% as input frequency is increased over a range from 47 to 420 Hz.

*Modules can be designed to meet higher temperature requirements. Consult factory concerning price and delivery.

**The output ripple can be reduced to 2% rms. If this option is to be incorporated, the case size of the catalog unit must be increased by one full size, and the suffix "L" must be added to the model number of the basic power module (e.g. NP-28.0-3.0L, case size GB). Additional charge: 20%.

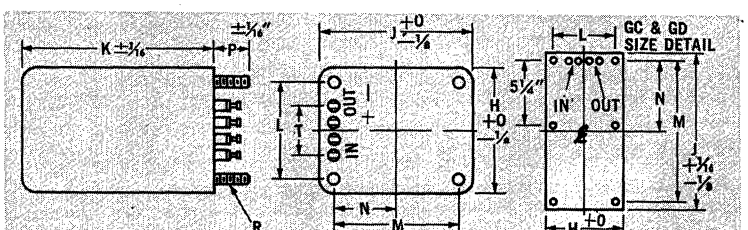
OPTIONAL FEATURES

Details in Technipower Catalog #701

	SUFFIX
Reduced size and weight	D
Shock and vibration mounts	G, V
Fully epoxy encapsulated	K
Off-ground operation	U
Special cases, shapes and finishes	

MECHANICAL DATA

(case size is called out in list of models and prices)



Case Size	* See detail MODULE DIMENSIONS H	J	K	L	M	N	P	R	T	Tolerances L,M,N,S	Recommended Clearance Terminal Cutouts	Terminal Height ±1/16
A	2 3/8	2 3/4	3 13/16	1 3/4	2 1/8	1 1/16	11/32	6-32	15/16	±1/64	3/8x1 5/16	19/32
B	2 5/8	3 1/16	4 1/4	1 55/64	2 19/64	1 3/32	11/32	8-32	15/16	±1/64	3/8x1 5/16	19/32
C	3 1/16	3 3/16	4 7/8	2 1/8	2 5/8	1 5/16	11/32	8-32	15/16	±1/64	3/8x1 5/16	19/32
D	3 3/8	3 15/16	5 1/4	2 7/16	3	1 1/2	15/32	10-32	15/16	±1/32	3/8x1 5/16	19/32
E	3 11/16	4 5/16	5 9/16	2 11/16	3 5/16	1 27/32	7/16	10-32	15/16	±1/32	3/8x1 5/16	19/32
F	4	4 11/16	6	3	3 11/16	1 27/32	9/16	1/4-20	15/16	±3/64	3/8x1 5/16	19/32
G	4 5/16	5 1/16	6 13/16	3 5/16	4 1/16	2 21/32	9/16	1/4-20	15/16	±3/64	3/8x1 5/16	19/32
GA	4 15/16	6 9/16	7	3 5/8	5 1/4	2 5/8	21/32	5/16-18	1 1/2	±3/64	1/2x2	5/8
GB	6 9/16	6 3/4	7	5 1/4	5 7/16	2 23/32	2 3/32	5/16-18	1 1/2	±3/64	1/2x2	5/8
GC*	4 15/16	13 1/16	7	3 5/8	11 13/16	5 29/32	21/32	5/16-18	1 7/8	±3/64	5/8x2 1/2	5/8
GD*	6 9/16	13 1/16	7	5 5/16	11 13/16	5 29/32	21/32	5/16-18	1 7/8	±3/64	5/8x2 1/2	5/8

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06877

MODELS AND PRICES

Output Voltage	Output Current (amps)	Case Size (see dwg)	Model	Price	Thermal Ref. No.
3.0	0.750	B	NP-3.0-0.750	40	1
3.0	1.5	D	NP-3.0-1.5	50	2
3.0	3.0	E	NP-3.0-3.0	55	4
3.0	6.0	F	NP-3.0-6.0	65	6
3.0	12.0	GA	NP-3.0-12.0	105	7
3.0	25.0	GB	NP-3.0-25.0	130	8
3.3	0.750	B	NP-3.3-0.750	40	1
3.3	1.5	D	NP-3.3-1.5	50	2
3.3	3.0	E	NP-3.3-3.0	55	4
3.3	6.0	F	NP-3.3-6.0	70	6
3.3	12.0	GA	NP-3.3-12.0	105	7
3.3	25.0	GB	NP-3.3-25.0	130	8
3.7	0.750	B	NP-3.7-0.750	40	1
3.7	1.5	D	NP-3.7-1.5	50	2
3.7	3.0	E	NP-3.7-3.0	55	4
3.7	6.0	F	NP-3.7-6.0	70	6
3.7	12.0	GA	NP-3.7-12.0	105	7
3.7	25.0	GB	NP-3.7-25.0	130	8
4.1	0.750	B	NP-4.1-0.750	40	1
4.1	1.5	D	NP-4.1-1.5	50	2
4.1	3.0	E	NP-4.1-3.0	60	4
4.1	6.0	F	NP-4.1-6.0	85	6
4.1	12.0	GA	NP-4.1-12.0	110	7
4.1	25.0	GB	NP-4.1-25.0	135	8
4.5	0.750	B	NP-4.5-0.750	45	1
4.5	1.5	D	NP-4.5-1.5	50	2
4.5	3.0	E	NP-4.5-3.0	60	4
4.5	6.0	F	NP-4.5-6.0	90	6
4.5	12.0	GA	NP-4.5-12.0	115	7
4.5	25.0	GB	NP-4.5-25.0	140	8
5.1	0.750	B	NP-5.1-0.750	45	1
5.1	1.5	D	NP-5.1-1.5	55	2
5.1	3.0	E	NP-5.1-3.0	65	4
5.1	6.0	F	NP-5.1-6.0	95	6
5.1	12.0	GA	NP-5.1-12.0	120	7
5.1	25.0	GB	NP-5.1-25.0	145	8
5.5	0.750	B	NP-5.5-0.750	45	1
5.5	1.5	D	NP-5.5-1.5	55	2
5.5	3.0	E	NP-5.5-3.0	65	4
5.5	6.0	F	NP-5.5-6.0	95	6
5.5	12.0	GA	NP-5.5-12.0	120	7
5.5	25.0	GB	NP-5.5-25.0	150	8
6.0	0.750	B	NP-6.0-0.750	45	1
6.0	1.5	D	NP-6.0-1.5	55	2
6.0	3.0	E	NP-6.0-3.0	65	4
6.0	6.0	F	NP-6.0-6.0	100	6
6.0	12.0	GA	NP-6.0-12.0	120	7
6.0	25.0	GB	NP-6.0-25.0	150	8
6.6	0.375	B	NP-6.6-0.375	40	1
6.6	0.750	C	NP-6.6-0.750	45	1
6.6	1.5	D	NP-6.6-1.5	55	2
6.6	3.0	F	NP-6.6-3.0	65	4
6.6	6.0	GA	NP-6.6-6.0	90	6
6.6	12.0	GB	NP-6.6-12.0	115	7
6.6	25.0	GC	NP-6.6-25.0	155	8
7.3	0.375	B	NP-7.3-0.375	40	1
7.3	0.750	C	NP-7.3-0.750	45	1
7.3	1.5	D	NP-7.3-1.5	55	3
7.3	3.0	F	NP-7.3-3.0	80	4
7.3	6.0	GA	NP-7.3-6.0	95	6
7.3	12.0	GB	NP-7.3-12.0	120	7
7.3	25.0	GC	NP-7.3-25.0	160	8
8.1	0.375	B	NP-8.1-0.375	40	1
8.1	0.750	C	NP-8.1-0.750	45	1
8.1	1.5	D	NP-8.1-1.5	55	3
8.1	3.0	F	NP-8.1-3.0	80	4
8.1	6.0	GA	NP-8.1-6.0	100	6
8.1	12.0	GB	NP-8.1-12.0	120	7
8.1	25.0	GC	NP-8.1-25.0	160	8
8.9	0.375	B	NP-8.9-0.375	40	1
8.9	0.750	C	NP-8.9-0.750	45	1
8.9	1.5	D	NP-8.9-1.5	55	3
8.9	3.0	F	NP-8.9-3.0	80	4
8.9	6.0	GA	NP 8.9-6.0	100	6
8.9	12.0	GB	NP-8.9-12.0	125	7
8.9	25.0	GC	NP-8.9-25.0	165	8
9.8	0.375	B	NP-9.8-0.375	40	1
9.8	0.750	C	NP-9.8-0.750	50	1
9.8	1.5	D	NP-9.8-1.5	60	3
9.8	3.0	F	NP-9.8-3.0	85	4
9.8	6.0	GA	NP-9.8-6.0	105	6
9.8	12.0	GB	NP-9.8-12.0	125	7
9.8	25.0	GC	NP-9.8-25.0	170	8
10.8	0.375	B	NP-10.8-0.375	40	1
10.8	0.750	C	NP-10.8-0.750	50	1
10.8	1.5	D	NP-10.8-1.5	60	3
10.8	3.0	F	NP-10.8-3.0	85	4
10.8	6.0	GA	NP-10.8-6.0	105	6
10.8	12.0	GB	NP-10.8-12.0	130	7
10.8	25.0	GC	NP-10.8-25.0	175	8
12.0	0.375	B	NP-12.0-0.375	40	1
12.0	0.750	C	NP-12.0-0.750	50	1
12.0	1.5	D	NP-12.0-1.5	60	3
12.0	3.0	F	NP-12.0-3.0	90	4
12.0	6.0	GA	NP-12.0-6.0	105	6
12.0	12.0	GB	NP-12.0-12.0	135	7
12.0	25.0	GC	NP-12.0-25.0	180	8

Output Voltage	Output Current (amps)	Case Size (see dwg)	Model	Price	Thermal Ref. No.
13.1	0.200	B	NP-13.1-0.200	35	1
13.1	0.375	B	NP-13.1-0.375	40	1
13.1	0.750	C	NP-13.1-0.750	50	1
13.1	1.5	E	NP-13.1-1.5	60	3
13.1	3.0	G	NP-13.1-3.0	90	4
13.1	6.0	GA	NP-13.1-6.0	110	6
13.1	12.0	GC	NP-13.1-12.0	145	7A
13.1	25.0	GD	NP-13.1-25.0	190	8
14.5	0.200	B	NP-14.5-0.200	35	1
14.5	0.375	B	NP-14.5-0.375	40	1
14.5	0.750	C	NP-14.5-0.750	50	1
14.5	1.5	F	NP-14.5-1.5	70	3
14.5	3.0	G	NP-14.5-3.0	90	4
14.5	6.0	GA	NP-14.5-6.0	110	6
14.5	12.0	GC	NP-14.5-12.0	145	7A
14.5	25.0	GD	NP-14.5-25.0	195	8
15.8	0.200	B	NP-15.8-0.200	35	1
15.8	0.375	B	NP-15.8-0.375	45	1
15.8	0.750	C	NP-15.8-0.750	50	1
15.8	1.5	F	NP-15.8-1.5	70	3
15.8	3.0	G	NP-15.8-3.0	90	4
15.8	6.0	GA	NP-15.8-6.0	110	6
15.8	12.0	GC	NP-15.8-12.0	140	7A
15.8	25.0	GD	NP-15.8-25.0	195	8
17.5	0.200	B	NP-17.5-0.200	40	1
17.5	0.375	B	NP-17.5-0.375	45	1
17.5	0.750	C	NP-17.5-0.750	50	2
17.5	1.5	F	NP-17.5-1.5	70	3
17.5	3.0	G	NP-17.5-3.0	90	5
17.5	6.0	GA	NP-17.5-6.0	110	6
17.5	12.0	GC	NP-17.5-12.0	145	7A
17.5	25.0	GD	NP-17.5-25.0	195	8A
19.2	0.200	B	NP-19.2-0.200	40	1
19.2	0.375	C	NP-19.2-0.375	45	1
19.2	0.750	C	NP-19.2-0.750	50	2
19.2	1.5	F	NP-19.2-1.5	70	3
19.2	3.0	G	NP-19.2-3.0	90	5
19.2	6.0	GA	NP-19.2-6.0	110	6A
19.2	12.0	GC	NP-19.2-12.0	145	7A
19.2	25.0	GD	NP-19.2-25.0	200	8A
21.2	0.200	B	NP-21.2-0.200	40	1
21.2	0.375	C	NP-21.2-0.375	45	1
21.2	0.750	C	NP-21.2-0.750	50	2
21.2	1.5	F	NP-21.2-1.5	75	3
21.2	3.0	GA	NP-21.2-3.0	90	5
21.2	6.0	GB	NP-21.2-6.0	110	6A
21.2	12.0	GC	NP-21.2-12.0	155	7A
21.2	25.0	GD	NP-21.2-25.0	205	8A
23.3	0.200	B	NP-23.3-0.200	40	1
23.3	0.375	C	NP-23.3-0.375	45	1
23.3	0.750	D	NP-23.3-0.750	50	2
23.3	1.5	F	NP-23.3-1.5	70	3
23.3	3.0	GA	NP-23.3-3.0	90	5
23.3	6.0	GB	NP-23.3-6.0	110	6A
23.3	12.0	GC	NP-23.3-12.0	155	7A
23.3	25.0	GD	NP-23.3-25.0	210	8A
25.7	0.200	B	NP-25.7-0.200	40	1
25.7	0.375	C	NP-25.7-0.375	45	1
25.7	0.750	D	NP-25.7-0.750	55	2
25.7	1.5	F	NP-25.7-1.5	75	3
25.7	3.0	GA	NP-25.7-3.0	90	5
25.7	6.0	GB	NP-25.7-6.0	125	6A
25.7	12.0	GC	NP-25.7-12.0	165	7A
25.7	25.0	GD	NP-25.7-25.0	220	8A
28.0	0.200	B	NP-28.0-0.200	40	1
28.0	0.375	C	NP-28.0-0.375	45	1
28.0	0.750	D	NP-28.0-0.750	65	1
28.0	1.5	F	NP-28.0-1.5	75	3
28.0	3.0	GA	NP-28.0-3.0	90	5
28.0	6.0	GB	NP-28.0-6.0	125	6A
28.0	12.0	GC	NP-28.0-12.0	170	7A
28.0	25.0	GD	NP-28.0-25.0	225	8A
31.5	0.200	B	NP-31.5-0.200	40	1
31.5	0.375	C	NP-31.5-0.375	45	1
31.5	0.750	E	NP-31.5-0.750	65	1
31.5	1.5	G	NP-31.5-1.5	80	3
31.5	3.0	GA	NP-31.5-3.0	95	5
31.5	6.0	GB	NP-31.5-6.0	135	6A
31.5	12.0	GC	NP-31.5-12.0	180	8
34.5	0.200	B	NP-34.5-0.200	40	1
34.5	0.375	C	NP-34.5-0.375	45	1
34.5	0.750	E	NP-34.5-0.750	65	2
34.5	1.5	G	NP-34.5-1.5	80	3
34.5	3.0	GA	NP-34.5-3.0	105	5
34.5	6.0	GB	NP-34.5-6.0	140	6A
34.5	12.0	GC	NP-34.5-12.0	190	8
38.0	0.200	B	NP-38.0-0.200	40	1
38.0	0.375	C	NP-38.0-0.375	45	1
38.0	0.750	E	NP-38.0-0.750	60	2
38.0	1.5	G	NP-38.0-1.5	85	3
38.0	3.0	GA	NP-38.0-3.0	110	6
38.0	6.0	GB	NP-38.0-6.0	145	6A
38.0	12.0	GC	NP-38.0-12.0	200	8
42 0	0.200	C	NP-42.0-0.200	45	1
42.0	0.375	C	NP-42.0-0.375	50	1
42.0	0.750	E	NP-42.0-0.750	75	2
42.0	1.5	G	NP-42.0-1.5	90	3
42.0	3.0	GA	NP-42.0-3.0	115	6
42.0	6.0	GB	NP-42.0-6.0	160	7
42.0	12.0	GC	NP-42.0-12.0	210	8

See Catalog #701 for models up to 1000 VDC

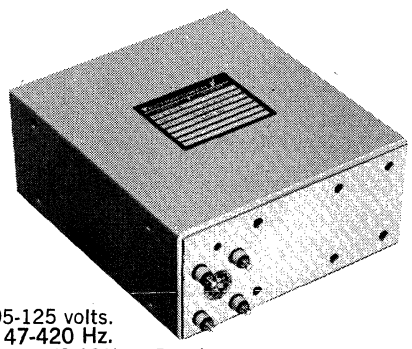
TECHNIPOWER, INC.
A BENRUS SUBSIDIARY

Ridgefield, Conn.
06877

RA-80

HIGH EFFICIENCY, PROGRAMMABLE MODULAR POWER SUPPLIES WITH SWITCHING REGULATOR

Zero Adjust Regulated AC-DC
Base Temperature Rated to 80°C



DESIGN PARAMETERS (Typical)

Temperature coefficient: 0.015%/°C or 1 mv/°C, whichever is greater.
Recovery time: Less than 3 ms, 1/2L to FL.
Efficiency: Up to 80%.
Programmability: From zero (±200 mv) to maximum voltage.
Remote sensing of output voltage: Provided so as to compensate for an IR drop of up to 0.5 volts total in the leads connecting the module to the load.
External output adjustment: Terminals are provided for voltage control from an external potentiometer.

OPTIONAL FEATURES

Details in Technipower Catalog #701

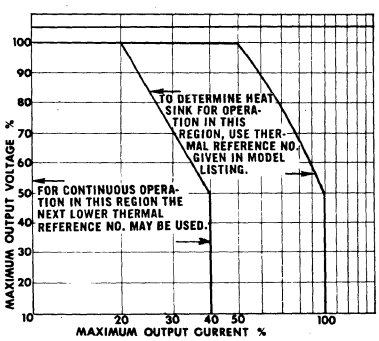
	SUFFIX
Fixed output	F
Fully epoxy encapsulated	K
Off-ground operation	U

Special shapes and finishes

208 or 230 volt input available — consult factory

RA-80 SUPPLY MAY BE ORDERED IN BENCH OR RACK MOUNT — SEE LA-80 SERIES, IN CATALOG 701

POWER CURVE



SPECIFICATIONS

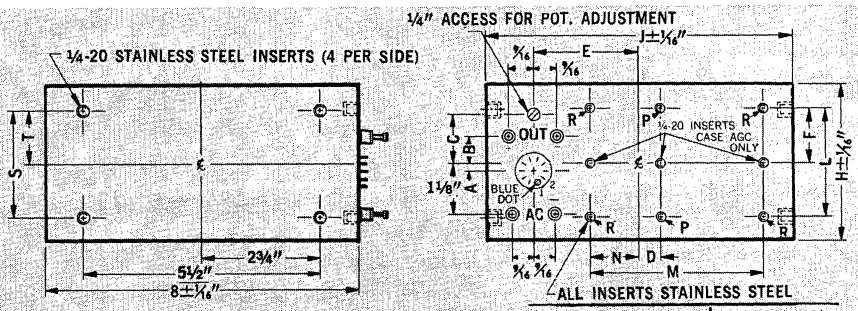
Input voltage range: 105-125 volts.
Input frequency range: 47-420 Hz.
Regulation accuracy-Line: ±(0.10% + 5 mv).
Load: ±(0.15% + 5 mv).
Ripple (rms): 0.2% of maximum output voltage.*
Output adjustment range: From zero (±200 mv) to maximum voltage setting.
Operating temperature: —20°C to +80°C. (max. base temp.).
Storage temperature: —62°C to +85°C.
Polarity: May be used positive or negative.
Output voltage and current: See specific model listings
Series operation: Standard unit provides for series operation either in conventional manner or with complex loads.
Short circuit protection: Terminals are provided for adjusting output current limit from zero to the output current rating, by an external potentiometer. See power curve below.
Overvoltage protection: See model listings.
* 1% of max. output voltage at —20°C.

MODEL & PRICES

Output Voltage Range (VDC)*	Maximum Output Current (amps.)*	Maximum Output Power (watts)	Size (See dwg)	Model	Price	Thermal Curve No.	O.V. Ref.
0-10	12.0	60	AGA	RA-10.0-12.0	300	8	D
	25.0	120	AGB	RA-10.0-25.0	355	9	**
0-20	6.0	60	AGA	RA-20.0-6.0	280	7	D
	12.0	120	AGA	RA-20.0-12.0	315	8	D
	25.0	240	AGB	RA-20.0-25.0	390	8A	**
0-40	3.0	60	AG	RA-40.0-3.0	270	6	C
	6.0	120	AGA	RA-40.0-6.0	305	7	D
	12.0	240	AGA	RA-40.0-12.0	370	8	D
	25.0	500	AGC	RA-40.0-25.0	455	9A	**
0-80	1.5	60	AG	RA-80.0-1.5	275	6	**
	3.0	120	AG	RA-80.0-3.0	310	6A	**
	6.0	240	AGA	RA-80.0-6.0	380	8	**
	12.0	500	AGC	RA-80.0-12.0	465	9	**
	25.0	1000	AGC	RA-80.0-25.0	605	9A	**
0-160	0.750	60	AG	RA-160.0-0.750	290	5	**
	1.5	120	AG	RA-160.0-1.5	320	6A	**
	3.0	240	AGA	RA-160.0-3.0	390	8	**
	6.0	500	AGC	RA-160.0-6.0	500	8A	**
	12.0	1000	AGC	RA-160.0-12.0	625	9A	**

* Maximum output voltage and current are not available simultaneously. See power curve.
** Consult Factory.

MECHANICAL DATA
(Case size is called out in list of models and prices)

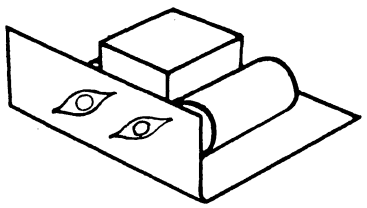


CASE SIZE	A	B	C	D	E	F	H	J	L	M	N	P	R	S	T	TERMINAL HEIGHT ± 1/16 INPUT	TERMINAL HEIGHT ± 1/16 OUTPUT
	MODULE DIMENSIONS																
AG	5/16	3/8	15/16	1 5/16	2 1/2	1 1/8	3 1/2	7 5/16	2 1/4	4 3/16	1 1/4	1/4-20	1/4-20	2 1/2	1 1/4	5/8	5/8
AGA	1 1/16	3/4	1 1/2	1 5/16	2 1/2	1 3/4	5 1/4	7 5/16	3 1/2	4 1/4	1 5/16	1/4-20	3/16-18	4 1/4	2 1/8	5/8	5/8
AGB	5/16	3/8	15/16	1 3/32	6 7/16	1 1/8	3 1/2	15 1/4	2 1/4	8 5/16	2 7/8	1/4-20	1/4-20	2 1/2	1 1/4	5/8	*5/8
AGC	1/16	3/4	1 1/2	1/4	6 3/8	2 1/16	5 1/4	15 1/4	4 1/8	8	3 3/4	5/16-18	5/16-18	4 1/4	2 1/8	5/8	*5/8

* 7/8 on 25 amp units only

TODD's X SERIES

NEW LOW COST HI PERFORMANCE OEM POWER SUPPLIES



- **RUGGED** Designed for Computer-Industrial applications
- **PRECISE** 0.1% low noise series regulator
- **LOW COST** OEM sub chassis construction
- **HI-PERFORMANCE** Fully specified to 71°C
- **RELIABLE** Backed by full 5 year warranty

SPECIFICATIONS

INPUT: 105-132 volts ac 47-420 Hz.

OUTPUT: Floating, isolated from ground, 300 vdc max.

REGULATION: Line or Load 0.1% or 10 mv for rated change.

RIPPLE: 1 mv rms, 10 mv p-p.

TEMPERATURE COEFFICIENT: 0.03%/°C.

RECOVERY TIME: 50 Microseconds to recover within 50 mv for no load to full load change.

OVERLOAD PROTECTION: Automatic electronic current limiting foldback.

SHORT CIRCUIT PROTECTION: Will withstand continuous short circuit without damage.

REMOTE SENSE: Sense terminals provided for compensation of external wiring drop for up to ½ volt.

OPERATING TEMPERATURE: −20°C to +71°C.

STORAGE TEMPERATURE: −55°C to +85°C.

INPUT-OUTPUT CONFIGURATION: Barrier Strip.

CONTROL: Voltage adjust potentiometer (screwdriver).

OPTIONAL: Overvoltage protection available.

XAS SERIES 3⅛ h x 4 x 6¾

MODEL	OUTPUT VOLTAGE	OUTPUT CURRENT 50°C	60°C	71°C	UNIT PRICE
XAS-5-3.5	4.5-5.5	3.5	3.2	1.8	59.
XAS-10-2.4	9-11	2.4	2.2	1.7	59.
XAS-15-2.0	13.5-16.5	2.0	1.8	1.4	59.
XAS-20-1.4	18-22	1.4	1.3	1.0	59.
XAS-24-1.2	21.6-26.4	1.2	1.1	0.9	59.

$59

XBS SERIES 3⅛ h x 4⅞ x 6¾

MODEL	OUTPUT VOLTAGE	OUTPUT CURRENT 50°C	60°C	71°C	UNIT PRICE
XBS-5-5.0	4.5-5.5	5.0	4.5	3.0	69.
XBS-10-3.8	9-11	3.8	3.5	2.8	69.
XBS-15-2.8	13.5-16.5	2.8	2.6	2.1	69.
XBS-20-2.1	18-22	2.1	1.9	1.5	69.
XBS-24-1.8	21.6-26.4	1.8	1.6	1.3	69.

$69

XCS SERIES 3¾ h x 4⅞ x 9¼

MODEL	OUTPUT VOLTAGE	OUTPUT CURRENT 50°C	60°C	71°C	UNIT PRICE
XCS-5-8.0	4.5-5.5	8.0	6.5	4.3	89.
XCS-10-5.9	9-11	5.9	5.4	4.3	89.
XCS-15-4.8	13.5-16.5	4.8	4.4	3.5	89.
XCS-20-3.7	18.22	3.7	3.4	2.6	89.
XCS-24-3.4	21.6-26.4	3.4	3.1	2.5	89.

$89

XDS SERIES 4¾ h x 7½ x 9⅞

MODEL	OUTPUT VOLTAGE	OUTPUT CURRENT 50°C	60°C	71°C	UNIT PRICE
XDS-5-15	4.5-5.5	15	13	10	149.
XDS-10-12	9-11	12	10	8	149.
XDS-15-10	13.5-16.5	9	8.1	7	149.
XDS-20-7.4	18.22	7.4	6.6	5.7	149.
XDS-24-7	21.6-26.4	7	6	5.1	149.

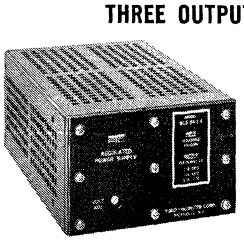
$149

XES SERIES 4¾ h x 7½ x 12⅛

MODEL	OUTPUT VOLTAGE	OUTPUT CURRENT 50°C	60°C	71°C	UNIT PRICE
XES-5-20	4.5-5.5	20	18	15.3	189.
XES-10-16	9-11	16	14.4	12.2	189.
XES-15-14	13.5-16.5	14	12.6	10.7	189.
XES-20-12	18-22	12	10.8	9.2	189.
XES-24-11	21.6-26.4	11	9.9	8.4	189.

$189

THREE OUTPUT SYSTEM SUPPLY



- +5 VDC
- ±15 VDC TRACKING TO 0.1%
- FULLY ENCLOSED IN STANDARD "C" CASE
- X-SERIES SPECIFICATIONS

MODEL 3 X 515 3⅛ h x 4⅞ x 8¾

OUTPUT	ADJUSTMENT RANGE	OUTPUT CURRENT 50°C	60°C	71°C	UNIT PRICE
+5	4.5-5.5	3.0	2.7	1.8	155.
+15	12-16	0.5	0.5	0.3	
−15	12-16	0.5	0.5	0.3	

$155

WRITE FOR CATALOG ON COMPLETE LINE AND ACCESSORIES

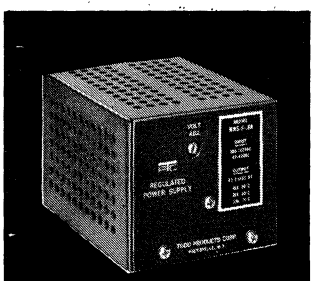
TODD PRODUCTS CORP.

123 MILBAR BLVD., FARMINGDALE, N. Y. 11735 • (516) 293-3440 • TWX: 510-224-6584

TODD SYSTEMS POWER SUPPLIES

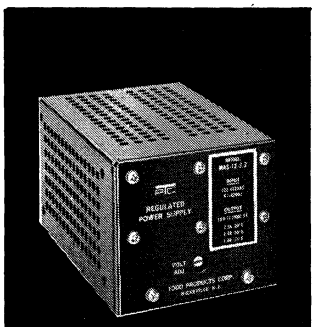
FEATURES:

- High Reliability — .01% I/C Regulator.
- Low Noise — .5 mv ripple — No Switching Regulators.
- Meets full MIL environmental specifications.
- 71°C operating temperature without external heat sinking or forced air required.
- Automatic electronic short circuit and overload protection.



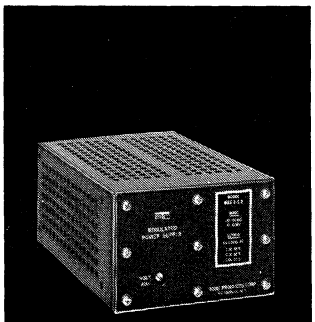
M SERIES

3 7/64 x 3 21/32 x 4 1/2"



A SERIES

3 7/64 x 3 21/32 x 6 1/4"



B SERIES

3 7/64 x 4 27/32 x 6 1/4"

M SERIES

MODEL	RATED OUTPUT V.*	OUTPUT CURRENT 50°C	60°C	71°C	UNIT PRICE
SLOT RANGE					
MMS-3-1.1	2.7-4.3	1.1	1.0	0.8	69.
MMS-3-1.6	2.7-4.3	1.6	1.4	1.2	79.
MMS-4-1.0	3.6-5.4	1.0	0.9	0.7	69.
MMS-4-1.5	3.6-5.4	1.5	1.3	1.1	79.
MMS-5-.88	4.5-6.5	.88	.80	.72	69.
MMS-5-1.3	4.5-6.5	1.3	1.1	1.0	79.
MMS-6-.82	5.4-7.6	.82	.75	.60	69.
MMS-6-1.2	5.4-7.6	1.2	1.0	.90	79.
MMS-7-.75	6.3-8.7	.75	.68	.54	69.
MMS-7-1.1	6.3-8.7	1.1	1.0	.80	79.
MMS-8-.69	7.2-9.8	.69	.63	.50	69.
MMS-8-1.0	7.2-9.8	1.0	.90	.76	79.
MMS-10-.59	9.0-12.0	.59	.54	.43	69.
MMS-10-.88	9.0-12.0	.88	.79	.67	79.
MMS-12-.53	10.8-14.2	.53	.48	.38	69.
MMS-12-.80	10.8-14.2	.80	.72	.61	79.
MMS-14-.46	12.6-16.4	.46	.42	.32	69.
MMS-14-.69	12.6-16.4	.69	.62	.52	79.
MMS-16-.42	14.4-18.6	.42	.38	.30	69.
MMS-16-.63	14.4-18.6	.63	.56	.48	79.
MMS-20-.35	18.0-23.0	.35	.32	.25	69.
MMS-20-.52	18.0-23.0	.52	.46	.40	79.
MMS-24-.32	21.6-27.4	.32	.29	.23	69.
MMS-24-.48	21.6-27.4	.48	.43	.36	79.
MMS-28-.26	25.2-31.8	.26	.24	.19	69.
MMS-28-.42	25.2-31.8	.42	.37	.32	79.
MMS-36-.21	32.4-40.6	.21	.19	.15	69.
MMS-36-.31	32.4-40.6	.31	.28	.24	79.
MMS-48-.16	43.2-53.8	.16	.15	.12	69.
MMS-48-.24	43.2-53.8	.24	.21	.18	79.
MMS-100-.08	90-111	.08	.07	.06	89.
MMS-100-.12	90-111	.12	.10	.09	99.
MMS-120-.06	108-133	.06	.06	.05	89.
MMS-120-.09	108-133	.09	.08	.07	99.
MMS-150-.05	135-166	.05	.05	.04	89.
MMS-150-.07	135-166	.07	.06	.05	99.
WIDE RANGE					
MMW-8-.7	0-8	0.70	0.63	.53	79.
MMW-16-.38	0-16	0.38	0.34	.28	79.
MMW-32-.21	0-32	0.21	0.19	.16	79.
DUAL OUTPUT					
MBT-514-A	4.5-6.5	1.5	1.3	1.1	155.
	11.5-15.5	1.5	1.3	1.1	
MBT-524-A	4.5-6.5	1.5	1.3	1.1	155.
	22-28	1.0	0.9	0.7	
MBT-15-1	11.5-15.5	1.0	0.9	0.7	155.
	11.5-15.5	1.0	0.9	0.7	
MBT-1220-A	10-14	.75	.68	.6	155.
	18-22	.75	.68	.6	

A SERIES

MODEL	RATED OUTPUT V.*	OUTPUT CURRENT 50°C	60°C	71°C	UNIT PRICE
SLOT RANGE					
MAS-3-3.7	2.7-4.3	3.7	3.4	1.8	99.
MAS-4-3.6	3.6-5.4	3.6	3.3	1.8	99.
MAS-5-3.5	4.5-6.5	3.5	3.2	1.8	99.
MAS-6-3.4	5.4-7.6	3.4	3.1	1.8	99.
MAS-7-3.1	6.3-8.7	3.1	2.8	1.8	99.
MAS-8-2.8	7.2-9.8	2.8	2.6	1.8	99.
MAS-10-2.4	9.0-12.0	2.4	2.2	1.7	99.
MAS-12-2.2	10.8-14.2	2.2	2.0	1.6	99.
MAS-14-2.0	12.6-16.4	2.0	1.8	1.4	99.
MAS-16-1.8	14.4-18.6	1.8	1.7	1.3	99.
MAS-20-1.4	18.0-23.0	1.4	1.3	1.0	99.
MAS-24-1.2	21.6-27.4	1.2	1.1	.88	99.
MAS-28-1.1	25.2-31.8	1.1	1.0	.80	99.
MAS-36-.88	32.4-40.6	.88	.80	.64	99.
MAS-48-.70	43.2-53.8	.70	.63	.50	99.
MAS-100-.34	90-111	.34	.21	.25	119.
MAS-120-.28	108-133	.28	.26	.21	119.
MAS-150-.23	135-166	.23	.21	.12	119.
WIDE RANGE					
MAW-8-2	0-8	2.0	1.8	1.5	99.
MAW-16-1.0	0-16	1.0	0.9	0.7	99.
MAW-32-.6	0-32	0.6	0.5	0.4	99.

B SERIES

MODEL	RATED OUTPUT V.*	OUTPUT CURRENT 50°C	60°C	71°C	UNIT PRICE
SLOT RANGE					
MBS-3-5.0	2.7-4.3	5.0	4.5	2.9	115.
MBS-4-5.0	3.6-5.4	5.0	4.5	2.9	115.
MBS-5-5.0	4.5-6.5	5.0	4.5	2.9	115.
MBS-6-5.0	5.4-7.6	5.0	4.5	2.9	115.
MBS-7-4.6	6.3-8.7	4.6	4.2	2.9	115.
MBS-8-4.2	7.2-9.8	4.2	3.8	2.9	115.
MBS-10-3.8	9.0-12.0	3.8	3.5	2.8	115.
MBS-12-3.2	10.8-14.2	3.2	2.9	2.3	115.
MBS-14-2.8	12.6-16.4	2.8	2.6	2.1	115.
MBS-16-2.6	14.4-18.6	2.6	2.4	1.9	115.
MBS-20-2.1	18.0-23.0	2.1	1.9	1.5	115.
MBS-24-1.8	21.6-27.4	1.8	1.6	1.3	115.
MBS-28-1.5	25.2-31.8	1.5	1.4	1.1	115.
MBS-36-1.2	32.4-40.6	1.2	1.1	.88	135.
MBS-48-1.0	43.2-53.8	1.0	.91	.73	135.
MBS-100-.50	90-111	.50	.46	.37	135.
MBS-120-.42	108-133	.42	.38	.30	135.
MBS-150-.34	135-166	.34	.31	.25	135.
WIDE RANGE					
MBW-8-2.9	0-8	2.9	2.6	2.2	115.
MBW-16-1.6	0-16	1.6	1.4	1.1	115.
MBW-32-.8	0-32	0.8	0.7	0.5	115.

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TODD SYSTEMS POWER SUPPLIES

THE MOST VERSATILE UNITS IN THE INDUSTRY

C SERIES

MODEL	RATED OUTPUT V.*	OUTPUT CURRENT 50°C	60°C	71°C	UNIT PRICE
SLOT RANGE					
MCS-3-7.5	2.7-4.3	7.5	6.5	4.3	135.
MCS-4-7.5	3.6-5.4	7.5	6.5	4.3	135.
MCS-5-7.5	4.5-6.5	7.5	6.5	4.3	135.
MCS-5-10	4.7-5.3	10.0	9.0	5.5	155.
MCS-6-7.5	5.4-7.6	7.5	6.5	4.3	135.
MCS-7-7.0	6.3-8.7	7.0	6.4	4.3	135.
MCS-8-6.6	7.2-9.8	6.6	6.0	4.3	135.
MCS-10-5.9	9.0-12.0	5.9	5.4	4.3	135.
MCS-12-5.3	10.8-14.2	5.3	4.8	3.8	135.
MCS-14-4.8	12.6-16.4	4.8	4.4	3.5	135.
MCS-16-4.5	14.4-18.6	4.5	4.1	3.3	135.
MCS-20-3.7	18.0-23.0	3.7	3.4	2.6	135.
MCS-24-3.4	21.6-27.4	3.4	3.1	2.5	135.
MCS-28-3.0	25.2-31.8	3.0	2.7	2.2	135.
MCS-36-2.4	32.4-40.6	2.4	2.2	1.7	155.
MCS-48-2.0	43.2-53.8	2.0	1.8	1.3	155.
MCS-100-1.0	90-111	1.0	.94	.75	155.
MCS-120-.87	108-133	.87	.79	.63	155.
MCS-150-.70	135-166	.70	.64	.51	155.
WIDE RANGE					
MCW-8-4.3	0-8	4.3	3.9	3.2	135.
MCW-16-2.3	0.16	2.3	2.0	1.6	135.
MCW-32-1.3	0.32	1.3	1.1	0.9	135.

D SERIES

MODEL	RATED OUTPUT V.*	OUTPUT CURRENT 50°C	60°C	71°C	UNIT PRICE
SLOT RANGE					
MDS-3-15	2.7-4.3	15	13	10	205.
MDS-4-15	3.6-5.4	15	13	10	205.
MDS-5-15	4.5-6.5	15	13	10	205.
MDS-6-15	5.4-7.6	15	13	10	205.
MDS-7-14	6.3-8.7	14	12	9	205.
MDS-8-13	7.2-9.8	13	11	9	205.
MDS-10-12	9.0-12.0	12	10	8	205.
MDS-12-11	10.8-14.2	11	10	8	205.
MDS-14-10	12.6-16.4	10	9	8	205.
MDS-16-9	14.4-18.6	9	8.1	7	205.
MDS-20-7.4	18.0-23.0	7.4	6.6	5.7	205.
MDS-24-6.8	21.6-27.4	6.8	6.2	5.1	205.
MDS-28-6.0	25.2-31.8	6	5.4	4.6	205.
MDS-36-5.4	32.4-40.6	5.4	4.8	4.1	235.
MDS-48-4.1	43.2-53.8	4.1	3.7	3.1	235.
MDS-100-2.0	90-111	2	1.8	1.5	235.
MDS-120-1.7	108-133	1.7	1.5	1.3	235.
MDS-150-1.4	135-166	1.4	1.2	1	235.
WIDE RANGE					
MDW-8-8.7	0-8	8.7	7.8	6.5	205.
MDW-16-4.7	0-16	4.7	4.2	3.5	205.
MDW-32-2.6	0-32	2.6	2.3	1.9	205.

E SERIES

MODEL	RATED OUTPUT V.*	OUTPUT CURRENT 50°C	60°C	71°C	UNIT PRICE
SLOT RANGE					
MES-3-22	2.7-4.3	22.0	19.7	16.8	265.
MES-4-21	3.6-5.4	21.0	18.9	16.1	265.
MES-5-20	4.5-6.5	20.0	18.0	15.3	265.
MES-5-25	4.7-5.3	25.0	22.5	16.5	295.
MES-6-19	5.4-7.6	19.0	17.0	15.0	265.
MES-7-18.5	6.3-8.7	18.5	16.6	14.1	265.
MES-8-18	7.2-9.8	18.0	16.2	13.7	265.
MES-10-16	9.0-12.0	16.0	14.4	12.2	265.
MES-12-15	10.8-14.2	15.0	13.5	11.5	265.
MES-14-14	12.6-16.4	14.0	12.6	10.7	265.
MES-16-13	14.4-18.6	13.0	11.7	9.9	265.
MES-20-12	18.0-23.0	12.0	10.8	9.2	265.
MES-24-11	21.6-27.4	11.0	9.9	8.4	265.
MES-28-10	25.2-31.8	10.0	9.0	7.6	265.
MES-36-8	32.4-40.6	8.0	7.2	6.1	295.
MES-48-6	43.2-53.8	6.0	5.4	4.6	295.
MES-100-3	90-111	3.0	2.7	2.0	295.
MES-120-2.5	108-133	2.5	2.2	1.9	295.
MES-150-2.0	135-166	2.0	1.8	1.5	295.
WIDE RANGE					
MEW-8-11	0.8	11	9.9	8.3	265.
MEW-16-6	0.16	6	5.4	4.5	265.
MEW-32-3.3	0-32	3.3	3.0	2.5	265.

SPECIFICATIONS

INPUT: 105-132 Volts AC 47-420 Hz.

OUTPUT: Floating, isolated from ground, 300 VDC max.

REGULATION: LINE: .01% or 1 mv whichever is greater, for rated input line voltage-changes.
LOAD: .01% or 1 mv whichever is greater, for no-load to full-load change at any output within specification.

RIPPLE: Less than .5 mv or .001% rms, 5 mv or .01% Peak to Peak.

STABILITY: .02% or 10 mv, whichever is greater, for 8 hrs., after 30 min. warmup. Measured at constant input line, load and Amb. Temp.

TEMPERATURE COEFFICIENT: (.02% + 100 uv)/Deg. C.

TEMPERATURE RANGE: OPERATING: — 20 to + 71 Deg. C. (see power rating chart)
NON-OPERATING: — 55 to + 85 Deg. Centigrade.

RECOVERY TIME: 50 Microseconds to within 50 mv of regulation spec for no-load to full-load change.

REMOTE PROGRAMMING: RESISTANCE: 1000 ohms/volt.
VOLTAGE: 1 volt/volt.

REMOTE SENSING: The amplifier is capable of compensating for a 1 volt load lead loss and still maintain regulation at the load. An additional 1 volt is available at the output if local sensing is used.

OVERLOAD PROTECTION: Fixed, automatic, electronic current limiting, limits output current for overload and short circuit conditions. Automatic recover upon removal of fault condition.

OVERVOLTAGE PROTECTION (OPTIONAL): Adjustable overvoltage protection, mounts externally.

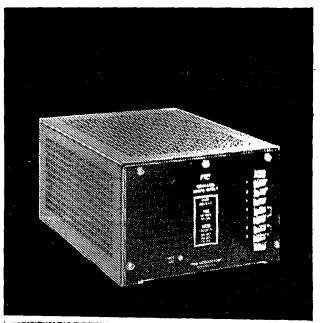
MODE OF OPERATION: Constant Voltage with automatic current limit.

CONTROLS: Recessed screwdriver adjust over output range.

CONNECTIONS: Barrier Strip.

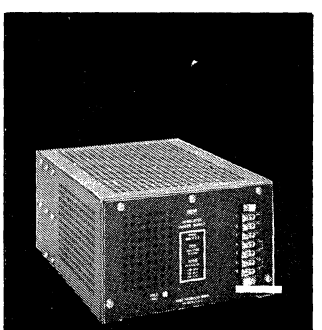
C SERIES

3 7/64 x 4 27/32 x 8 3/4"



D SERIES

4 25/32 x 7 1/2 x 9 3/8"



E SERIES

4 25/32 x 7 1/2 x 11 1/16"

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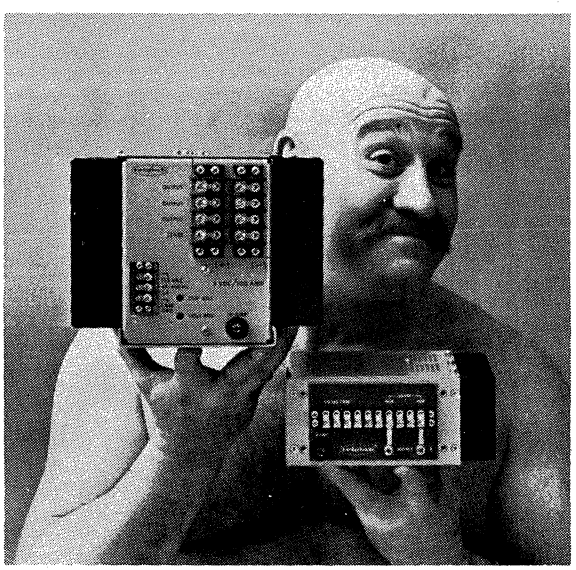
From 100W to 500W; from 3VDC to 30VDC; single, dual, triple outputs; commercial, military, and export models.

Now in use by such leaders as Burroughs, Control Data, Honeywell, IBM, Litton, NCR, RCA, Univac, and many Government installations. We also custom develop/produce to specific needs.

triolab

POWER SUPPLIES

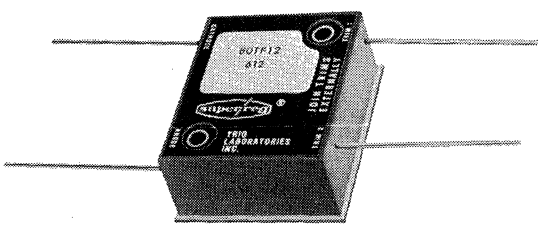


Model SP631
5VDC/100A
Typical efficiency 70%
8.50" x 6.81" x 8.75"
21.5 lbs.
$695.

Model SP601
5VDC/20A
Typical efficiency 65%
3.25" x 6.50" x 7.50"
6 lbs.
$400.

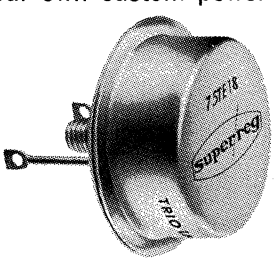
superreg®

precision power regulators build a power supply in minutes using any DC source



Super/reg miniature regulators, uniquely designed for maximum heat transfer and power handling capability, contain all the electronic circuits necessary for the most sophisticated system needs. Simply connect rough DC from any source—a semi-filtered, half-wave rectified transformer output or even a battery—and you have instant, precision DC power where you need it: at the load itself.

Available in shunt and series versions, these ultra-compact configurations provide maximum layout flexibility over a wide range of voltage levels. The point-of-load installation eliminates distribution-line losses and cross-talk. And the off-the-shelf stock levels enable you to build your own custom power supply—literally in minutes!



- Low Output Impedance: .01% Regulation
- 125°C Operation
- Adjustable Output: ±10%
- Short Circuit Protection
- 104 Models Available
- Temperature Compensated: .01%/°C

NEW IDEAS IN POWER SOURCES

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Single Output — Multi Output
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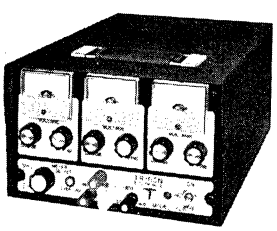
1 Watt to 3000 Watts

All Silicon Design
Stock Delivery
Over 250 Models
UL Quality
Economical Pricing

Laboratory

Single Output – CV/CC
Multiple Output
Over 26 Models

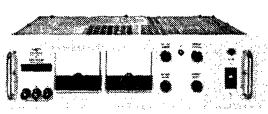


Regulation: 0.01%
Ripple: 0.5 mV

Typical Unit: TL8-3
(Triple Output)
+0 to 8 VDC/3 ADC
+0 to 32 VDC/1 ADC
−0 to 32 VDC/1 ADC
$225

Wide Range High Power

Voltages to 320 VDC
Currents to 150 ADC
Precision CV/CC
Over 33 Models

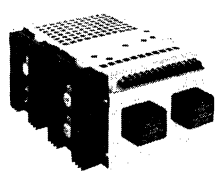


Regulation: 0.005%
Ripple: 1 mV

Typical Unit: M5C40-30 OV
0 to 40 VDC (OV)/30 ADC
$665

System Modules

6 Package Sizes
Single Output
Multiple Output
Voltages to 300 VDC
Currents to 25 ADC
Over 150 Models
Priced from $67 to $320

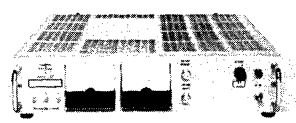


Regulation: 0.05% — 1%
Ripple: 1 mV — 50 mV

Typical Unit: TP3E
(Triple Output)
+3.2 to 5.5 VDC (OV)/6 ADC
+10 to 26 VDC/1.8 ADC
— 5 to 16 VDC/1.5 ADC

Systems High Power

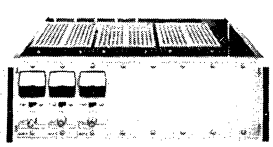
Broad Slot Voltage
Voltages to 160 VDC
Currents to 100 ADC
Over 49 Models



Regulation: 0.01%
Ripple: 0.5 mV

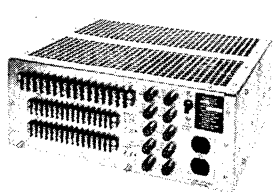
Typical Unit: L5D5-100 OV
2.5 to 5.5 VDC (OV)/100 ADC
Priced from $524 to $602

Special Assemblies — OEM Designs



Modular Assemblies, up to 16 outputs. Fully wired and tested.

Custom Design with System Sequencing and Control.



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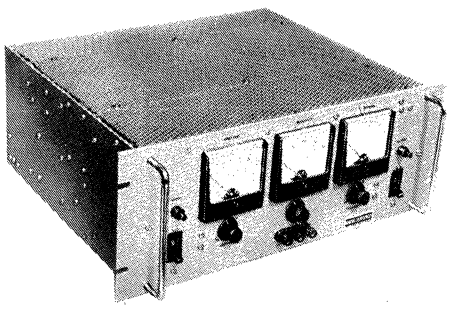

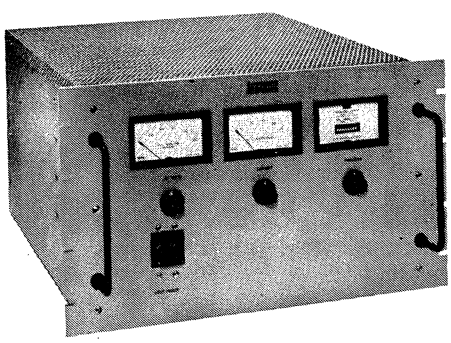

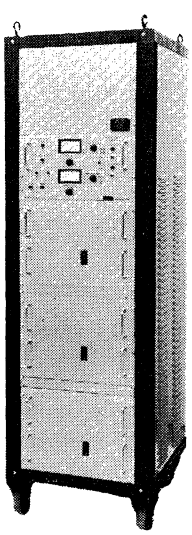

50/60 Hz TO 400 Hz

- For Operation of Military Equipment
- Ground Support Systems
- Testing to MIL-STD-704A (28 VDC Output Optional)

400 Hz TO 60 Hz

- Provide Power for Commercial Equipment in Military Installations

50 Hz TO 60 Hz
60 Hz TO 50 Hz

- Interface with Foreign Commercial Power
- Development and Production Testing

DC TO 60 Hz
DC TO 400 Hz

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- Airborne Installations
- Shipboard Power Conversion
- Standby Power — Uninterruptible Power System

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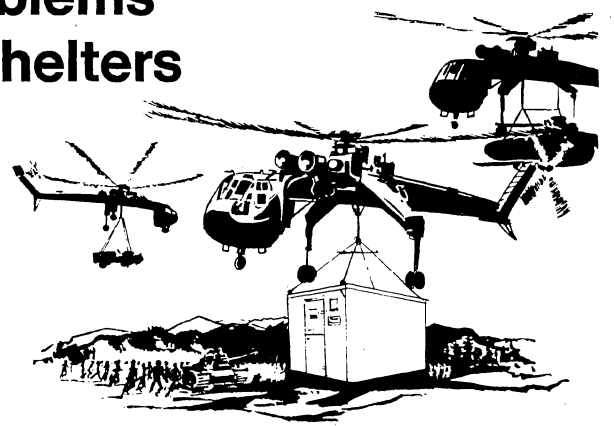
- Modification of Standard Circuitry to Meet Customer Requirements

VARADYNE Systems offers complete power conversion capability; power converters, power inverters and uninterruptible emergency AC power sources up to 150 KVA. The company's technical staff will be pleased to review your power conversion requirements and assist you in specifying the optimum equipment for your application.

Unitron's solid state power converters solve air-conditioning problems in transportable military shelters



With Unitron's Air-Conditioning Drives you can eliminate these problems associated with conventional modulated-control systems:

POWER SOURCE DEPENDANCE

Use multiple-frequency power (50/60/400 Hz) without compromising cooling capacity, size, weight, or system complexity.

DISCHARGE TEMPERATURE VARIATIONS

Eliminate abrupt temperature changes that cause improper operation of temperature-sensitive equipment near discharge vents.

INPUT TRANSIENTS

Eliminate starting surges that can disturb line-sensitive equipment and require over-sized prime power sources.

COMPRESSOR LIFE

Extend compressor life by decreasing wear and stress on moving parts.

HUMIDITY

Eliminate humidity problems that create hazardous working conditions and potential degradation of equipment.

NOISE

Reduce the high noise level created by modulated operation of the compressor.

POWER FACTOR

Provide automatic power factor correction in excess of 90%.

STANDARDIZATION/EFFICIENCY

Unit sizes may be standardized and operated at less than capacity without excessive power consumption.

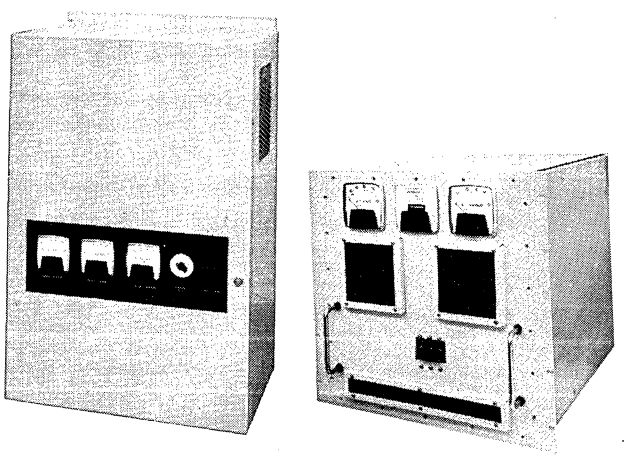
POWER FAILURE

Easily adapted with stand-by facilities to use batteries for emergency power in event of prime power loss.

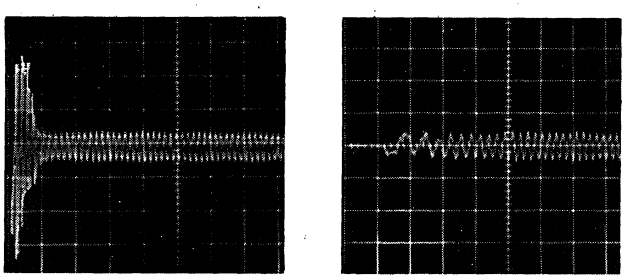
Unitron's solid-state drives, by controlling the operating speed of the compressor, provide *true proportional control* for air-conditioning systems for transportable military shelters. Improved operation is achieved with less system complexity than with on/off modulating techniques such as hot-gas bypass systems.

Single-event soft starting eliminates input transients (see photos at right). Continual compressor operation, at reduced speed, eliminates transient compressor loads. Compressor life is extended and temperature variation and humidity problems minimized.

Units can be packaged to meet all types of shelter and air-conditioning requirements. Unitron will be glad to discuss your particular application with you.



Unitron's Air Conditioning Drives can be supplied in a variety of configurations, for wall, floor, or rack mounting, and for 50-60, 400, or 50/60/400 Hz primary power, for units 9200 BTU/hr. and up. Units may be provided with or without metering and are designed to meet applicable MIL-specs.



CONVENTIONAL START **SOFT START**

ELIMINATE STARTING SURGES. These typical traces illustrate starting surge when compressor is turned on without Unitron's air-conditioning drive (left) and the "soft start" when compressor motor is controlled by Unitron's drive (right).

UNITRON

DIVISION OF ELECTRIC MACHINERY MFG. COMPANY

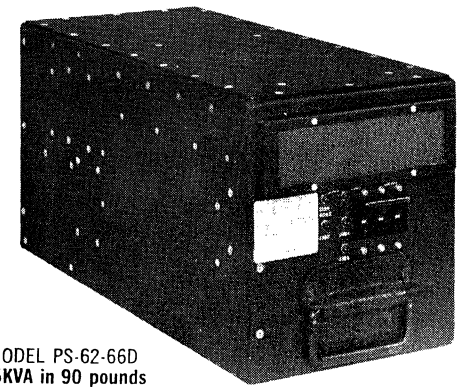
SPECIALISTS IN SOLID STATE POWER CONVERSION

1624 NORTH FIRST STREET • P.O. BOX 1331 • GARLAND, TEXAS 75040 • (214) 276-8591 • TELEX: 73-0644

FREQUENCY CONVERTERS

400 Hz to 60 Hz SINE WAVE OUTPUT

Meets Applicable MIL Specifications for Airborne and Ground Support Equipment



MODEL PS-62-66D
3.5KVA in 90 pounds

FEATURES

■ High efficiency ■ RFI protection ■ Short circuit and overload protection ■ Long, maintenance-free operation ■ Self-contained cooling ■ Light weight ■ Low distortion

APPLICATIONS

These converters provide a dependable source of 60 Hz sine wave power for airborne and air-transportable test equipment. They are also used with 60 Hz ground equipment wherever primary power available is 400 Hz. Applications include use with oscilloscopes, metering equipment, recorders, cryptographic machines, and teletypes.

MODEL	POWER	INPUT		OUTPUT		SIZE (Dim. in Inches)
PS-65-225-7	400 VA	115/200 VAC	400 Hz	115 VAC ± 5 %	60 Hz ± 1.0%	7.8 x 5.2 x 21.3
PS-64-162	750 VA	115/200 VAC	400 Hz	115 VAC ± 5 %	60 Hz ± 1.0%	7.5 x 12 x 20.5
PS-61-41B	1500 VA	115/200 VAC	400 Hz	115 VAC ± 10 %	60 Hz ± 1.0%	19 x 10.5 x 14.25
PS-62-66D	3500 VA	115/200 VAC	400 Hz	115 VAC ± 2.5%	60 Hz ± 1.0%	10 x 9 x 21.6
PS-61-33D	8000 VA	115/200 VAC	400 Hz	115 VAC ± 2.5%	60 Hz ± 1.0%	12.2 x 20 x 23.5

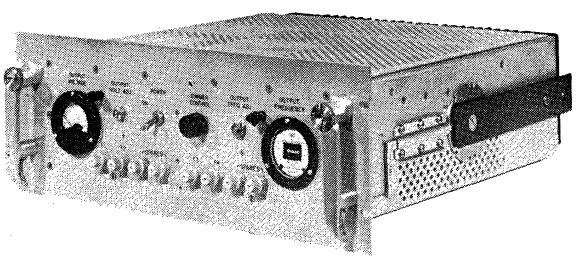
All units available with other input voltages, and frequencies of 360-1000 Hz.

All units available with output frequency to 0.01%.

FREQUENCY CONVERTERS

60 Hz to 400 Hz SINE WAVE OUTPUT

Meets Applicable MIL Specifications for Shipboard and Ground Support Equipment



MODEL PS-65-243-1

FEATURES

■ High efficiency ■ Small size ■ Light weight ■ Low distortion ■ Virtually no audible noise ■ Long, maintenance-free operation ■ Short circuit and overload protection ■ RFI protection

APPLICATIONS

Extremely stable and quiet-operating, these converters are excellent for flight simulators, and wherever 400 Hz power is required to operate airborne-type equipment. Other applications include ground support systems, design and test labs, and shipboard installations.

MODEL	POWER	INPUT		OUTPUT		SIZE (Dim. in Inches)
PS-65-243-1	1000 VA	115 VAC	60 Hz 1φ	*115 VAC ± 2%	§400 Hz ± 1.0%	19 x 7 x 20.5
PS-67-325-1	2000 VA	115/200 VAC	60 Hz 3φ	115 VAC ± 2%	400 Hz ± 1.0%	11.75 x 18 x 22.75
PS-67-326-1	2500 VA	115/200 VAC	60 Hz 3φ	115/200 VAC ± 2%	400 Hz ± 1.0%	14 x 18 x 25.25
PS-68-346R	3500 VA	115/200 VAC	60 Hz 3φ	115 VAC ± 2%	400 Hz ± 1.0%	19 x 17.5 x 21.5
PS-65-216-2	8000 VA	115/200 VAC	60 Hz 3φ	115/200 VAC ± 2%	400 Hz ± 0.5%	19 x 19 x 21.75
PS-67-337	15000 VA	120/208 VAC	60 Hz 3φ	120/208 VAC ± 2%	400 Hz ± 1.0%	19 x 42 x 21.75

*Adjustable, 105 to 125 VAC §Adjustable, 380 to 420 Hz

Model PS-67-325-R available in rack-mount, fully-metered configuration.

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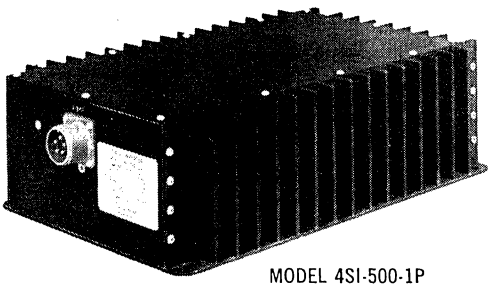
STATIC INVERTERS

28 VDC to 400 Hz SINE WAVE OUTPUT

Meets Applicable MIL Specifications for Airborne and Ground Support Equipment



MODEL 4SI-500-1P

FEATURES

■ Overload and short-circuit protected ■ High efficiency ■ Light weight ■ Voltage-regulated ■ Low distortion ■ Stable output frequency ■ Long, maintenance-free operation ■ Virtually no audible noise ■ RFI protection

APPLICATIONS

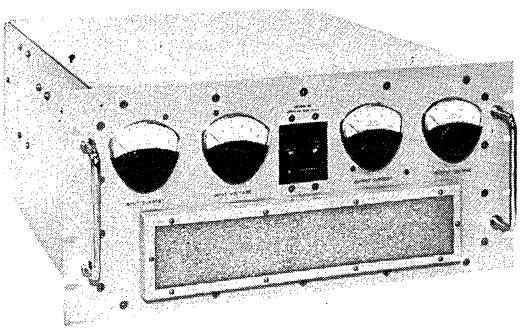
These inverters are ideal for providing AC power from DC sources to one or more items of airborne equipment, and also are excellent sources of power for 400 Hz ground support equipment. Typical applications include use with weather radar, Doppler navigation systems, artificial horizons, omni's, autopilots, ADF, DME, transceivers, transponders, and engine analyzers.

MODEL	POWER	INPUT	OUTPUT		SIZE (Dim. in Inches)
PS-67-321	75 VA	24 to 32 VDC	26 VAC ± 5%	400 Hz ± 5%	11.5 x 7 x 5
4SI-125-1P	125 VA	24 to 32 VDC	115 VAC ± 2%	400 Hz ± 1%	9.7 x 6 x 3.4
4SI-250-1P	250 VA	24 to 32 VDC	115 VAC ± 2%	400 Hz ± 1%	11.2 x 6.5 x 4.2
4SI-500-1P	500 VA	24 to 32 VDC	115 VAC ± 2%	400 Hz ± 1%	14.2 x 8.7 x 4.2
4SI-750-3P	750 VA	24 to 32 VDC	115/200 VAC ± 2%	400 Hz 3ϕ ± 1%	17.4 x 10.2 x 7.7
4SI-3000-3P	3000 VA	22.5 to 30 VDC	115/200 VAC ± 3%	400 Hz 3ϕ ± 5%	21.5 x 20 x 26

STATIC INVERTERS

28 VDC to 60 Hz SINE WAVE OUTPUT

Meets Applicable MIL Specifications for Airborne and Ground Support



MODEL PS-67-324-1

FEATURES

■ High efficiency ■ Light weight ■ Small size ■ Low distortion ■ Virtually no audible noise ■ Long, maintenance-free operation ■ Short circuit and overload protection ■ RFI protection

APPLICATIONS

For aircraft instrumentation systems with 28 VDC electrical systems, and for flying laboratories, these instruments provide an excellent source of 60 Hz power. Applications for these inverters include power for oscilloscopes, meters, cryptographic machines, teletypes, and recorders.

MODEL	POWER	INPUT	OUTPUT		SIZE (Dim. in Inches)
PS-65-178-B	250 VA	24 to 32 VDC	115 VAC ± 2%	60 Hz ± 1.0%	7.9 x 10.4 x 14
PS-65-236	500 VA	24 to 32 VDC	115 VAC ± 2%	60 Hz ± 1.0%	7.9 x 10.4 x 17.3
PS-63-81A	1000 VA	24 to 32 VDC	115 VAC ± 2%	60 Hz ± 0.1%	19 x 8.75 x 20.2
PS-67-324-1	2000 VA	24 to 32 VDC	115 VAC ± 5%	60 Hz ± 1.0%	19 x 8.75 x 20
PS-64-154	3600 VA	24 to 32 VDC	115 VAC ± 5%	60 Hz ± 1.0%	13 x 22.8 x 24.4

All units available with output frequency of 0.01%.

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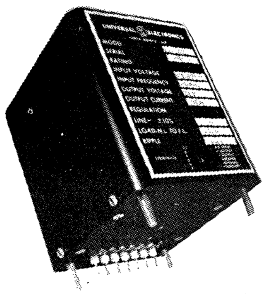
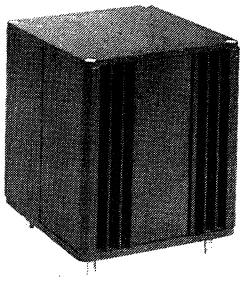


SIZES 1 & 2



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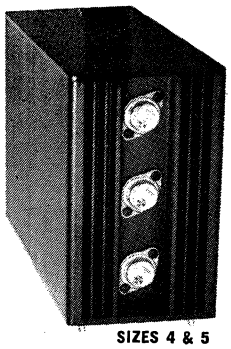


SIZES 4 & 5

MODULAR DC REGULATED SUPPLIES

FEATURES

- **Extremely Well Regulated**
- **Fully Protected Against Short Circuit — Automatic Recovery**
- **Repairable Construction**
- **All Silicon Semi-conductors**
- **Remote Sensing Terminals**
- **Integrated Amplifier Design**
- **5 Year Warantee**

GENERAL

Universal power supplies are designed for applications requiring highly stable fixed voltage sources. Since first introduced the design of these modules has been constantly improved and offers a demonstrated field reliability. The all-silicon circuit features an integrated amplifier containing an internal dc reference voltage, assuring temperature stability over the range of −20° to −71°C. Modern printed circuit board and accessible construction provide for simple field maintenance. Industrial quality components, including computer grade capacitors are used for excellent reliability. Sizes 3, 4 and 5 utilize beautiful black annodized aluminum extrusions with slide-in panels to hide and protect power transistors.

M SERIES SPECIFICATIONS

AC INPUT	105 — 125V ac • 57 — 420 Hz
DC Output	Standard DC voltages are available from 5 to 28 volts.
Regulation Line Load	0.02% or 3 mV, whichever is greater, for line changes of 10%. .02% or 3mV, whichever is greater, from NL to FL.
Temperature Coefficient	0.015% or 1mV per degree C.
Remote Sensing	Sensing terminals are provided to compensate for voltage losses in the load leads.
Overload Protection	Fully protected against external short circuits by means of current limiting. Recovery is automatic.

Construction	Fully repairable with most of the components mounted on a simple printed circuit board.
Ripple	Less than 500uV or 0.001% rms, whichever is greater.
Temperature Operating Storage	−20°C to +71°C. (Mounting base plate must be held to +80°C). −55°C to +85°C.
Transient Response	Less than 50us to recover within 0.01% of the output voltage in response to a full load change in the output current.
Stability	0.1% or 10mV maximum over an 8 hour period after a 30 minute warmup.

Nominal Output Voltage (DC)	±Adjustment Range (Volts)	Output Current 0-Max. (Amps.)	Case* Size (See Below)	Model Number	Price $
5	0.5	0.5	1	M5-.5	37
		1.0	2	M5-1	43
		3.0	3	M5-3	63
		5.0	4	M5-5	89
		10.0	5	M5-10	130
6	0.5	0.5	1	M6-.5	37
		1.0	2	M6-1	44
		3.0	3	M6-3	69
		5.0	4	M6-5	95
		10.0	5	M6-10	135
12	0.5	0.5	1	M12-.5	38
		1.0	2	M12-1	45
		3.0	4	M12-3	115
		5.0	5	M12-5	140

Nominal Output Voltage (DC)	±Adjustment Range (Volts)	Output Current 0-Max. (Amps.)	Case* Size (See Below)	Model Number	Price $
15	0.5	0.5	1	M15-.5	39
		1.0	2	M15-1	46
		3.0	4	M15-3	120
		5.0	5	M15-5	145
±15	0.5	0.5 Ea.	3	MD15-.5	76
		1.0 Ea.	4	MD15-1	88
24	1	0.5	2	M24-.5	41
		1.0	3	M24-1	77
		3.0	5	M24-3	149
		5.0	5	M24-5	155
±24	1	0.5 Ea.	3	MD24-.5	83
		1.0 Ea.	4	MD24-1	128
28	1	0.5	2	M28-.5	48
		1.0	3	M28-1	87
		3.0	5	M28-3	155
		5.0	5	M28-5	165

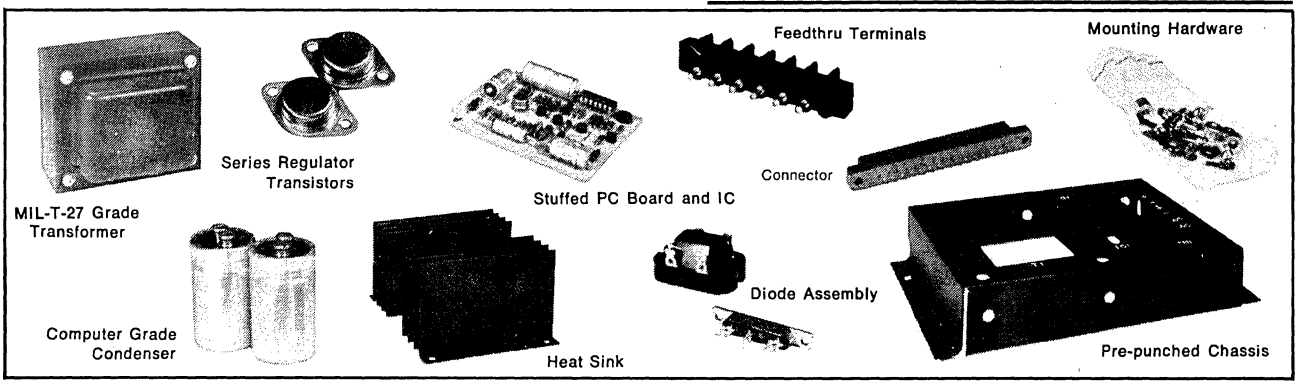
CASE DIMENSIONS

	L	W	H
*SIZE 1	3 1/32	x 3 1/32	x 3 13/16
SIZE 2	3 1/32	x 3 1/32	x 4 13/16
SIZE 3	4	x 4	x 4 1/2
SIZE 4	6	x 4	x 5 1/2
SIZE 5	8	x 4	x 6 13/16

OPTION OF OVERVOLTAGE PROTECTION

Add $25.00 for Singles

Add $35.00 for Duals



PROFESSIONAL DC POWER SUPPLY KITS

IDEALLY SUITED FOR:

☐ INDUSTRIAL CONTROLS ☐ RESEARCH/DESIGN FACILITIES ☐ LABORATORIES
☐ UNIVERSITY APPLICATIONS ☐ OEM DESIGNS ☐ HOBBIESTS

FEATURES:

- Select from several pre-designed circuits, regulated and unregulated, single and dual outputs.
- Many power levels available (.5 to 10A).

ADVANTAGES:

- Large $ savings — cost less than modules.
- Eliminates design time.
- Assembles in minimum time.
- Nothing else to buy.

KITS INCLUDE:

- Punched chassis, annodized and screened.
- All components and solid state devices.
- Mounting hardware.
- Heat sinks.
- Proven schematic.
- Instructions.

TRANSISTORIZED DC POWER SUPPLY CIRCUITS (KR Models Regulated .02%)

FEATURES:

- Highly regulated.
- Fast (50μSEC) transient response.
- Short-circuit proof (current limited-fold back-self recovery).

REGULATION:

LINE — .02% or 3 mV.
LOAD — .02% or 3 mV no load — full load.
RIPPLE — 550μV RMS.
AC INPUT — 105/125 VAC, 57-63 Hz.
DC VOLTAGE ADJUSTMENT: ±.5V.

POWER SUPPLY CIRCUITS (Unregulated KC Models)

FEATURES:

- Long life, single or dual.
- Simplicity.
- Mechanically rugged.

REGULATION:

LINE — Unregulated.
LOAD — 10% from half to full load.
RIPPLE — 1 VRMS or less.
VOLTAGE TOLERANCE: ±5% at 115 VAC.
AC INPUT — 105/125 VAC, 57-420 Hz.

KIT NUMBER, SIZE AND PRICE

DC OUTPUT VOLTAGE	REGULATED KR KIT NUMBER, SIZE AND PRICES — DC OUTPUT CURRENT				
	.5A	1A	3A	5A	10A
5 VDC	KR5-.5 A6 $31.25	KR5-1 A7 $34.00	KR5-3 A10 $56.00	KR5-5 A12 $63.00	KR5-10 B13 $88.00
6 VDC	KR6-.5 A7 $31.25	KR6-1 A7 $34.00	KR6-3 A10 $56.50	KR6-5 A13 $64.00	KR6-10 B13 $90.00
12 VDC	KR12-.5 A7 $34.50	KR12-1 A7 $37.00	KR12-3 B11 $68.00	KR12-5 B13 $76.00	KR12-10 B15 $110.00
15 VDC	KR15-.5 A7 $35.00	KR15-1 A7 $37.00	KR15-3 B12 $69.50	KR15-5 B14 $78.00	KR15-10 B16 $125.00
±15 VDC	KRD-15-.5 B7 $56.00	KRD15-1 B8 $63.00	KRD15-3 C15 $115.00	KRD15-5 C17 $139.00	KRD15-10 D17 $221.00
24 VDC	KR24-.5 A8 $47.50	KR 24-1 B8 $50.00	KR24-3 B12 $83.00	KR24-5 B14 $93.00	KR24-10 C15 $143.00
±24 VDC	KRD24-.5 B9 $59.00	KRD24-1 B10 $79.00	KRD24-3 D15 $147.00	KRD24-5 D18 $170.00	KRD24-10 E19 $270.00
28 VDC	KR28-.5 A8 $49.00	KR28-1 B8 $52.00	KR28-3 B13 $96.00	KR28-5 B15 $118.00	KR28-10 D17 $178.00
±28 VDC	KRD28-.5 B9 $63.00	KRD28-1 B11 $83.00	KRD28-3 D16 $163.00	KRD28-5 D19 $203.00	KRD28-10 E19 $295.00

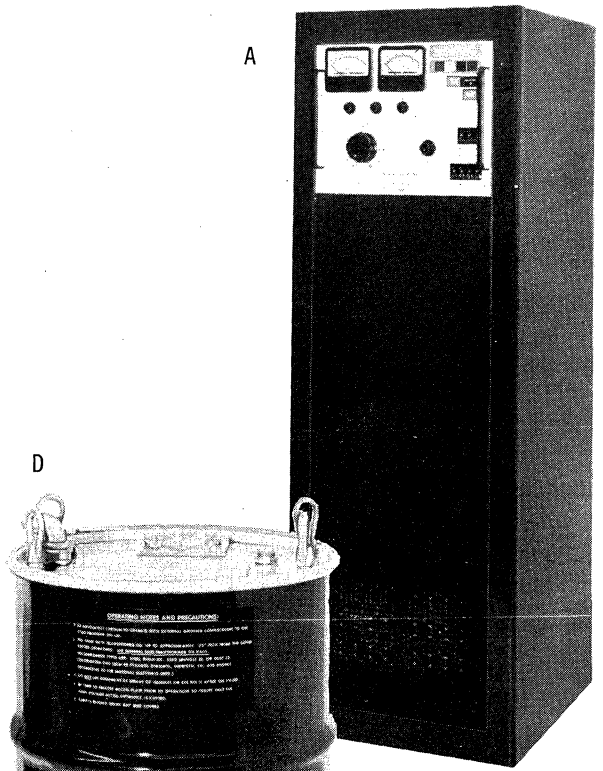
DC OUTPUT VOLTAGE	KC KIT NUMBER, SIZE AND PRICES — DC OUTPUT CURRENT				
	.5A	1.0A	3A	5.0A	10.0A
5 VDC	KC5-.5 A6 $22.75	KC5-1 A7 $24.00	KC5-3 A7 $34.00	KC5-5 A8 $39.00	KC5-10 B9 $46.50
6 VDC	KC6-.5 A7 $22.75	KC6-1 A7 $24.00	KC6-3 A8 $34.50	KC6-5 A9 $39.00	KC6-10 B9 $46.50
12 VDC	KC12-.5 A7 $28.00	KC12-1 A7 $30.00	KC12-3 A8 $37.50	KC12-5 A9 $42.00	KC12-10 B11 $49.00
15 VDC	KC15-.5 A7 $28.00	KC15-1 A7 $30.00	KC15-3 B9 $38.00	KC15-5 B10 $44.00	KC15-10 B12 $55.00
±15 VDC	KCD15-.5 A7 $38.00	KCD15-1 A7 $41.00	KCD15-3 C10 $52.00	KCD15-5 C11 $59.00	KCD15-10 D13 $80.00
24 VDC	KC24-.5 A7 $28.00	KC24-1 A8 $30.00	KC24-3 B8 $44.00	KC24-5 B10 $49.00	KC24-10 C12 $69.00
±24 VDC	KCD24-.5 A7 $39.00	KCD24-1 A8 $47.00	KCD24-3 D10 $66.00	KCD24-5 D12 $76.00	KCD24-10 D13 $120.00
28 VDC	KC28-.5 A8 $30.00	KC28-1 A8 $33.00	KC28-3 B9 $47.00	KC28-5 B11 $52.00	KC28-10 C13 $80.00
±28 VDC	KCD28-.5 A8 $42.00	KCD28-1 A8 $50.00	KCD28-3 D11 $68.50	KCD28-5 D13 $79.00	KCD28-10 D14 $128.00

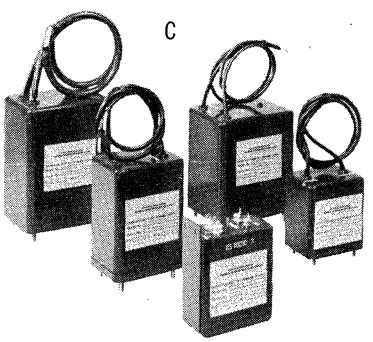
*** CHASSIS SIZES CODE:** A = 3⅜" wide, B = 4⅝" wide, C = 5⅛" wide, D = 6" wide, E = 6⅞" wide
LENGTHS: 6 to 19 inches

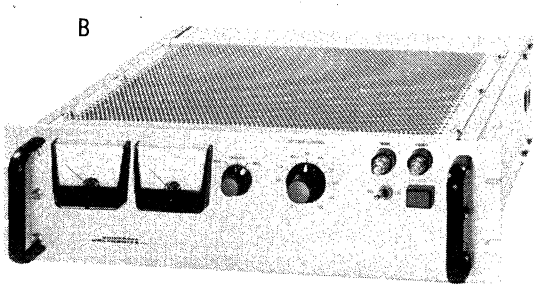
SAMPLE CODE: B8 = Chassis, 4⅝" x 8" C10 = Chassis, 5⅛" x 10"

UNIVERSAL ELECTRONICS COMPANY • P.O. BOX 4517 • 17811 SKY PARK CIRCLE, IRVINE, CALIFORNIA 92664 • PHONE (714) 540-5249

high VOLTAGE DC POWER SUPPLIES







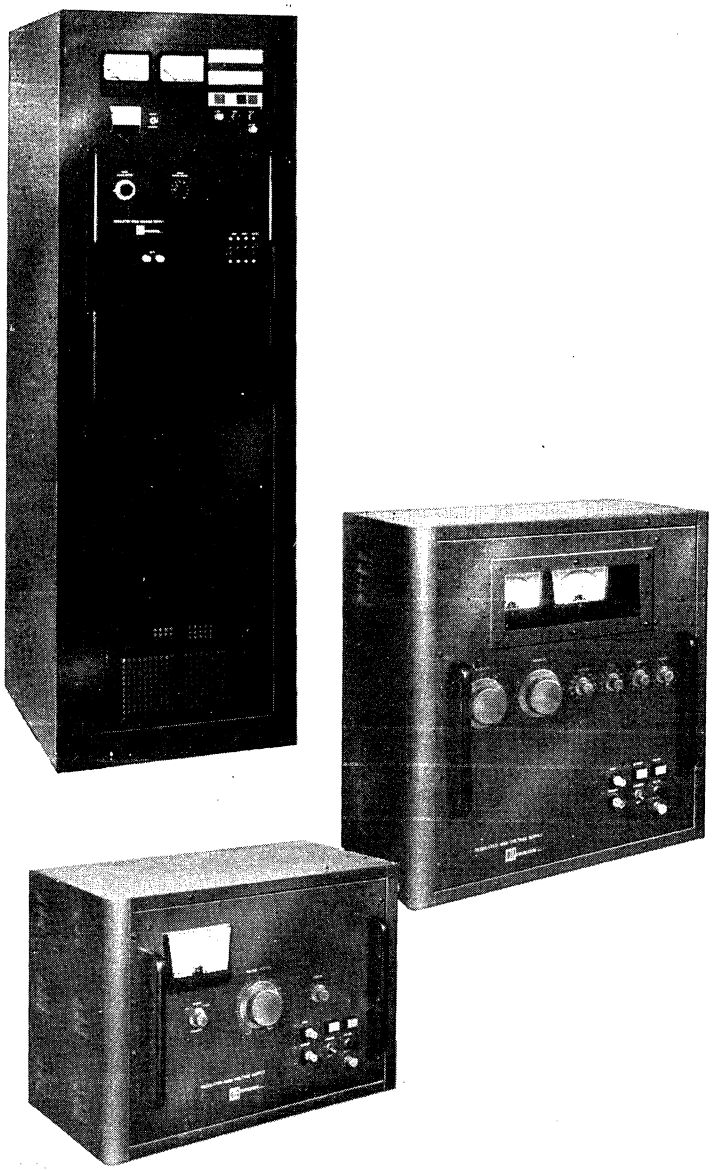
ADJUSTABLE OUTPUT POWER SUPPLIES

Series "BA" adjustable power supplies and series "BP" power packs are available at voltage ratings from 1 KVDC through 2000 KVDC at output power ratings from 1 watt to 250 kilowatts continuous. The adjustable series includes applications oriented control features and package design as shown in photos A and B. The power pack series (photos C and D) has many applications in OEM systems and for general laboratory use.

Every UVC power supply includes conservatively rated high voltage components designed and manufactured under the strict control of the specialized UVC technical staff to insure continuous duty, long term, trouble free operation. A one year factory backed and field supported warranty policy accompanies each shipment.

LOOK AT THESE FEATURES

1. **Ripple** Each power supply offers a standard ripple specification of 5% maximum or better. Optional filters and attenuators are available for every UVC supply to reduce ripple to as low as .01% rms.
2. **Polarity** Each power supply offers the flexibility of reversible output polarity performance.
3. **Protection** Overvoltage and overcurrent protection features are available as both adjustable range and fixed value circuits. All access areas and doors are interlocked for personnel protection and all energy storage components and circuits are discharge protected for personnel protection.
4. **Package** Rack mounted, floor and bench operable as well as portable design are among the packages available for UVC standard high voltage power supplies.

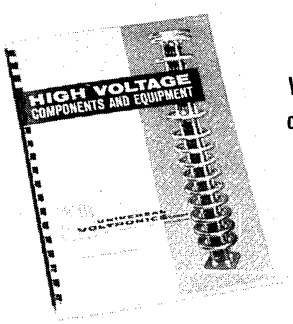


PRECISELY REGULATED EQUIPMENT

Precisely regulated performance over wide adjustment range, low ripple, fast response and high stability enable the series "BRE" power supplies to be used in exacting work for x-ray spectroscopy, electron microscopes, TWTs, ion bombardment experiments, particle separators.

These precisely regulated power supplies are available in voltage ratings from 1 KV through 500 KVDC at continuous duty output power up to 40 KW. Our regulation circuitry techniques realize performance specifications which are virtually independent of input line variations or no load-full load changes. Ripple in most cases is 0.01% rms and the output polarity is available as both fixed and reversible. Two voltage adjustment schemes are offered, namely digital dialable control for the most exacting applications and continuous coarse and vernier controls. In the digital dialable scheme, we allow for adjustment in increments of 10 KV, 1 KV, 100 volts, 10 volts, 1 volt and 0-1 volt vernier. This system provides the assurance that the actual output is always within 1% of the dial readings. As indicated, you may select a coarse and vernier voltage adjustment scheme and realize economic savings without sacrificing basic regulated performance. Regulation accuracy of ±0.25%; ±0.1%; ±0.05% and ±0.01% for line or load changes are available on most series "BRE" power supplies.

A new line of solid state, precisely regulated power packs for photo multiplier and CRT applications have also been recently introduced. These supplies are available at voltage ratings up to 20 KVDC.



Write or phone for Catalog UVC-670 containing complete specifications for the extensive line of UVC high voltage power supplies.

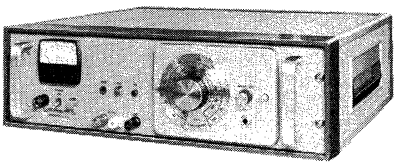
UNIVERSAL VOLTRONICS

**27 Radio Circle Drive,
Mt. Kisco, N.Y. 10549
914-241-1300**

REGULATED, WIDE BAND AC to AC POWER SUPPLIES

"S" SERIES POWER SUPPLIES THE STANDARD "S" SERIES FEATURES:

- All silicon solid state components
- Single phase and multi-phase outputs
- Advanced, state-of-the-art designs
- Accepts over 50 different plug-in oscillators
- Rack mounted units and bench models
- 18 Models from 130 VA to 6000 VA.



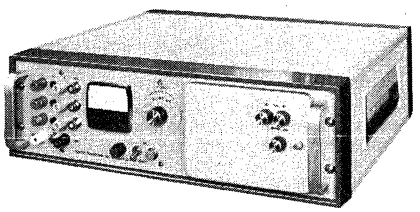
All aluminum parts are finished in gold iridite or black anodize. Steel parts are cadmium plated and finished with gold iridite. Front panels are standard Vector light blue gray semi-gloss enamel. Other paint available on special order. Furnish color chip and federal specification number.

SINGLE PHASE OUTPUT

MODEL	POWER OUTPUT VA	DIMENSIONS (Inches) H	W	D	MODEL	POWER OUTPUT VA	DIMENSIONS (Inches) H	W	D
130-S	130	5¼	19	14	750-S	750	12¼	19	20
200-S	200	5¼	19	14	1000-S	1000	12¼	19	20
300-S	300	7	19	20	1500-S	1500	14	19	20
500-S	500	7	19	20	2000-S	2000	14	19	20

3 PHASE OUTPUT

MODEL	POWER OUTPUT VA	DIMENSIONS (IN.) H	W	D	MODEL	POWER OUTPUT VA	DIMENSIONS (IN.) H	W	D
Y-150-S	150	5¼	19	17	Y-1500-S	1500	12¼	19	20
Y-390-S	390	5¼	19	17	Y-1800-S	1800	14	19	20
Y-500-S	500	7	19	20	Y-2500-S	2500	14	19	20
Y-600-S	600	7	19	20	Y-4500-S	4500	24½	19	20
Y-900-S	900	12¼	19	20	Y-6000-S	6000	24½	19	20



ELECTRICAL SPECIFICATIONS (APPLY TO SINGLE & 3 PHASE MODELS)

INPUT DATA

VOLTAGE: 105 to 125 V AC, single phase for all units 600 VA and below (nominal 115 volts). If 210 to 250 V input voltage desired, add suffix "2" to model number. All models from 750 VA to 6000 VA are normally supplied with 208/230 V AC 3 phase input. 440/460 AC 3 phase input also available, add suffix "3" to model number.

FREQUENCY: 47 to 65 Hz. 47 to 480 Hz available on special order.

INPUT CONNECTION: All units have barrier strips at the rear.

OUTPUT DATA

BASIC FREQUENCY RANGE: All single phase output models 45 Hz to 10 KHz.

DISTORTION: 2% or less including plug-in oscillator.

VOLTAGE: Variable from 0 to 130 volts.

POWER OUTPUT: Full rated VA from 110 to 130 volts.

POWER FACTOR: Full rated VA from unity to 0.7 lead or lag. Greater power factor with some derating.

LINE REGULATION: ±0.25% over input voltage range, at full rated VA.

LOAD REGULATION: ±0.25% from no load to full load.

RECOVERY: 100 microseconds.

OVERLOAD: Automatic overload protection with manual reset and overload indicator.

HUM AND NOISE: —60 DB below full output.

OUTPUT CONNECTIONS: Five way binding posts on front panel and barrier strips at rear.

OUTPUT CONFIGURATION: Single phase models have two wire floating output (one side may be grounded) insulated for 500 volts RMS.

ADDITIONAL SPECIFICATIONS FOR 3 PHASE UNITS

All electrical specifications shown above apply to 3 phase units plus the following:

PHASE UNBALANCE: 100% phase unbalance will not affect any electrical specification.

OUTPUT CONFIGURATION: Four wire, neutral floating. Units will accept △ or Y loads. The neutral, or any one leg may be grounded.

OUTPUT VOLTAGE: 0-130 volts, line to neutral.
0-225 volts, line to line Y.
0-130 volts, line to line △.

METERING: Units of 900 VA and over are supplied with 3 output volt meters. Units below 900 VA are supplied with one meter and a switch to read line to neutral, line to Y, and line to △.

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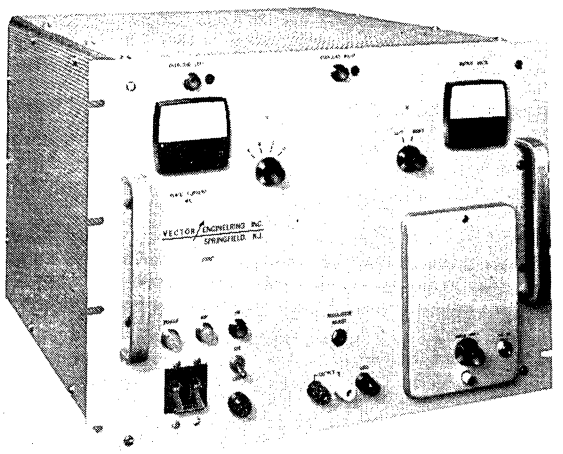
58 BROWN AVENUE, SPRINGFIELD, NEW JERSEY 07081 • TEL. 201: 379-7800

"T" SERIES AMPLIFIERS



The "T" series of regulated A.C. power sources is an extension of the "S" series in the higher power range with outputs up to 20,000 VA. The standard "T" series feature all silicon solid state components except for the output stage where rugged, forced air vacuum tubes are used. These units can also be used as high power audio amplifiers. The supplies are compact, ruggedly constructed, and contain all of the electrical and mechanical features of the "S" series except as follows: Distortion: 2% max., Line regulation: ±0.5%, Load regulation: ±0.5%.

SINGLE PHASE OUTPUT

MODEL	POWER OUTPUT VA	H	DIMENSIONS (Inches) W	D
2000-T	2000	14	19	20
3000-T	3000	45	25	25
5000-T	5000	45	25	25
7500-T	7500	45	36	26
10000-T	10,000	56	42	34
15000-T	15,000	56	42	34
20000-T	20,000	56	42	34

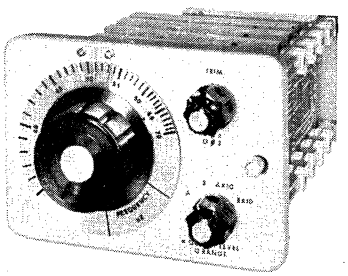
THREE PHASE OUTPUT

MODEL	POWER OUTPUT VA	DIMENSIONS (Inches) H	W	D
Y-5000-T	5000	45	25	25
Y-7500-T	7,500	58	30	30
Y-10000-T	10,000	58	30	30
Y-15000-T	15,000	78	34	34
Y-20000-T	20,000	78	34	34

NOTE:

Two phase and four phase units are available on short delivery. All "T" units are in semi-military angle and skin enclosures. The bottom is fitted with skids for fork lift truck. Casters and/or removable lifting eyes are available on request.

PLUG-IN OSCILLATORS FOR "S" AND "T" SERIES



These oscillators feature all silicon solid state components and precision variable frequency determining elements and are available in **single phase, two phase,** and **three phase.** All single phase oscillators are provided with an external signal input.

Frequency stability: Oscillators may be ordered with frequency stability ranges from ±0.5% thru ±0.001% as shown in the table below.

FREQUENCY RANGE	FREQUENCY STABILITY				
	±0.5%	±0.25%	±0.1%	±0.01%	±0.001%
ANY FIXED FREQUENCY BETWEEN 45 and 10 KHz	X	X	X	X	X
VARIABLE					
45 to 75 Hz	X	X	X		
320 to 480 Hz	X	X	X		
320 to 2000 Hz	X	X	X		
45 to 6000 Hz	X	X			
45 to 10000 Hz	X	X			

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VENUS SCIENTIFIC INC.

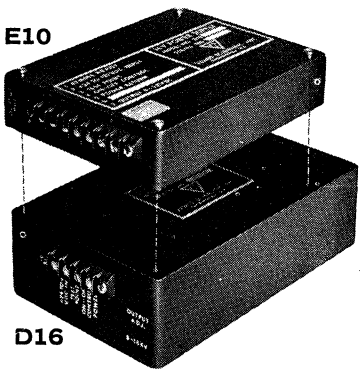
Expanding High Voltage Technology in:

• ELECTRO-OPTICS • CRT DISPLAY • NIGHT VISION EQUIPMENT • SCIENTIFIC APPLICATIONS

PRECISION DISPLAY POWER SUPPLIES

Stable, low ripple, high voltage supplies modularly assembled for use in precision display systems...or be used individually as precision high voltage sources.

Model D-16 is an adjustable 8-16KV high voltage power supply featuring tight regulation, low ripple and solid state reliability. This unit is capable of delivering 1 ma of current at full output voltage. Additional features include a logic controlled on-off sweep failure protection circuit, a high voltage monitoring test point and short circuit and reverse polarity protection.



SPECIFICATIONS	MODEL D-16
Input	24 to 30VDC
Output	8-16KV (adjustable) @ 1ma
Regulation	Line—.003% Load—.06%
Ripple	.015% P-P @ F.L.
Mechanical	Size 5" x 8" x 2¼", Fully encapsulated & Shielded
Oper. Temp.	−25°C to +71°C
Temp. Coefficient	±100PPM/°C
Test Point	Scale Factor 1V/1KV
Logic Control	T²L Compatible
Price	$620.*

Model E-10 (output 100 to 1000VDC) } are
Model E-30 (output 100 to 3000VDC) }
precision regulated modular high voltage power supplies featuring tight regulation and low ripple. These reliable, all silicon units are ideally suited for photomultiplier, CRT focus, laboratory and systems application. The output is controllable by a screwdriver adjustment on the unit or remotely by an analog signal 0-12VDC. Additional features include logic controlled on-off, a high voltage monitoring test point and short circuit and reverse polarity protection.

SPECIFICATIONS	MODEL E 10	MODEL E 30
Input	24 to 31VDC	24 to 31VDC
Output	100 to 1000VDC @ 10ma	100 to 3000VDC @ 5ma
Regulation	Line .01%, Load .1%	Line .01%, Load .03%
Ripple P-P	.02% (<200mvP-P @ F.L.)	.02% (<500mvP-P @ F.L.)
Oper. Temp.	−25°C to +71°C	−25°C to +71°C
Logic Control	T²L Compatible	T²L Compatible
Test Point (Scale Factor)	1V/100V ±10%	3V/1000V ±10%
Mechanical	5" x 6½" x 1⅜"	5" x 6½" x 1⅜"
Price	$280.*	$310.*

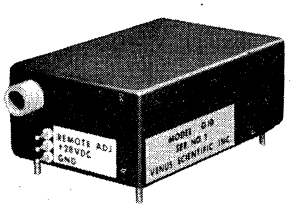
For applications requiring dual output voltage the E10 and/or E30 may be combined with the D16 and ordered as integral assembly from the factory. The units will be supplied bolted together, with common inputs externally strapped together. Specify as follows:
D16/E10 $775.* D16/E30 $795.*

**Militarized versions are available at slightly higher cost.*

PRECISION MINIATURE CATHODE RAY TUBE POWER SUPPLIES

The G and H Series precision regulated high voltage power supplies are mil type DC to DC converters featuring high efficiency and reliability in miniature packages. These units are particularly useful in airborne applications.

G SERIES

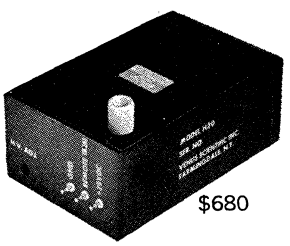


Input Voltage	24 to 32VDC (50DVC Surge)
Output Current	500ua (max)
Efficiency	>50%
Temp Range	−55°C to +71°C
Temp Coefficient	.025%/°C rom −55°C to +71°C
Size/Weight	3¾" x 2⅞" x 1½" (15 cu in) / 1¼ lb.
Altitude	0-50,000 ft.

- **All Silicon Circuitry**
- **Remotely Adjustable**
- **Short Circuit and Reverse Polarity Protected**
- **Shielded and Encapsulated**
- **Mil-E-5400**
- **MTBF 42,000 hrs.**

MODEL	OUTPUT VOLTAGE RANGE	LINE/LOAD REG.	RIPPLE P-P AT FULL LOAD	PRICE
G-5	500V to 5000V	0.1%	0.15%	$450
G-10	1000V to 10,000V	0.1%	0.15%	$490
G-12	1200V to 12,000V	0.1%	0.15%	$550

MODEL H-20



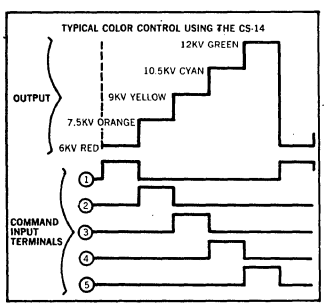
- **Output** Adjustable from *10KV to 20KVDC @ 500ua
- **Input** 28VDC ±10%
- **Ripple** 0.05% P-P at full load
- **Line/Load Regulation** .05%
- **Efficiency** 50% @ Full Load
- **Compact** 4⅞ x 3⅛ x 1⅞ (30 cu in) 2.5 lbs.
- **Temp Range** −55 to +71°C
- **Temp Coefficient** .01%/°C from −55°C to +71°C
- **Short circuit and reverse polarity protected**
- **Mil-E-5400**
- **MTBF** 58,200 hrs.
- **Altitude** 0 to 50,000 ft.

**Available also with a negative output at no additional cost. Model H20N*

FAST SWITCHING "COLOR DISPLAY" HIGH VOLTAGE POWER SUPPLY

Designed for use with Color Beam Penetration Cathode Ray Tubes

The CS-14 is a programmable solid state high voltage power supply capable of step switching its output voltage over a range of 6-14KV and thereby varying the accelerating potential necessary for beam penetration CRT operation.
This unit has provision for 5 individually adjustable preset output potentials. These levels are controlled by low level logic commands to any one of five input terminals.



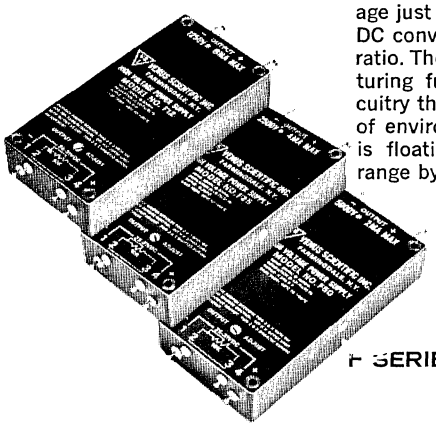
Input Power	28VDC ±10% @ 800ma
Command Signal	2.5V to 5.5V
Output	Switchable 5 levels 6KV to 14KV
Repetition Rate	60Hz (ie) a sum total of 8KV switching transitions permitted per each 16msec period
Capacitive Load	600Pf (max)
DC Load	4.5W (max)
Slewing Rate	20V/usec (with 150Pf load)
Settling Time	75usec to within 100V of final value
Regulation Line/Load	0.5%
Ripple P-P	0.1%
Size	4" x 7½" x 1⅞"

MODEL CS-14

Prices and Data subject to change without notice.

VENUS SCIENTIFIC INC.

MINIATURE 10W "FLAT PACK" HIGH VOLTAGE POWER SUPPLIES



F SERIES

10 watts of high voltage power in a package just 6.4 cu. inc. These versatile DC to DC converters offer a high power to size ratio. The F-Series are rugged devices, featuring fully encapsulated all silicon circuitry that will perform over a wide range of environmental conditions. The output is floating and adjustable over a wide range by means of a screw driver adjustment or remotely controlled by means of an external resistance.

COMMON SPECIFICATIONS:

Input Voltage	25 to 31VDC 50V 1 sec. max.
Isolation	7000VDC
Input Current	590ma typical @ F.L.
Line Regulation	0.01%
Load Regulation	1.0% (½ F.L. to F.L.)
Temp Range	−55° to +100°C Case
Altitude	0-12,000 ft.
Efficiency	>60%
Minimum Load	None Required
M.T.B.F.	70,000 hours
Size	2" x 4" x 0.8"
Short Circuit & Reverse Polarity Protected	

MODEL	OUTPUT VOLTAGE RANGE	OUTPUT CURRENT	RIPPLE P-P	PRICE 1-9
F-6	220V to 675V	16ma	0.25%	$209.
F-12	500V to 1300V	8ma	0.25%	$235.
F-25	1100V to 2800V	4ma	0.25%	$260.
F-50	3000V to 5500V	2ma	0.3%	$285.

PHOTOMULTIPLIER POWER SUPPLIES

The K-Series high voltage power supplies offer extremely flexible operation in that the output is proportional to input voltage, and both input and output leads are floating. This permits operation from any desired combination of source and output polarities.

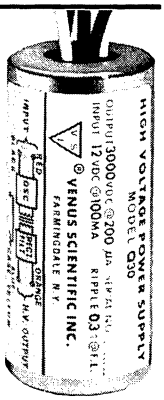
- **Small** — 1" Dia. x 2¼" long
- **Shielded** — Encapsulated
- **Qualified** per Mil-Std-810
- **Operates** from −55°C to +71°C
- **MTBF** >100,000 hrs. @ 71°C
- **Output Proportional to Input**
- **Fast Response**
- **Output Input Floating**
- **Short Circuit Protected**
- **Reverse Polarity Protected**

Photomultipliers / Flying Spot Scanners / Image Dissectors / Ionization Chambers / Scan Converters / CRT Bias and Focus Circuits / Scintillation Tubes / Geiger Counters

MODEL	INPUT	OUTPUT RANGE	RIPPLE (P-P)	EFFICIENCY @ FULL LOAD	PRICE 1-9
K-15	3V to 15V	300V to 1500V @ 1.0ma	0.1%	>50%	$149.
K-30	3V to 15V	600V to 3000V @ 0.5ma	0.5%	>50%	$158.
Q-30*	2V to 12V	500V to 3000V @ 0.2ma	0.3%	>60%	$168.

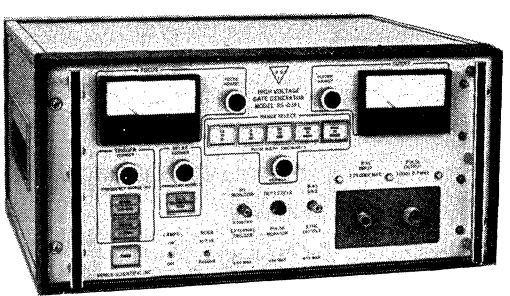
**The Model Q-30 utilizes highly efficient circuitry which lends itself well to battery and other low power applications—Typical no load idling current is only 8ma.*

HIGH VACUUM ENVIRONMENT types are available. The K- and Q-Series power supplies will be supplied in 3" long cases with vacuum seal. To specify a high vacuum version add the suffix "Z" to the model number (i.e. K-30Z) and $30 additional to the unit price.



Q and K SERIES

HIGH VOLTAGE GENERATOR IMAGE INTENSIFIER TEST SET



R503FLC

PRICE: RS03FL R $7250
RS03FL C $7465

The RS03FL is a versatile laboratory and development instrument designed to provide the focus and cutoff potentials for image intensifier tubes. The 3KV gated output can be floated to ±25KV, and PRF to 10KHz is provided. Controls for focus voltage, cutoff voltage, PRF, pulse width and pulse delay are front panel mounted.

An option which permits reversing of the gating pulse direction to operate either MCP or conventional image intensifier tubes is also available.

APPLICATIONS

■ QC inspection/test ■ laboratory simulation ■ high speed shutter for image intensifier tube ■ automatic exposure control for intensifier tube or photomultiplier ■ LIDAR range gate ■ direct viewing image intensifiers ■ vidicon coupled image intensifiers

Venus Scientific Inc. manufactures special purpose "Gate" and "Zoom" power supplies for use in night vision and LLLTV equipment. These units are available as compact rectangular modules or in custom configurations.

SPECIFICATIONS

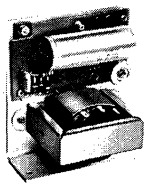
- **Pulse Amplitude (reference to photocathode bias level)**
  - **Focus (positive) Level** ..... 0 to 500VDC
  - **Cutoff (negative) Level** ..... 0 to −2500VDC
  - **Maximum Pulse Amplitude** .... 3000V peak-to-peak
- **Maximum Bias Voltage** ..... ±25KVDC
- **Rated Load** ..... 10^9 ohms shunted by 30pf
- **Pulse Repetition Rate**
  - **Internal Trigger** ..... 10 to 10,000Hz
  - **External Trigger** ..... 0 to 10,000Hz
    (+2 to +5v, 0.5 μsec. min. pulse width)
- **Dimensions:** 19 in. wide, 8¾ in. high, 14 in. deep
- **Color:** Gray with Black Trim
- **Weight:** 39 lbs.
- **Operating environment:** Laboratory conditions
- **Pulse Shape at Rated Load**
  - **Rise Time** ..... 55 nsec
  - **Fall Time** ..... 55 nec
  - **Flatness** ..... ±1%
  - **Overshoot & Noise** ..... ±3%
- **Pulse Width** ..... 0.5 μsec to 100 msec
- **Pulse Delay** ..... 0.3 to 50 μsec
- **Pulse Jitter**
  - **Width** 0.05%
  - **Delay** 0.05%
- **Power Source Required**
  115VAC 60CPS, 1 amp max.
- **Accessories supplied:** High voltage leads, bias ground strap, operator's guide
- **Case:** Model RS03FLR for rack mounting
  Model RS03FLC with cabinet

Prices and Data subject to change without notice.

VENUS SCIENTIFIC INC. 399 SMITH STREET, FARMINGDALE, NEW YORK 11735 (516) 293-4100
Send for the 1971 VENUS Catalog featuring many High Voltage Power Supplies as off the shelf items. TWX 510-224-6588

Beat Balky Budget/Performance/Delivery Problems...
with WANLASS "Off-the-Shelf" OEM DC Power Supplies/Power Conditioners

DPS SERIES
Super Economy All Purpose D.C. Power Supplies
...to 3 Amps



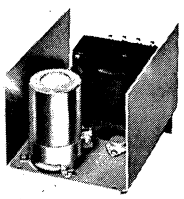
10 & 20W Regulated Power Supplies

No frills, just sound "functionalized" design that offers ±1% regulation, overload and short-circuit protection, and a high-power to small-package ratio. The DPS-1 has 50% fewer parts, provides 1-Watt/cubic inch, weighs just 1.6 oz./Watt and costs only 65¢/Watt — less than you could build it yourself!

Wanlass Model	D.C. Output	Prices 1-9	10-24	25-49	50-99
DPS-1	5 & 6V @ 3.0A	$24.95	$23.70	$22.45	$21.20
DPS-5	5 & 6V @ 1.5A	19.95	18.95	17.95	16.95
DPS-2	12 & 15V @ 1.5A	24.95	23.70	22.45	21.20
DPS-6	12 & 15V @ 0.75A	19.95	18.95	17.95	16.95
DPS-3	24V @ 1.0A	24.95	23.70	22.45	21.20
DPS-7	24V @ 0.4A	19.95	18.95	17.95	16.95
*DPS-4	180-220V @ 100mA	36.00	34.20	32.40	30.60

*DPS-4 only: Line Reg. = ±2.0%; Ripple = ±2.0%

PHASE II SERIES
OEM D.C. Power Supplies
...to 10 Amps

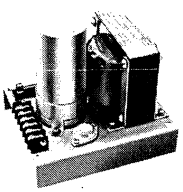


30-60-120W Power Supplies

Offering a choice of three power ratings — 30-60-120W — with 4 voltage ranges in each (3.6-9V/9-17V/17-30V/30-60V), these floating-output supplies provide design flexibility and peak performance at low prices! Line/load regulation is just ±1%, they have automatic short-circuit protection.

Wanlass Model	D.C. Output	Prices
30-OEM-1	3.6-9V @ 2.5A	1—9 $46.00
30-OEM-2	9-17V @ 30W	10—24 $43.75
30-OEM-3	17-30V @ 30W	25—49 $41.50
30-OEM-4	30-60V @ 30W	50—99 $39.00
60-OEM-1	3.6-9V @ 5A	1—9 $57.50
60-OEM-2	9-17V @ 60W	10—24 $54.50
60-OEM-3	17-30V @ 60W	25—49 $51.75
60-OEM-4	30-60V @ 60W	50—99 $49.00
120-OEM-1	3.6-9V @ 10A	1—9 $86.25
120-OEM-2	9-17V @ 120W	10—24 $82.00
120-OEM-3	17-30V @ 120W	25—49 $77.75
120-OEM-4	30-60V @ 120W	50—99 $73.50

MARK III SERIES
Precision OEM Slot Supplies
...to 10 Amps

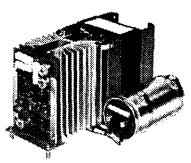


60-120W Power Supplies

Ideal for IC, QP-AMP and MOS/FETS or other voltage sensitive loads. Features dual 115/230V A.C. input, regulation to ±0.1%, ripple of 1 mV or less RMS at full load, and adjustable voltage. Built-in adjustable overvoltage crowbar provides overvoltage protection. Overload protection is automatic and adjustable.

Wanlass Model	D.C. Output	Prices 1-9	10-24	25-49	50-99
III OEM 5-5	5V @ 5A				
III OEM 6-5	6V @ 5A				
III OEM 12-5	12V @ 5A				
III OEM 15-4	15V @ 4A	$89.50	$85.00	$80.50	$76.00
III OEM 18-3	18V @ 3A				
III OEM 24-2.5	24V @ 2.5A				
III OEM 28-2	28V @ 2A				
III OEM 5-10	5V @ 10A				
III OEM 12-10	12V @ 10A	137.50	180.60	123.75	116.85
III OEM 24-5	24V @ 5A				

"BRUTE" SERIES
High Power OEM D.C. Slot Supplies
...to 50 Amps



300-600-1200W Power Supplies

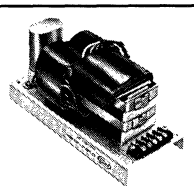
Choose any one of the three BRUTE power ranges — 300-600-1200W — and you'll get a single unit that provides two continuously adjustable voltage ranges (2-25V or 5-50V), SCR closed-loop control assures ±0.1% line/load regulation. Adjustable current limiting protects against overload and "shorts". All this at lower than "slot supply" prices!

Wanlass Model	D.C. Output	Prices 1-9	10-24	25-49	50-99
BRUTE I	5-50/2-25V* @ 6/12A	$148.00	$141.00	$133.00	$126.00
BRUTE II	5-50/2-25V* @ 12/24A	195.00	185.00	176.00	166.00
BRUTE III	5-50/2-25V* @ 24/50A	315.00	299.00	284.00	268.00

*Can be connected either for 5 to 50V or 2 to 25V depending upon output current desired

Optional Kits: K1 — 10-Turn Potentiometer Kit (for fine voltage adj.) — $20.00/ea.
K2-1/K2-2 — Ripple Reduction Kit (cuts ripple by 50%) — $25.00/ea.
K2-3 — Ripple Reduction Kit for BRUTE III (cuts ripple by 50%) — $52.00/ea.
K3 — OVP for all BRUTE types (may also be used with any DC power supply within a 6-60V/0-500A range) — $49.50/ea.

PARAFORMER™ PEC SERIES
...over 50dB Noise Attenuation

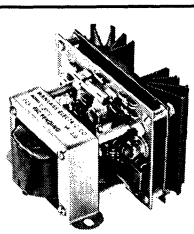


Invented by Wanlass, the novel PARAFORMER™ provides a number of important design advantages... over 50dB noise filtering at low-frequencies (below 1.0MHz); line voltage regulation; unilateral operation, phase-locked output voltage; and, inherent overload and short-circuit protection. Its simple, no-moving-parts structure assures trouble-free, highly reliable operation under the most stringent conditions.

A.C. Input: 105-125V, Single Phase
A.C. Output: 117V, Single Phase

Model No.	Capacity	Regulation Line / Load	Prices 1-9	10-24	25-49	50-99
PEC-60	60VA @ 60Hz	±0.25% / ±1.5%	$95.00	$90.25	$85.50	$80.75
PEC-150	150VA @ 60Hz	±0.5% / ±2.0%	150.00	142.50	135.00	127.50
PEC-500	500VA @ 60Hz	±0.5% / ±2.0%	225.00	213.75	202.50	191.25
PEC-1000	1KVA @ 60Hz	±0.5% / ±2.0%	425.00	401.75	382.50	361.30
PEC-4-75	75VA @ 400Hz	±1.0% / ±2.5%	105.00	99.75	94.50	89.25

CLIP-AC™ C3000 SERIES
AC Regulators
...30VA to 1000VA



Wanlass CLIP-AC™ regulators are the ideal successors to ferroresonant transformers for the majority of AC regulation requirements to 1KVA! Frequency insensitive, they offer a host of advantages such as: wide input voltage and frequency ranges, adj. output voltage, line transient suppression, line regulation to 0.1%, instant response, "clipped" sinusoidal output, excellent TC and efficiency. All this, plus their low-cost, small-size and light-weight make them a "best buy" in AC regulators!

A.C. Input: 100-130V, 47-420Hz, Single Phase
A.C. Output: 117V Nominal
Regulation (RMS): ±0.5% (for ±10% A.C. Line Change)
±0.5% (for 10% to full Load Change)
Power Factor Regulation: ±0.5%
Frequency Regulation: ±0.5%

Model No.	Ratings	Prices 1-9	10-24	25-49	50-99
C-3003	30VA	$39.00	$37.00	$35.00	$33.00
C-3006	60VA	46.00	43.75	41.50	39.00
C-3012	120VA	51.00	48.50	46.00	43.50
C-3025	250VA	89.50	85.00	80.50	76.00
C-3050	500VA	125.00	118.75	112.50	106.00
C-3100	1000VA	210.00	199.50	189.00	178.50

These, and many other Wanlass products, are immediately available from over 70 distributor locations: Allied, Cramer, Intermark, Liberty, Newark, Olive Industrial, Philadelphia Electronics, Radio Products, Stark Electronics, Summit, TI Supply & Zack Electronics...backed by over $1,500,000 in factory warehouse stock! And, if your requirements call for "customization", Wanlass's proven expertise can provide an optimum, yet expeditious, and economical solution.

WANLASS

Division of **AMBAC**

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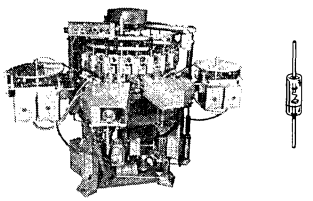
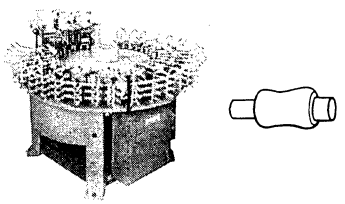
KAHLE—leaders in Automatic Production Machinery for the Electronics Industry.

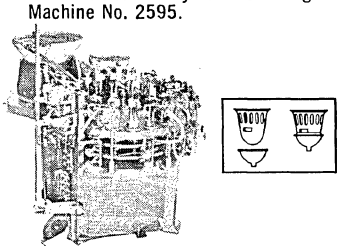
Automatic Diode Assembly and Seal Machine No. 3918



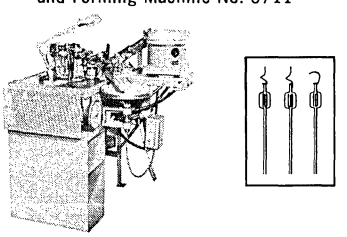
Fully Automatic Miniature Component Assembly Machine No. 4175



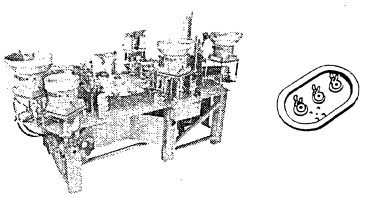
Automatic Assembly and Soldering Machine No. 2595.



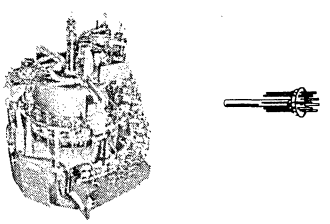
Automatic Wire Component Assembly and Forming Machine No. 3711



Automatic Assembly and Welding Machine No. 4463



Cathode Ray Tube Button Stem Manufacturing Machine No. 3960



For over 40 years, Kahle has specialized in the design and manufacture of automatic production machines for the electronics industry.

Kahle has designed and built machines for every operation in the precision manufacture of: transistors, diodes, X-ray tubes, cathode ray tubes, lamps, printed circuit assemblies, semiconductors, electrical sub-assemblies, switches, vacuum bottles, receiving and transmitting tubes, subminiature tubes, radar tubes, power tubes. Also, hermetic seal and exhaust machines including those for most vacuum gas filled devices; two or three piece lead — and cap, lead and slug butt welding by resistance or capacitor discharge welding machines with 100-200 per minute capacity; wire component or current carrying element welding. Glass machinery of all types.

If you have a process and assembly problem or are simply looking to reduce costs, give Kahle a call. We'll be pleased to discuss the matter with you. No obligation of course. The number is 201-867-6500. Or, if you'd prefer, write for free literature. Also inquire about Kahle's complete line of Index Drives and Chassis.

KAHLE

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"Designers and Builders of Automatic Production Machines and Machine Systems for the Electronics Industry"

The Measurement and Control Company **schaevitz engineering**

See Sections 2200 and 5500 for additional information

THE LVDT in MEASUREMENT AND CONTROL

"Transducer elements; heart of the newest measuring instruments". This was the theme of Part 4 of HYDRAULICS & PNEUMATICS's special report on Fluid Power Instrumentation. This report presented an in-depth study which compared and evaluated all the available transducer elements. The conclusion was significant; LVDT's are the optimum choice! The table, titled "Evaluating and Selecting Transducer Elements", which appeared in this report is reproduced here.

EVALUATING AND SELECTING TRANSDUCER ELEMENTS

CHARACTERISTICS E=excellent F=fair G=good P=poor / TRANSDUCER ELEMENT	RESOLUTION	HYSTERESIS	RESPONSE AND DYNAMIC CHARACTERISTICS	TEMPERATURE CHARACTERISTICS	VIBRATION AND ENVIRONMENTAL SENSITIVITY	LINEARITY	MECHANICAL OVERLOAD CAPABILITIES	LIFE
Piezoelectric	G	G	E	F	F		P	G
Variable Reluctance	G	F	G	E	P		E	E
Variable Reluctance Pulse Output	F			E	G		E	E
Wire Wound Potentiometer	F	F	P	G	G	G	P	F
Film Potentiometer	G	F	P	G	F	G	P	F
Unbonded Strain Gage	G	G	G	F	F	E	P	G
Foil Strain Gage	E	E	E	G	E	E	G	E
Semiconductor Strain Gage	E	E	E	F	E	G	G	E
Conductive Elastomer	F	P		P		F		
LVDT & RVDT	E	E	E	E	G	E	E	E
E – Pickup	G	F	P	E	G	G	E	E

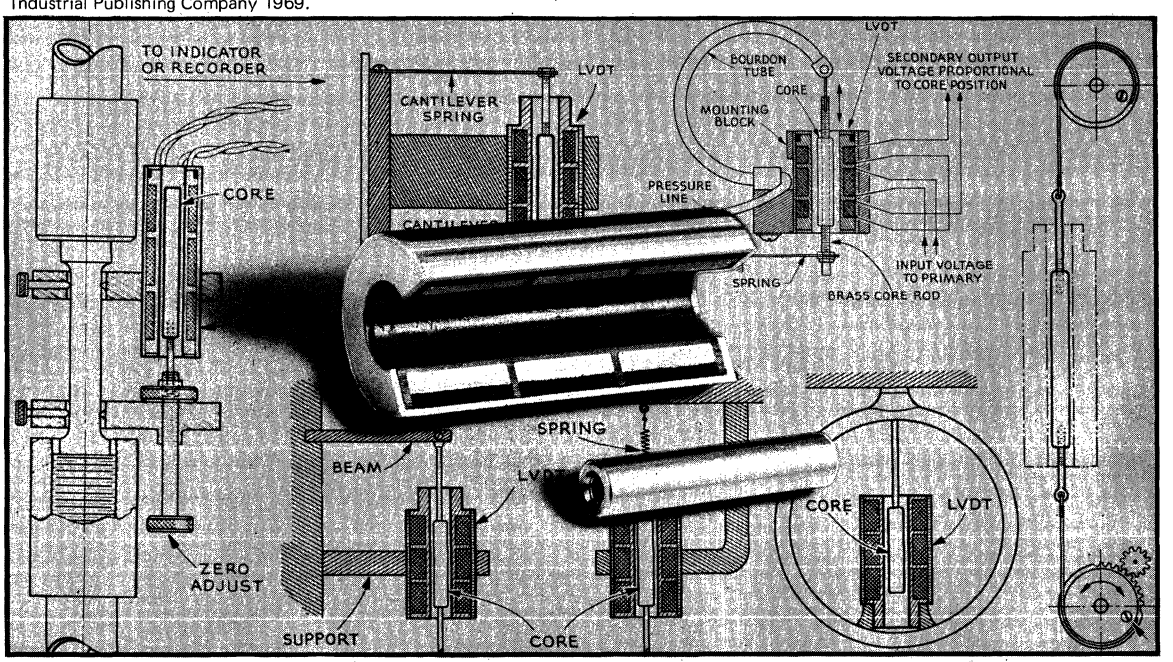
Courtesy of Hydraulics and Pneumatics Magazine, Copyright Industrial Publishing Company 1969.

The Linear Variable Differential Transformer (LVDT) is not a complex device. It has only one moving part – a permeable core. The position of this core varies the voltage induced into each of two identical secondaries connected series opposed. When the core is moved off-center a differential voltage will appear across the secondaries. This voltage is a linear function of displacement.

The LVDT and its counterpart, the Rotary Variable Differential Transformer (RVDT) can be used with many types of sensors to convert physical phenomena to displacement porportional outputs. Small core mass and the absence of friction enhance the dynamic response characteristics of LVDT mechanisms. Schaevitz Engineering has incorporated the features of the LVDT and RVDT into a wide range of other transducers for measuring parameters such as force, weight, torque and pressure.

LVDT's, as AC devices, can be used directly in closed-loop AC (60 Hz – 400 Hz) servo systems. However, the popularity of electronic instrumentation has created many new applications where a DC output signal is mandatory. Conversion to DC output is normally accomplished with carrier-type signal conditioners (AC-DC converters). Schaevitz Engineering is the leader in state-of-the-art carrier type signal conditioning equipment. A significant achievement in this area is the Schaevitz DC in – DC out LVDT's where the signal conditioning becomes an integral part of the LVDT itself. This is a perfect case of value-engineering – a simple circuit for a simple transducer.

Schaevitz Engineering sells large quantities of LVDT transducers, but what is more important is our complete commitment to solving problems in the field of measurement and control. Hundreds of Schaevitz Measurement and Control Systems are operating in the field – from simple analog measuring equipment to computerized digital control equipment. In all cases, the LVDT transducer is the preferred choice.



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Types Available:

- Thick Film
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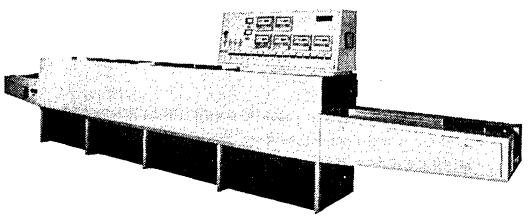
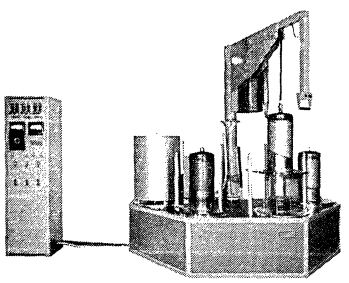
- Glazing
- Metallizing
- Sintering
- Heat-Treating
- Vertical Retort
- Nuclear Fuel Sintering
- Co-Firing
- Horizontal Tube
- Vacuum
- Laboratory
- Cold Wall
- Solder Reflow
- Chip Joining
- Infra-Red

Plus —

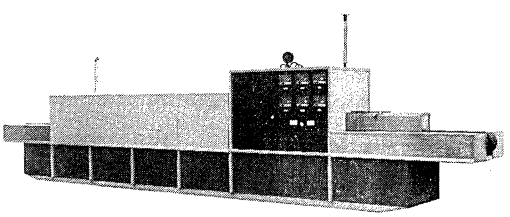
- Automatic Process and Handling Equipment and Automatic Vacuum Pump Stations



Model 8CA-132 offers TOTAL CONTROL of time, temperature and atmosphere for the thick-film firing process.



Model 10VR-16, a three station vertical retort furnace with center pivot boom, provides maximum versatility and operating economy.



Model 6C-72 features precise control over process variables in a wide variety of industrial applications.

Watkins-Johnson offers the widest selection of furnaces for industrial applications. Whether your requirements are standard or not-so-standard, W-J's proven capability can help you meet critical profile parameters. Put our experience and engineering know-how to work for you today. Contact our Representative in your area or call Watkins-Johnson Applications Engineering at (408) 438-2100, Extension 217.

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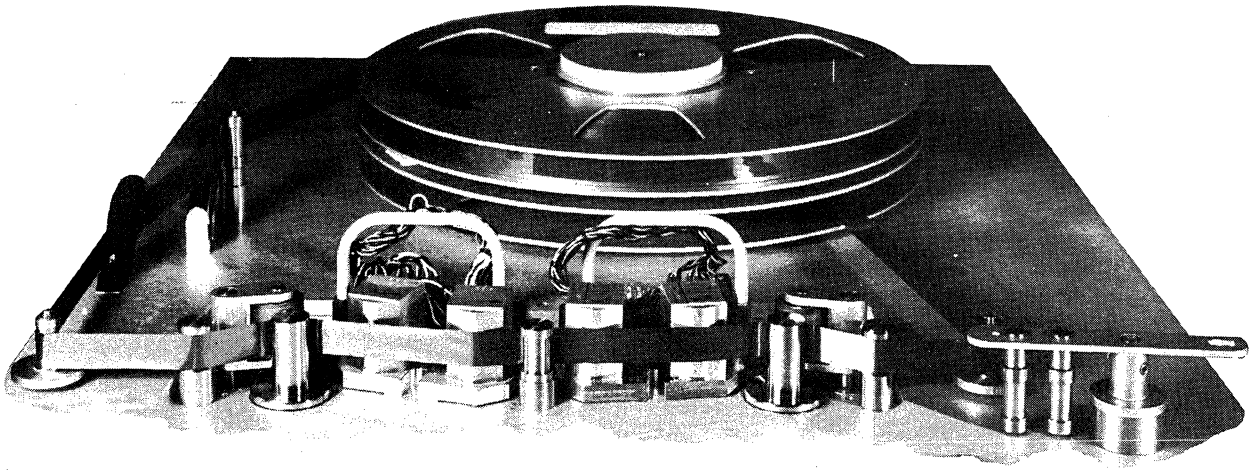

NOW! GEOTECH DELIVERS THE ULTIMATE LONG-TERM RECORDER

HERE'S WHY GEOTECH'S MODEL RM100 IS THE FINEST, MOST RELIABLE TAPE RECORDER YOU CAN BUY.

HIGHEST RELIABILTY

- Straight line tape path with dual capstan system gives precise control of tape across heads.
- Simplified electronic drive powers twin capstans — no gears or multistage belts.
- Geotech-patented tape heads.
- Proven concentric reel arrangement for dependable operation.

UTMOST CAPABILITY

- 100-to-1 multiple speed range for compressing or expanding time.
- AC or DC operation anywhere.
- FM or Direct Recording.
- Unattended operation up to 33⅓ days.
- Realtime reproduce.
- Proven performance in field or laboratory.

GREATEST VERSATILITY

- Portable or rack mount.
- Weighs less than 40 lbs. in standard suitcase.
- Utilizes ½" or 1" tape, 10½" or 14" reels.
- Single or multispeed; short or long term.
- Vertical or horizontal mounting and operation.
- Highly competitive price.

TYPICAL SPECIFICATIONS

TAPE SPEEDS* I P S	FREQUENCY RESPONSE DIRECT	FM	NO. OF CH	RECORD TIME DAYS
.03	.1 to 38 Hz	DC to 10 Hz	7 or 14	33.3
.075	.25 to 95 Hz	DC to 25 Hz	7 or 14	13.2
.3	1.0 to 380 Hz	DC to 100 Hz	7 or 14	3.3
.75	2.5 to 950 Hz	DC to 250 Hz	7 or 14	1.32
1.5	5.0 to 1900 Hz	DC to 500 Hz	7 or 14	.66
3.0	10.0 to 3800 Hz	DC to 1000 Hz	7 or 14	.33

*Other speed sets available

Send for full information, specifications and competitive prices for the Geotech RM 100.

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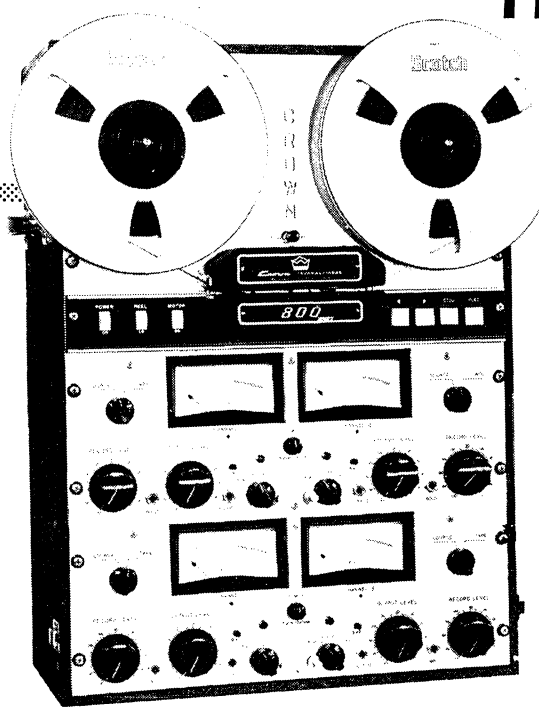
Crown® PRECISION TAPE RECORDERS WIDEBAND POWER AMPS



All models handle ¼-inch tape and reels 5" to 10½", all 19" rack mount.

Standard speeds 15 - 15/16 ips with 1 to 4 channels.

Patented electro-magnetic brakes never need adjustment.

Lifetime lubrication of all bearing surfaces.

True straight-line threading with easy-edit design.

Individual erase, record and play heads for 1, 2 or 4 tracks.

Six years proven solid state circuitry - etched circuit modules.

Extremely low noise electronics; modular transport construction.

Strict quality control with individual proof-of-performance records - entirely American made.

Over 40 standard models $545-$3700; custom modifications for OEM use.

Also available: slow speed data loggers (down to 0.33 ips), duplicator systems, and complete series of players and decks.

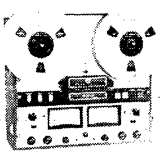
TWO BASIC TAPE DECK STYLES:

700 Rugged, high quality simple unit with only 9 moving parts; automatic stop in "play" mode.

800 Basic 700 construction plus computer logic control which never breaks tape; IC logic levels for remote control and function readout; ideal for systems integration; 10 moving parts; photocell tape sensor, edit switch, cue lever; automatic replay accessory.

FOUR STYLES OF ELECTRONICS:

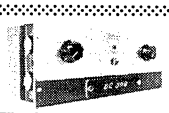
Varying features and degrees of flexibility to match user requirements. Contact sales dept. for complete descriptions.



TYPICAL PERFORMANCE CHARACTERISTICS

(varies with model & options selected)

Speed	Response-Hz	S/N	Wow
15 ips	±2db 50-30K	60db	0.06%
7 1/2	±2db 30-25K	60db	0.09%
3 3/4	±2db 50-15K	55db	0.18%
1 7/8	±3db 50-10K	45db	0.35%
15/16	±3db 50-5K	45db	0.50%



AMPLIFIERS	DC300	D150	D40
Output 4Ω load	300 watts/channel	125 watts/channel	40 watts/channel
Response 1 watt	±0.1db DC-20KHz	±0.1db 20Hz-20KHz	±0.1db 20Hz-20KHz
S/N 8Ω load	100db below 150w	100db below 75w	100db below 30w
IM Distortion	under 0.1%	under 0.1%	under 0.3%
Dimensions	7"x19"x9¾"	5¼"x19"x7"	1¾"x19"x7½"
Weight	40 lbs	20 lbs	7½ lbs
Price*	$685	$429	$229

*Subject to change without notice

DC300 - Lab Standard DC Amplifier
Outstanding for exceptional signal purity and stability coupled with unusually high power capabilities. Output _50 volts DC, 35 volts RMS AC. DC drift under 3mv up to 55° C.

D150 - Universal Audio Amplifier
Excellent general-purpose power amp with outstanding response, distortion and stability.

D40 - Ultra-Compact Audio Amplifier
Small, high quality amplifier with unusually wide power band-width.

All Crown amplifiers are completely stable two-channel units with internal protection for all loads. Rugged instrument-grade construction guaranteed three years for parts and labor. Custom modifications available for quantity OEM purchases.

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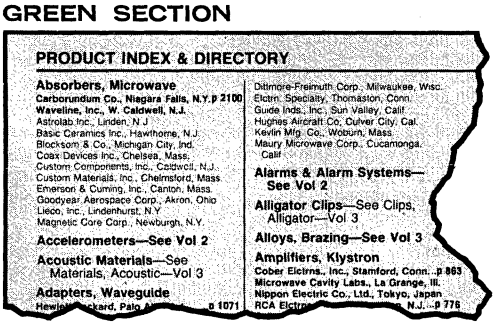
How to use eem

to find manufacturers of a specific product

GREEN SECTION



PRODUCT INDEX & DIRECTORY

Absorbers, Microwave
Carborundum Co., Niagara Falls, N.Y. p 2100
Waveline, Inc., W. Caldwell, N.J.
Astrolab Inc., Linden, N.J.
Basic Ceramics Inc., Hawthorne, N.J.
Blocksom & Co., Michigan City, Ind.
Coax Devices Inc., Chelsea, Mass.
Custom Components, Inc., Caldwell, N.J.
Custom Materials, Inc., Chelmsford, Mass.
Emerson & Cuming, Inc., Canton, Mass.
Goodyear Aerospace Corp., Akron, Ohio
Lieco, Inc., Lindenhurst, N.Y.
Magnetic Core Corp., Newburgh, N.Y.

Accelerometers—See Vol 2

Acoustic Materials—See Materials, Acoustic—Vol 3

Adapters, Waveguide
Hewlett-Packard, Palo A... p 1071
Ditmore-Freimuth Corp., Milwaukee, Wisc.
Electm. Specialty, Thomaston, Conn.
Gude Inds., Inc., Sun Valley, Calif.
Hughes Aircraft Co, Culver City, Cal.
Kevlin Mfg. Co., Woburn, Mass.
Maury Microwave Corp., Cucamonga, Calif.

Alarms & Alarm Systems—See Vol 2

Alligator Clips—See Clips, Alligator—Vol 3

Alloys, Brazing—See Vol 3

Amplifiers, Klystron
Cober Elctrns., Inc., Stamford, Conn. p 863
Microwave Cavity Labs., La Grange, Ill.
Nippon Electric Co., Ltd., Tokyo, Japan
RCA Electr... N.J. ...p 776

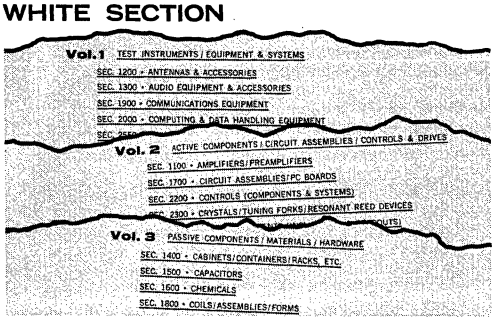
Each of the three volumes of **eem** contains a Product Index and Directory, the Green Section. This Index is a complete alphabetical listing of products. If the product you are looking for appears in the particular volume you are consulting, the green pages will provide a complete list of manufacturers who make that product. If the product is included in another volume of **eem**, the Index will provide a cross reference, directing you to the correct volume.

Boldface listings under product headings indicate that the listed manufacturer has products cataloged in **eem. Boldface** listings with page numbers indicate that this manufacturer's catalog pages include detailed data on the product indicated in the product heading.

Similar products are grouped together. For example, the many kinds of meters are listed in this manner: "Meters, Ampere," "Meters, Capacitance," "Meters, Flux" etc. To help you locate the prime product heading, there are hundreds of cross references, e.g. "Voltmeters — See Meters, Volt."

to find manufacturers' catalog information

WHITE SECTION



Vol. 1 TEST INSTRUMENTS / EQUIPMENT & SYSTEMS
SEC. 1200 • ANTENNAS & ACCESSORIES
SEC. 1300 • AUDIO EQUIPMENT & ACCESSORIES
SEC. 1900 • COMMUNICATIONS EQUIPMENT
SEC. 2000 • COMPUTING & DATA HANDLING EQUIPMENT
Vol. 2 ACTIVE COMPONENTS / CIRCUIT ASSEMBLIES / CONTROLS & DRIVES
SEC. 1100 • AMPLIFIERS / PREAMPLIFIERS
SEC. 1700 • CIRCUIT ASSEMBLIES / PC BOARDS
SEC. 2200 • CONTROLS (COMPONENTS & SYSTEMS)
SEC. 2300 • CRYSTALS / TUNING FORKS / RESONANT REED DEVICES
Vol. 3 PASSIVE COMPONENTS / MATERIALS / HARDWARE
SEC. 1400 • CABINETS / CONTAINERS / RACKS, ETC.
SEC. 1500 • CAPACITORS
SEC. 1600 • CHEMICALS
SEC. 1800 • COILS / ASSEMBLIES / FORMS

Catalog pages in **eem** are divided into three volumes based on very broad product groupings. These are:

Volume 1 — Test Instruments / Equipment and Systems

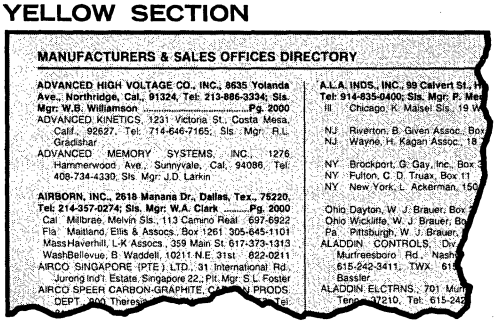
Volume 2 — Active Components / Circuit Assemblies / Controls and Drives

Volume 3 — Passive Components / Materials / Hardware

These volumes are further divided into 55 **eem** Product Sections which are assigned individually to the most appropriate volume. Within each of the 55 product sections manufacturers are arranged alphabetically, wherever possible. A complete index of all manufacturers' catalog pages is included in every volume. To locate the catalog pages of a specific manufacturer, refer to this index at the beginning of the white section in any of the three volumes. This index will provide the page numbers you require. In Volume 1, the index begins on page 302, in Volume 2 on page 1274 and in Volume 3, page 2310.

to find manufacturers' addresses, phones and sales offices

YELLOW SECTION



MANUFACTURERS & SALES OFFICES DIRECTORY

ADVANCED HIGH VOLTAGE CO., INC., 8635 Yolanda Ave., Northridge, Cal., 91324, Tel: 213-886-3334; Sls. Mgr: W.B. Williamson ..... Pg. 2000
ADVANCED KINETICS, 1231 Victoria St., Costa Mesa, Calif., 92627. Tel: 714-646-7165; Sls. Mgr: R.L. Gradishar
ADVANCED MEMORY SYSTEMS, INC., 1276 Hammerwood Ave., Sunnyvale, Cal., 94086. Tel: 408-734-4330, Sls. Mgr: J.D. Larkin

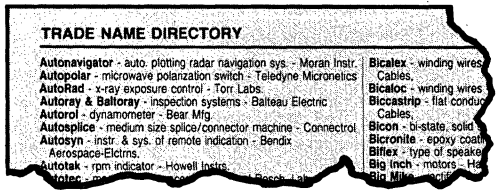
AIRBORN, INC., 2618 Manana Dr., Dallas, Tex., 75220, Tel: 214-357-0274; Sls. Mgr: W.A. Clark ..... Pg. 2000
Cal: Millbrae, Melvin Sls., 113 Camino Real 697-6922
Fla: Maitland, Ellis & Assocs., Box 1261 305-645-1101
Mass: Haverhill, L-K Assocs., 359 Main St. 617-373-1313
Wash: Bellevue, B. Waddell, 10211 N.E. 31st. 822-0211
AIRCO SINGAPORE (PTE.) LTD., 31 International Rd., Jurong Ind'l. Estate, Singapore 22., Plt. Mgr: S.L. Foster
AIRCO SPEER CARBON-GRAPHITE, CA... PRODS. DEPT., 900 Theresia... Tel:

A.L.A. INDS., INC., 99 Calvert St., H... Tel: 914-835-0400; Sls. Mgr: P. Mes...
Ill: Chicago, K. Maisel Sls., 19 W...
NJ: Riverton, B. Given Assoc., Box...
NJ: Wayne, H. Kagan Assoc., 18...
NY: Brockport, G. Gay, Inc., Box 3...
NY: Fulton, C. D. Truax, Box 11...
NY: New York, L. Ackerman, 150...
Ohio: Dayton, W. J. Brauer, Box...
Ohio: Wickliffe, W. J. Brauer, Bo...
Pa: Pittsburgh, W. J. Brauer, ...
ALADDIN CONTROLS, Div... Murfreesboro Rd., Nash... 615-242-3411, TWX: 615... Bassler
ALADDIN ELCTRNS., 701 Murf... Tenn., 37210, Tel: 615-242...

More than 6,000 manufacturers of electronic components, materials, instruments, assemblies, systems and key services are listed in the Yellow Section. An identical Yellow Section appears in each of the three volumes of **eem**, listing addresses, phone numbers and sales managers' names. TWX numbers are also included where available. **Boldface** listings indicate that detailed information on the manufacturers' products is cataloged in the White Section of **eem. Boldface** listings also indicate that local sales offices or representatives are listed for that manufacturer.

to find trade name sources

VOLUME 1, PAGE 957



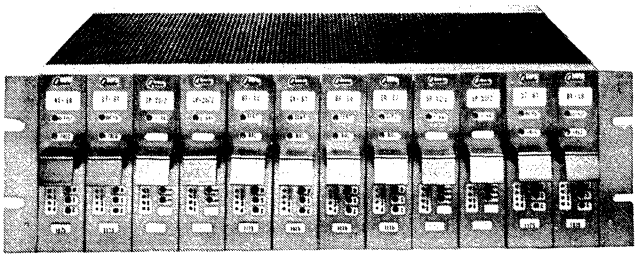
TRADE NAME DIRECTORY

Autonavigator - auto. plotting radar navigation sys. - Moran Instr.
Autopolar - microwave polarization switch - Teledyne Microneitics
AutoRad - x-ray exposure control - Torr Labs.
Autoray & Balloray - inspection systems - Balteau Electric
Autorol - dynamometer - Bear Mfg.
Autosplice - medium size splice/connector machine - Connectrol
Autosyn - instr. & sys. of remote indication - Bendix Aerospace-Elctrns.
Autotak - rpm indicator - Howell Instrs.
Autotec - ... Resch Lab...
Bicalex - winding wires... Cables,
Bicaloc - winding wires...
Biccastrip - flat conduc... Cables,
Bicon - bi-state, solid...
Bicronite - epoxy coati...
Biflex - type of speake...
Big Inch - motors - Ha...
Big Mike - ...

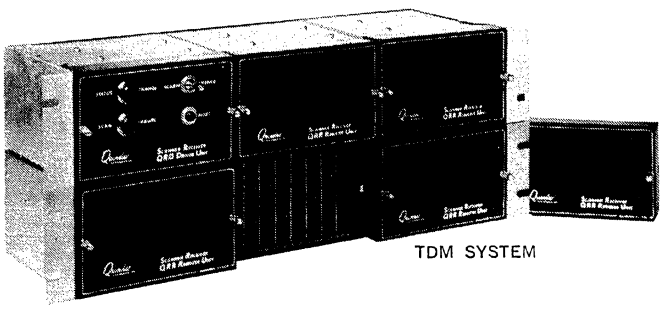
If you know only the trade name, brand name or trade mark of a product, you can locate it in **eem** by using the **Trade Name Directory.** This appears only in Volume 1, beginning on page 957 of the White Section. These pages can be identified by a vertical black band along the outside edge.

if you require additional assistance

contact the Editorial Department, United Technical Publications, Inc., 645 Stewart Ave., Garden City, N.Y. 11530, or phone (516) 248-9700.

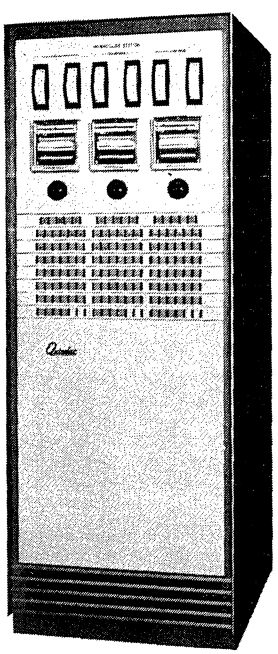


TONE CHANNEL

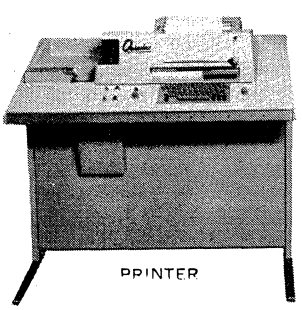


TDM SYSTEM

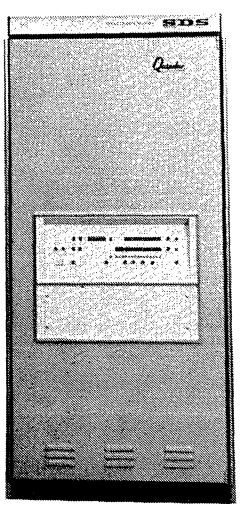
Did you know that Quindar makes a large array of Control/Telemetry Systems? From tone channels to computer based systems. From a single point to thousands of functions.



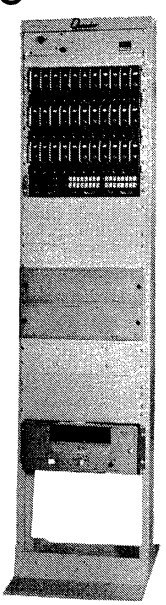
SUPERVISORY CONTROL



PRINTER



COMPUTER



INTERFACE & TRANSMISSION

Quindar

QUINDAR ELECTRONICS, INC., 60 FADEM RD., SPRINGFIELD, N.J. 07081
(201) 379-7400
Offices in principal cities throughout the United States, Canada and Europe.

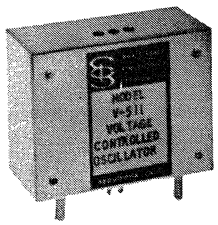
SOLID STATE SYSTEMS & COMPONENTS

DESIGNED TO MEET MIL-E-5272

AEROSPACE
GROUND
INDUSTRIAL
RESEARCH

TELEMETERING — ALL IRIG TELEMETER & RECORDING BANDS, PROPORTIONAL & CONSTANT BANDWIDTHS 400 Hz TO 1 MHz — CUSTOM RANGES

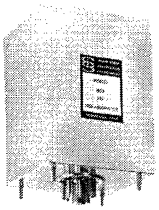
MODEL V-511



VOLTAGE CONTROLLED OSCILLATOR 0°C. TO +75°C.

Designed for accurate conversion of analog voltage to a linearly proportional sine wave frequency.

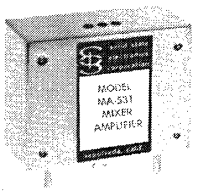
MODEL 401



FM DISCRIMINATOR 0°C. TO +50°C.

Designed to demultiplex and accurately convert varying frequency to a linearly proportional analog voltage.

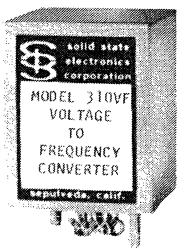
MODEL MA531



MIXER AMPLIFIER 0°C. TO +75°C.

Designed to multiplex many separate subcarrier frequencies (Model V-511) onto a single channel.

VOLTAGE-TO-FREQUENCY



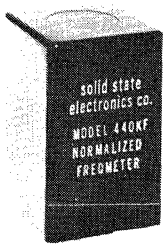
SERIES 300VF TO 100 KHz

Converts varying input voltage to a linearly proportional output pulse repetition frequency.

FEATURES: All Solid State, Microminiature, Rugged.

APPLICATIONS: Telemetering, Data Integration, Analog-To-Digital Conversion.

FREQUENCY-TO-VOLTAGE



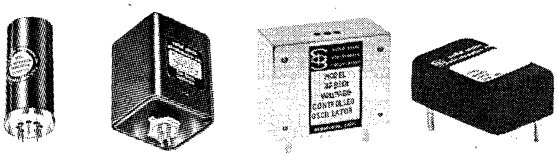
SERIES 400KF TO 100 KHz

Converts varying input frequencies to a linearly proportional output voltage.

FEATURES: All Solid State, Microminiature, Rugged.

APPLICATIONS: Telemetering, Frequency Discrimination, Monitor or Control, Tachometry, Over-Under Frequency or Speed Detectors, Modems.

OSCILLATORS



MODEL S-100 — FIXED FREQUENCY PLUG-IN

MODEL S-200 — FIXED FREQUENCY MOUNTED PLUG-IN

MODEL S-400 — ADJUSTABLE RESISTANCE CONTROLLED OSCILLATOR

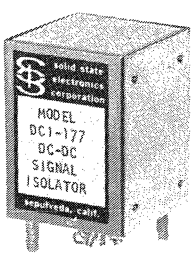
MODEL PG-113 — CRYSTAL CONTROLLED OSCILLATOR

These silicon transistor oscillators are epoxy encapsulated units designed to create stable signal sources.

DC-DC SIGNAL ISOLATORS

FEATURES

- COMPLETED SOLID STATE
- SILICON SEMICONDUCTORS
- ISOLATED INPUT OUTPUT SUPPLY
- MIL-E-5272
- SUBMINIATURE
- STABLE, RUGGED RELIABLE
- −55°C. TO +85°C.
- CUSTOM DESIGNS AVAILABLE



APPLICATIONS

- DC ISOLATION
- BRIDGE CIRCUIT MEASUREMENTS
- THERMOCOUPLE INSTRUMENTATION
- STRAIN GAGE INSTRUMENTATION
- FLOATING POTENTIAL SYSTEMS
- POLARITY REVERSAL
- TELEMETERING
- SERVO SYSTEMS

PHASE-TO-VOLTAGE

SERIES 791

Converts varying phase differences between two signals to a linearly proportional output voltage.

SOLID STATE RELAYS

−55°C. TO +125°C. 2 SEC SWITCH, ±100 V, ±50 MA SUBMIN, SHOCKPROOF, LONG LIFE, ARCLESS

MICROREED RELAYS

−55°C. TO +125°C. IMS SWITCH. ±28 V, 500A

FREQUENCY SENSITIVE RELAYS

0°C. TO +50°C. TO 100 KHz.

OTHER PRODUCTS

- Telemetering Systems
- Signal Conditioners
- Analog-To-Digital Converters
- Differential Operational
- DC Amplifiers
- DC Bridge Amplifiers
- Pressure-To-Frequency Converters
- Pressure-To-DC Converters
- Difference Frequency Modules
- Proximity Tachometers
- Analog Switches
- Solid State Time Delay Modules
- Frequency-To-DC Converters
- Freqmeter Panel Meters
- Shaft Angle-To-Digital Converters
- Shaft Angle-To-DC Converters
- Solid State Choppers

Phone, wire or write for specifications and application literature describing above units or consult your microfilm files (VSMF or Thomas Supplementary).

OTHER PRODUCTS — SEE EEM SECTION 5900

SOLID STATE ELECTRONICS CORP.
15321 RAYEN STREET
SEPULVEDA, CALIFORNIA 91343
Area Code 213 — 894-2271 • 785-4473

FREQMETERS (MODULAR & VISUAL)
DC DIFFERENTIAL OPERATIONAL AMPLIFIERS
XTAL PULSE GENERATORS
VOLTAGE CONTROLLED OSCILLATORS
TONE OSCILLATORS - TRANSFORMERS
RELAYS (SOLID STATE, TIME DELAY, REED, LIGHT)
MINIATURE TELEMETER SYSTEMS
PRESSURE TRANSDUCERS
DIGITAL LOGIC MODULES

Sonex

TELEMETRY SYSTEMS AND COMPONENTS

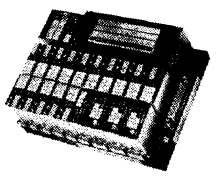
FM MULTIPLEX EQUIPMENT

Frequency-division multiplexing allows a number of different data channels to be transmitted simultaneously on a single link — either RF, telephone or coaxial cable — or to be recorded on a single track of a magnetic tape recorder. The measurement signals from transducers modulate subcarrier oscillators (VCO's) tuned to different frequencies. The outputs of the VCO's are linearity summed and the composite signal is transmitted or recorded. At the receiving end, subcarrier discriminators divide the composite signal into the individual subcarrier signals and demodulate them to produce the original measurement signals. FM multiplexing equipment includes:

Airborne

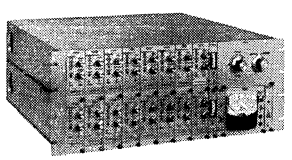
Voltage Controlled Oscillators
- Discrete Component
- Thick Film
- Isolated Input
- High-Level Input (5v)
- Low-Level Input (10mv)
- 28-Volt Operation

Summing Amplifiers
Voltage Calibrators
Power Supplies
Calibration Switches
Mounting Chassis
Signal Conditioners
Translators



Ground

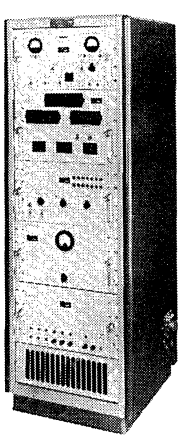
FM Subcarrier Discriminators
Bandswitching Discriminators
Voltage-Controlled Oscillators
Voltage Calibrators
Frequency Calibrators
Tape-Speed Compensators
Translators and Detranslators
Power Supplies
Amplifiers
Meters
Rack Mounts
Voice Annotators



METEOROLOGICAL SYSTEMS

The Model 3703 Meteorological Data Processor operates in conjunction with an AN/GMD Rawin Set or WBRT Radiotheodolite to automatically acquire digital meteorological data for storage on punched paper tape or magnetic tape. The data, which includes tracking angles, slant range, temperature, humidity and elapsed time, is processed to suit transmission line and/or computer input. Peripheral equipment includes:

Digital Printer
Tape Display Unit
Output Format Converter
Test Equipment

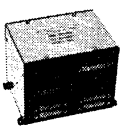


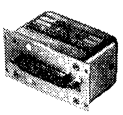
TIME DIVISION MULTIPLEX EQUIPMENT

Time-division multiplexing allows a number of different data channels to be transmitted sequentially on a single link—either RF, telephone or coaxial cable — or to be recorded on a single track of a magnetic tape recorder. A commutating device (multiplexer) sequentially samples the measurement signals from transducers. The commutator output is a series of pulses whose amplitudes correspond to the sampled values of the input channels from the transducers. This train of pulses is then transmitted by pulse amplitude modulation (PAM) or further processed to other transmission formats such as pulse duration modulation (PDM) or pulse code modulation (PCM). At the receiving end, the process is reversed to decommutate the pulse train to produce signals which correspond to the original measurement data. Available equipment includes:

Airborne Digital

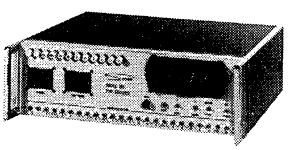
PCM Systems
PAM Commutators
PDM Commutators
Addressable Commutators and Multiplexers
Voice Multiplexing and Demultiplexing Systems





Ground Digital

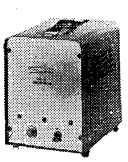
Single-Channel Decoders
Digital Demultiplexers
Signal Conditioners



MEDICAL ELECTRONIC SYSTEMS

The Model 56 Data Transmitter, combined with the Model 57 Data Receiver, provides the capability to multiplex up to six channels of analog data for transmission over leased telephone lines. This data modem has found wide use in transmitting ECG data from a remote intensive care center to a central monitoring hospital. Other physiological uses include transmission of information such as EEG, temperature and pressure. Specifications include:

Isolated Input
All Solid-State
Tape-Speed Compensation
DC to 100 Hz Bandwidth
±2.5-Volt Input



DATA COMMUNICATIONS EQUIPMENT

The following equipment is available from the I/Onex Division:

MODEMS

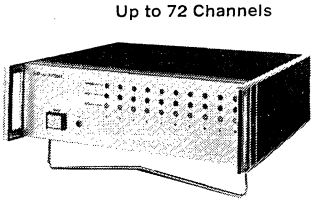
Compatible with Bell 103
To 300 Baud
Automatic Answer
No Adjustments
Single PC Board/Channel
Active Filters

MULTIPLEXERS

Modular Construction
Built-in Modem
Error Monitoring
Bit Interleaved
Full Duplex Operation
Up to 72 Channels

OEM SUBASSEMBLIES

PC Board Modems
Filters
Touch-Tone Generators
Touch-Tone Decoders



Sonex INC. 2337 PHILMONT AVE. • BETHAYRES, PA. 19006 • TEL. (215) 947-6100 TWX 510-665-5485

eem
electronic engineers master
1971-72

**THIS IS THE LAST PAGE
OF THE
CATALOG SECTION, VOLUME 1**

The Trade Name Directory
starts on
the next page

TRADE NAME DIRECTORY

The Trade Names listed here were supplied by the more than 6,000 manufacturers of electronic products whose product listings appear in the three volumes of **eem.** For addresses, telephone numbers, etc., please refer to the Manufacturers and Sales Offices Directory (yellow section).

eem
electronic engineers master
1971-72

Abchar - chemical material - Hughes Aircraft
Ablebond - adhesives - Ablestik Adhesive Div.
Ablefilm - epoxy film adhesives - Abletech
Ablefoam - foam - Ablestik Adhesive Div.
Abletherm - potting compounds - Ablestik Adhesive Div.
Aboglas - asbestos-fiberglass combination - Natvar
Abrax - test instruments - Abbeon
Absolute - air filter - Cambridge Filter
Abson - abs materials - Goodrich B. F. Chem.
Absorbed - low-carbon oils - Houghton, E.F.
Accel - shaft couplers - Britec
Accelograph - planar accelerometer, visual direct recording - Humphrey
Access - control and monitor - Digitech Data Inds.
Accopac - gasket materials - Armstrong Cork
Accraline - a solid state indicating temperature controller - Barber-Colman
Accu-Coat - screen printer - Aremco Prods.
Accu-Count - automatic counter feeders, & inventory machines - Automated Packaging Sys.
Accudata - signal conditioning equipment - Honeywell
Accuderm - coating thickness tester - Unit Process Assemblies
Accu-Drill - ceramic drilling mach. - Aremco Prods.
Accudrive - dual speed drive - Bowmar/Ali
Accufilm - drafting film - Bishop Graphics
Accu-Flo - metering pump - Beckman Instrs., (AISSD)
Acculock - phase lock motor control sys. - Borg-Warner Controls
Acculog - recorder, instrumentation tape - Borg-Warner Controls
Accumat - solid state controller - Hotpack
Accumatic - nc, 12 spindle unit - Excellon Inds.
Accumode - signal conditioner - Endevco
Accupower - power sys - Borg-Warner Controls
Accu-Press - screen press - Etchomatic
Accu-Probe - spectrometer sniffer - Veeco Instrs.
AccuRay - all products - Industrial Nucleonics
Accuspede - ac and dc motor control sys - Borg-Warner Controls
Accutron - instruments - Bendix
Accutron - timers and clocks - Bulova Watch
Ace - lock - Chicago Lock
Ace - fast firing scr - International Rectifier
Ace Bright - contact cleaner - Metex
Acemho - potentiometer - Ace Elctrn. Assocs.
Acepot - potentiometers - Ace Elctrn. Assocs.
Aceset - trimmer - Ace Elctrn. Assocs.
Acetrim - potentiometer - Ace Elctrn. Assocs.
Acitran - acid pump - General Sci. Equip.
Acitrol - pickling inhibitor - Houghton, E.F.
Acme - special effects motion picture equip. - Photo-Sonics
Aco-Therm Pyrometer - heat measuring device - Elctrn. Dev. Labs.
Acoustalloy - diaphragm - Electro-Voice
Acousta-Voicing - sound equalization process - Altec
Acoustic Coupler - dc-22 prentice - Prentice Elctrns.
Acoustic Mirror - transducer dispersion device - Alcor
Acoustifoam - windscreen material - Electro-Voice
Acra-Cote - camera lens coating - Pacific Universal Prods.
Acra-Kleen - optical lens cleaner - Pacific Universal Prods.
Acrasil - resistor - Sprague Elec.
Acroleaf - hot stamp foil - Acromark
Acromarker - nameplate stamping machine - Acromark
Acroreed - reed relay - Acrodyne
Acro-Sound - transformer - C.B.C. Inds.
Acrotimer - multi-switch timers - General Time
Acrylens - injection molded plastic lenses - Lancaster Glass
Acryliglas - acrylic-coated glass fabric - Natvar
ACTA - solvent - GM Nameplate
Actane - acid pickling compounds - Enthone
Actigraph III - paper radiochromatography counter - Nuclear-Chicago
Act/Ion - ion-sensetive electrodes - Corning Glass Works, Lab. Prods. Dept.
Action/Page - paging system - Action Systems
Activate - neutron foils - Nuclear Equip. Chem.
Acto - automatic microwave frequency extender - Systron-Donner
Actoflex - epoxy coated cloth - Natvar
Actucon - connector - ITT Cannon Electric
Acu-Min - miniature labels - Brady, W.H.
Ac-U-trol - coordinate measuring machine - Optomechanisms
Adap-Trol - mtr. output - signal converter - Sigma Instrs.
Adas - airborne recorders - Lockheed Aircraft Svc.
Adas II - airborn maintenance data acquisition system - Lockheed Aircraft Svce.
AdCor - electronic laboratory & test equipt - Advance Instr.
Address-O-Print - digital printer - Dytro
Adds 900 - advanced data display systems - Sanders Data Sys.
ADE - germanium power transistors - Motorola Semiconductor Prods.
AD/Five - analog/hybrid computer - Applied Dynamics Computer Sys.
AD/Four - analog/hybrid computer - Applied Dynamics Computer Sys.
ADF-31A - automatic direction finder - Narco Avionics
Adj-A-Caps - capacitors - Chicago Condenser
Adjust-a-box - adjustable box wrench - Hunter Tools
Adjusto-Fit Blind Bolts - adjustable diameter blind bolts - Adjustable Bushing
Adjusto-Fit Bolts - adjustable diameter bolts - Adjustable Bushing
Adjusto-Fit Shaft Mount Bushings - mounting hubs on shafts - Adjustable Bushing
Adjustohm - adjustable wire-wound resistors - Ward Leonard
Adjustone - hearing aid - Unex Labs.
Adjustoroid - variable inductor high inductance - Nytronics
Adjusto-Switch - rotary switch - Airflyte Elctrns.
Adjusto-Torq - clutches & brakes - General-Electro Mechanical
Adlake - relays & switches - Adams & Westlake
Adlock - prepregs (reinforced plastics) - Furane Plastics
Adrub RTV - flexible mold making rubber - Adhesive Prods.
Advance - dry batteries - Acme Battery
AdVenturer - tool and/or tackle boxes - Vichek Plastics
Advisor - intrusion sensor - Aerospace Resch.
ADX - analog-to-digital converter - Dynalex
Aerisweld - phosphor-bronze electrode - Lincoln Elec.
Aero - elapsed time indicators - Arnoux
AerObiax - heater, cable - American Standard
AerOcoax - heater, cable - American Standard
AerOdet - resistance thermometer - American Standard
Aero Fibre - vulcanized fibre - Bal, William
Aeroflex - polyethylene - Anchor Plastics
Aero-Frequency Meters - Arnoux
AerOgard - thermowell - American Standard
Aeromold - air filter - Cambridge Filter
Aeronautic Bearings - ball bearings - Raway Bearing
AerOpad - thermocouples - American Standard
AerOpak - thermocouple wire - American Standard
AerOrod - heaters - American Standard
AerOseal - moisture barrier - American Standard
Aerosolve - air filter - Cambridge Filter
Aero-Trak - multiple cable & hose carrier system - Aero-Motive Mfg.
Aerotuf - plypropylene - Anchor Plastics
Aetna Drivotrainer & Drivocator - driving simulators - Visual Educom
AE-16 Rosin - activated rosin core solder - Bow Solder Products
AE-21 Nochar - activater rosin core solder - Bow Solder Products
AFTMo - voltage controlled multivibrator - Dynamic Precision Controls
Agamp - automatic gain adjusting amplifier - GTE Lenkurt
Agglomerated - submerged arc flux - Lincoln Elec.
Aggre-Bond - arch. epoxy compounds - Techform Labs.
AGT - adage graphics terminal - Adage
Agtron - color/quality control instr - Magnuson Engrs.
A-H & H - switches & motorcontrol - Arrow-Hart
Aim - gyros - Aviation Instrument Mfg.
Aim - (analog integrated microsystems) - Precision Monolithics
Air Cap - packaging material - Sealed Air
Airdux - ducting - Kirkhill Rubber
Air Dux - inductor coils - Icore Electro-Plastics
Air Dux - inductance coils - Icore
Aire-Regulator - temperature/humidity chamber - Atlas Electric Devices
Airflex - industrial clutches and brakes - Fawick Airflex Div.
Air Flex-I-Lite - combination air & light pipe - Keystone Micro Scan.
Airmeters - air velocity measuring - Hastings-Raydist
Airout - air releasing compound - Isochem Resins
Ajaxomatic - automatic metal pouring - Ajax Magnethermic
Ajustrite - chairs & stools - Ajusto Equip.
Alabax - ceramic fixtures - Pass & Seymour
Alathon - polyethylene insulating mat'ls - E.I. DuPont DeNemours
Alautrone - gold allow plating process - Sel-Rex
Alchrome - heating element alloy - Driver, Wilbur B.
Alcorder - information recorder - Alcor
Alert - earthmover back-up alarm - Alert Prods. Div.
Alert-A-Light - alarm light - Winpower Mfg
Alertronic - (forklift) "in motion" alarm - Alert Prods. Div.
Alfax - recording paper - Alden Elctrn. & Impulse Record. Equip.
Align-O-Pot - special shaft feature - Bourns
Alinabal - rod ends & spherical bearings - MPB
Alkanex - polyester resin wire enamel varnish - General Elec.

Alk-Etch - etchants for production of printed circuits - Hunt, Philip A. Chemical
Allacast Sys. - epoxy potting & encapsulating - Packaged Resins
Allacast System - epoxy potting & encapsulating - Allaco Prods.
Allen-Head - hex socket screws - Allen Mfg.
Allied - transformers, relays, books, hand tools, panel meters, plugs & jacks,tubes, speakers, etc. - Allied Elctrns.
Allison - audiometric testing equipment - Tracor
Allispede - ac mech. adj. speed drives - Allis Louis
Allispede - ac mech. adj. speed drives - Allis, Louis
Alloy Rods - welding wire & electrodes - ARC Prods. Div.
Allros - non-activated rosin flux - Alpha Metals
Allsafe - ground fault interrupter (gfi) - Permavolt Transformers
All-State - brazing & soldering alloys - ARC Prods. Div.
All-Temp - screen ink - Podgor, Joseph
Alnico 5Cb - magnets - Thomas & Skinner
Alpa - cameras, lenses, filters, programmer/timer - Heitz, Karl
Alpac - silicon bridge rectifiers - Semtech
Alpaca - software for dp-203 digital plotter - Geo Space
Alpha - floated rate integrated gyros - Singer-General Precision
Alpha I - indicating temperature controller - Elctrn. Control Sys.
Alphaline - two wire temp. transmitter - Rosemount Engrg.
Alpha-Lite - alpha-numeric readout - Pinlites
Alphaloy - special alloy solders - Alpha Metals
Alphatron - vacuum gauges - Norton
Alphatron - vacuum gauges - Vacuum Equip. Div.
ALSiBase - thin ceramics - American Lava
ALSiCoat - ceramic coatings - American Lava
AlSiMag - pressed & extruded ceramics - American Lava
ALSiPak - ic/packages - American Lava
Altecall - pocket paging - Altec
Altecom - intercommunications - Altec
Alugard - lightning arresters - General Elec.
Alumagard - sheathed coaxials - Superior Continental
Alumalytic - capacitors - General Elec.
Alumapak - aluminum electrolytic capacitor assy - Sprague Elec.
Aluma-Trak - (aluminum chassis slides) - Zero Mfg.
Alumibond - bi-metallic casting - Tickle, Arthur Engrg. Works
Alumicoat - hot dip aluminizing - Tickle, Arthur Engrg. Works
Alumifoam - foam dielectric - Times Wire & Cable
Aluminax - aluminum shielded coaxial cables - Saxton Prods.
Aluminex - photo sensitized alum. - Graphtex
Aluminweld - aluminum silicon electrode - Lincoln Elec.
Alumisol - solid dielectric - Times Wire & Cable
Alumispline - spline dielectric - Times Wire & Cable
Alumitek - heat sinks, pc boards - Transistor Devices
A-Lum-O-Aire - air filters - Carey Elctrn. Engrg.
Alumon - processes for plating on aluminum - Enthone
Alumoweld - wire, strand and rods - Copperweld Steel
Alundum - aluminum oxide - Norton
Alutin - solder type alloy - Eutectic
Amaircell - braided wire - American Elec. Cable
Ambassador Gloves - industrial gloves - Standard Glove Co. of N.J.
Amberlith - masking film, art masters - Ulano Prods.
Ambilog 200 - hybrid computer - Adage
AMC - electron tubes - State Labs
Amco - fluxes - Force Chems. Div.
AMC Semiconductor - transistors-drodes - State Labs
Ameda - data accumulator - Femco Div.
Amerap - wrapped wire - American Elec. Cable
American Beauty - bench-size ultrasonic cleaners - American Elec. Heater
American Beauty - conduction-type soldering equip. & accessories - American Elec. Heater
Amerite - antenna towers - American Tower
Amer Plastic - insulated wire - American Elec. Cable
Amershield - braided shield - American Elec. Cable
AMFlite - illuminated indicator - AMF Electical Prods.
Amid-Therm - polyester insulated magnet wire - REA Magnet Wire
Aminco-Aire - environmental control source - American Instr.
Ammogas - gas generator - Sunbeam Equip.
Ampact - explosive cartridges - Amp
Amp-Blade - connector - Amp
Amp-Crimpac - flat packs header - Amp
Amp-Edge - connectors - Amp
Ampeez - connectors - Amp
Amp-Fine-Y-R - splice - Amp
Amp-Fit - tube fittings - Amp
Ampflex - radially expanding bellows-linear force in tension - Trish Energetics
Amp Fuse - wirewound resistor - Workman Elctrn. Prods.
Amphenol - connectors - Amphenol Ind'l. Div.
'Amphib' - chemical filter pump system - Sethco Mfg.
Ampillume - indicator lights - Amp
Amp-In - connectors - Amp
Amp-Incert - connectors - Amp
Ampip - post-insulation pod - Amp
Amplastic - plastic tubing - Amp
Amp-Leaf - connectors - Amp
Ampli-Bond - electrical splices and terminals - Amp
Amplibox - portable p.a. system - American Geloso Elctrns.
Amplibridge - accelerometer - Statham Instrs.
Ampli/Cator - amplifier & indicator - Tensitron
Ampli-Cycle - power converter - Electric Machinery Mfg.
Amplifilm - high voltage capacitors - Amp
Amplifilm - dielectric material - Amp
Amplimica - capacitors - Amp
Ampli-Speed - magnetic drives - Electric Machinery Mfg.
Amplite-End - closed-end splice - Amp
Amplivar - splices - Amp
Amplivoice - power megaphone - American Geloso Elctrns.
Ampli-Vox - public address sys. - Chamberlain Mfg.
Amp-Lok - connectors - Amp
Ampmodu - interconnection system - Amp
Amp-O-Lectric - electric machines - Amp
Ampomator - making machine - Amp
Amportapower - hydraulic tools - Amp
Ampower - splices and terminals - Amp
Amprobe - clamp-on volt/ammeters and strip chart recorders - Amprobe Instr.
Ampseal - connectors - Amp
Amp Shield - connectors - Amp
Amp-Sulation - heat shrinkable tubing - Amp
Amp-Tab - connectors - Amp
Amp-Tapematic - machines for tape-mounted terminals - Amp
Amp-Tapetronic - electric machine for applying tape-mounted terminals - Amp
Amp - Traps - fuse - Chase-Shawmut
Amp-Unyt - connectors - Amp
Analog Filters - electronic filters - Spectrum Instrs.
Analogger - analytical instr. data logger - Control Equip. Corp., New England
Analogic - analog modules - Computer Dynamics
Analytical Titra-Kit - redox-ph meter - Analytical Meas.
Ancoa - for automotive jobbers - Ward Products
Ancorene - high impact styrene - Anchor Plastics
And-O-Meter - oxygen recorders - Anderson, W.E.
Anechoic - sound chanders - Eckel Inds.
Angelica - service apparel - Angelica Uniform
Angelica-Prest - service apparel - Angelica Uniform
Anka - connector unit - British Insulated Callender's Cables,
Anniversary - soldering tips - Wall Mfg.
Announc-A-Mat - floor mat chime kit - On-Guard Corp. America
Annubar - flow meter - Ellison Draft Gage
Anodex - steel and copper electro cleaners - Mac Dermid
Anodicolors - Light Resistant Integral Dyes - Colonial Alloys
Anogard - porous anode cup - Materials Development
Anoguard - malfunction controller - Anocut Engrg.
Anonizing - coating for aluminum surfaces - Colonial Alloys
Antex-Precision - miniature soldering iron - Newman, M.M.
Anti-Dermatitis - hand cleaner - Topper Mfg.
Anti-Static #79 - static eliminator - Merix Chem.
Anti-Static #79-OL - static eliminator - Merix Chem.
Anton - connectors - Dale Elctrns.
Anviloy - tooling material - Mallory Metallurgical
Any Color Over Any Color - wire color coding inks - Formulabs Ind'l. Inks
Anzac - passive component - Adams-Russell
Apartment/Phone - aptt sys - Action Systems
APC-N - precision type N coaxial connector - Amphenol RF Div.
Apcor - drives & clutches - Geartronics
APC-7 - precision 7mm connector - Amphenol RF Div.
APC-7s - precision 7mm connector with plug & jack mating - Amphenol RF Div.
Apilon - ceramic friction face - American Precision Inds.
Apizon - oils, greases, waxes - Biddle, James G.
Apotal - copying lenses - Rank Precision Inds.
APTCO - transducers, ultrasonic - Advanced Patent Technology
APT ONE - computer, desk top - Advanced Patent Technology
Aquadag - graphite in water - Acheson Colloids
Aquaducer - water-pressure meas. apparatus - Nold, Walter
Aquafluor, Liqufluor, Omnifluor - liquid scintillation chemicals - Pilot Chemicals
Aquaflux - neutron howitzer - Nuclear Equip. Chem.
Aqualac - corrosion-resistant compounds - Mac Dermid
Aqua Link - underwater mateable elec. connector - Boston Insulated Wire & Cable
Aquameter - moisture analyzer - Beckman Instrs.
Aquaphone - underwater sound, transducer - Nold, Walter
Aqua-Purometer - conductivity meter - McNab
Aquatone - water level warning - Zeigler Controls
Aquatron - underwater sound amplification, apparatus - Nold, Walter
Arbond - adhesive - Artech
Archer - solder guns, irons, warning systems, fiber optics, cleaners, etc. - Allied Elctrns.
Arcs & Sparks - publication in spectroscopy - Ultra Carbon
Arctic Aire - window fan - Fasco Inds.
ARDS - terminal - Adage
Aremcobond - epoxy adhesives - Aremco Prods.
Aremcolox - machinable ceramics - Aremco Prods.
Aristar - elctrn. chem. & optical materials - Atomergic Chemetals
Aristocrat - changeable nameplates - Best Mfg.
Aristocrat - spkr. sys. - Electro-Voice
Arkomax 800 TM - permanent magnet - Arnold Engrg.
ARM - connectors - Americon
Armac - detector - Packard Instrument
ARMAC - scintillation detector - AMBAC Inds.
Armaflex - foamed plastic insulation - Armstrong Cork
Armalon - teflon impregnated fiber glass - E.I. DuPont DeNemours
ARMM - micro miniature connectors - Americon
Armo-Dur - microphone - Shure Bros.
Armor-Cote - insulation systems - Allis Louis
Armor-Guard - insulation systems - Allis Louis
Armor Line - ac motors - Allis, Louis
Armor-Seal - insulation system - Allis, Louis
Armortite - direct burial non-metallic sheath - Okonite
Arnox - permanent magnet - Arnold Engrg.
Aro - resistance welding guns - portable - Falstrom
ARP - molding compounds - Furane Plastics
ARSM - sub-miniature connectors - Americon
Artar - lenses - Goerz Optical
Arulab - ultrasonic test equipment - Arenberg Ultrasonic Lab.
Arumen - permanent magnet - Arnold Engrg.
Arval - equip. balancers - Falstrom
Asahi Pentax - (35mm camera) - Honeywell
ASCO - controls & solenoid valves - Automatic Switch
Asco-Braze - brazing alloys - American Silver Co. Div.
Asco-Flux - brazing flux - American Silver Co. Div.
Ascop - photomultiplier tubes - EMR Div.
A-Scope - interferometer - Varian Assocs.
ASP - all listed prods. - All Star Prods.
Assm - sub minature connectors - Astrolab
Assopreci - decades boxes - A.O.I.P.
Ast - minature connectors - Astrolab
Astro - interchangeable lenses - Ercona
Astro Dial - time control - Paragon Elec.
Astrodome - photoelectric control - General Elec.
Astro-Flare - emergency light - Crimpco Engrg.
Astrogide - p.c. card guides; guides circuit board - Bivar
Astrolite - indicator light - Drake Mfg.
Astrolite - ferrite attenuation - Astrolab
Astromast - portable antenna towers - Astro Resch.
Astromaster - master yagis antenna - RF Systems
Astron - computer tape - Memorex
ASTRO Plate - non tarnishing substitute for silver plating - Amphenol RF Div.
Astroscat - parabolic reflectors - RF Systems
Astroseal - special lowloss sealing mt'l for hemetic sealing - Astrolab
Astrosorb - ferrite termination - Astrolab
Astrotenna - antennas - Video Inds.
Astro/348 - connector - Amphenol Connector Div.
Asymptotic - calorimeter - Hy-Cal Engrg.
Atom - aluminum electrolytic capacitor - Sprague Elec.
Atomax - lamps - Perkin-Elmer
Atomiclad - contact rivets - Gibson Elec.
Attache' - microphone - University Sound
AT6A Flightguard - solid-state transponder - Narco Avionics
Audev - computer & video tape - Audio Devices
Audiac - audio access equip. & sys. - Merchant, Robert C.
Audimax - limiter - CBS Laboratories
Audio Baton - audio filter - Blonder-Tongue Labs.
Audiodiscs - blank discs - Audio Devices
Audio-Line - all broadcast accessory equipment - Audio Accessories
Audiopak - cassettes & cartridges - Audio Devices
Audiopoints - stylus - Audio Devices
Audiotape - soundtape - Audio Devices
Audiotran - audio ampl. module - Ferrotran Elctrn.
Audio-Verter - paper tape transmitter - Digitronics
Auditor - hand held monitor receivers - Unimetrics
Auger Point - masonry drills - Tilden Tool Mfg.
Aurall 292 - 24 kt. gold process giving excellent metal distribution - Lea-Ronal
Auric - gold plating solutions - Fidelity Chem. Prods.
Aurion-X - ion-exchange gold reclamation unit - Sel-Rex
Aurobond - gold strike - Sel-Rex
Auro Dure - 24 kt. gold process giving hard deposits - Lea-Ronal
Aurostrip - gold-stripping chemical - Mac Dermid
Autobag - bag loader sealers - Automated Packaging Sys.
Autobag - plastic bags - Automated Packaging Sys.
Auto-Bridge - automatic limit bridge - Beckman Instrs.
Autochemic - fluxes - Eutectic
Autocorder - photographic recorder - Sprengnether, W.F. Instr.
Autodrive - automatic drive for roughometer - Marduth Prods.
Autofinger - solenoid deck - Nuclear Data
Auto-Flow - mark II drafting machine - Keuffel & Esser
Auto-Gain - instrumentation amplifier - Ithaco
Auto-Gamma - detector - Packard Instrument
Auto-Gamma - gamma counting sys. - AMBAC Inds.
Autographs - nameplates & tags - Metalcraft
Autohet - frequency counter - EIP
Auto-Lift - digital-data storage drum - Bryant Computer Prods.
Autoloc - amplifier - Keithley Instrs.
Autolog - automatic logging equip. - Rust
Automagnetic - (magnetic processing system) - RFL Inds.
Automaster - portable power tools - Portable Elec. Tools, Div.
Automat - grounding control device - Wintriss Controls
Automatic Pressure Controller - automatically regulates the gas pressure in a system - Granville-Phillips
Automaze - air filter - North American Rockwell
Auto Mod - complete telemetry systems - Autocon Inds.
Auto-Monitor - solid state recording annunciator - Autocall Co., The
Autonavigator - auto. plotting radar navigation sys. - Moran Instr.
Autopolar - microwave polarization switch - Teledyne Micronetics
AutoRad - x-ray exposure control - Torr Labs.
Auto-Ranger - charge amplifiers - Unholtz-Dickie
Autoray & Baltoray - inspection systems - Balteau Electric
Auto Reg - chargers - C & D Batteries
Autorol - dynamometer - Bear Mfg.
Auto-Roll - air filter - Cambridge Filter
Auto-Scan - automatic panning head - GBC Closed Circuit TV
Auto Sense - elctrn. motion sensing device - United Resch. Lab.,
Autosplice - medium size splice/connector machine - Connectrol
Autosyn - instr. & sys. of remote indication - Bendix Aerospace-Elctrns.
Autotak - rpm indicator - Howell Instrs.
Autotec - magnetic tape recorders - United Resch. Lab.,
Autotemp - temperature indicator - Howell Instrs.
Auto TIG Welder - automatic inert gas welder - Flexion
Auto-Torque - taut-band mechanism - Jewell Electrical Instrs.
Autotorque - internally ribbed coil form - Precision Paper Tube
Autotrac - lock-in amplifier - Keithley Instrs.
Autotransfer - transfer control - Wintriss Controls
Avex - rivets - Avdel
Avikrimp - solderless terminals & connectors - Waldom Elctrns.
Avikrinp - insulated vibration resistant terminal - ETC
Avsafe - locking bolt - Avdel
AWAC - conductors - Copperweld Steel
Aximax - fan - Rotron
Axiohm - axial lead enamel resistors - Ward Leonard
Axitube - tubeaxial fans - Joy Mfg.
Axivane - vaneaxial fans - Joy Mfg.
AZ - type uf - Plastic Wire & Cable

B

Backalarm - truck back-up alarm - Alert Prods. Div.
Bakelite - plastics products; vinyl, pe, etc. - Union Carbide, Chemicals & Plastics
Balance Pac - portable balancer & vibration analyzer - Balance Technology
Balco - resistance alloy - Driver, Wilbur B.
Balladier - microphones - Conrac
Ballistic Flow Calibrator - transducer flow calibrator - Flow Technology
Ballistrak - transducer flow calibrator - Flow Technology
Ball-Lok - quick release pins - Avdel
Ball Paint Marker - industrial marker - Markal
Baltograph - x-ray machine - Balteau Electric
Baltomatic - x-ray machine - Balteau Electric
Baltospot - x-ray machine - Balteau Electric
Band-Guard - transistors - Motorola Semiconductor Prods.
Bandstand - phonographs - amplifiers - Electron Enterprises
Bangstick - underwater gun - Beckman Instrs., Advanced Tech.
Bantam - miniature round connectors - Burndy

BantamDuct - flexible duct - Flexaust
Bantam Rota-Crimp - crimping tools - Amp
Bantamweight - frequency changers/inverters - Nova Electric Mfg.
Bar-Bac - uniforms - Angelica Uniform
Barco - industrial chemicals - Barium & Chems.
Barco - electronic chemicals - Barium & Chems.
Barco - non-inflammable solvents - Barco Chem. Prods.
Barex Getters - tube parts - King Laboratories
Barex Givers - tube parts - King Laboratories
Barocel - pressure transducers - CGS/Datametrics
Baronet - degreasers - Baron-Blakeslee
Barratron - transmitting tubes - Litton Inds.
Barrymount - shock and vibration isolators - Barry Controls
Basicast - bci castable. 99 plus alumina and mullite castable refractory concretes. - Basic Ceramics
Basiment - bci cement - Basic Ceramics
Batt Meter - elapsed time indicator - Engler Instr.
Batt-Sub - battery substitute - Dynage
Bayflex - grinding wheel - Avco Bay State Abrasives Div.
Bazooka - solder gobbler/iron - Air-Vac Engrg.
Bazooka - vacuum probes - Air-Vac Engrg.
B-Cap - twist-on connector - Buchanan Elec. Prods.
BCI - linear polyamides - Belding Chem. Inds.
BDT - non cyanide gold plating process - Sel-Rex
Beam-Tron - detector - Automation Devices
Beam-X - beam switching tube - Burroughs
Bear - coated abrasives - Norton Coated Abrasive & Tape Divs.
Bear-Tex - resilient abrasives - Norton Coated Abrasive & Tape Divs.
Beau Motor - Beau Motor Div.
Beau Plug - connectors & plugs - Vernitron Elec. Comps.
Becon - printed circuit connectors - Teledyne Kinetics
Beeco - miniature precision sintered sleeve bearings. expansion plates - Beemer Engrg.
Beeplites - indicator light - Drake Mfg.
Behlman Invertron - ac power sources - California Instrs.
Bekomatic Elctrn. - balancer - Bear Mfg.
Bellco Nameplates - plastic & metal identification plates - Bell
Belling & Lee - component suppl - Ercona
Bellowform - connector contact - Continental Connector
Bemac II - ac generators - Electric Machinery Mfg.
Bench Model Solderette - wavesolder system - Electrovert
Bendohm - wirewound resistor - Workman Elctrn. Prods.
Bendway - bendable metal duct - Flexaust
Berg - pliers - Erikson Specialized Tool
BergCon - packaging system - Berg Elctrns.
Bergflo - plating process - Berg Elctrns.
Berglance - male pin - Berg Elctrns.
Berglok - modular interconnection system - Berg Elctrns.
Bergold - graduated gold plating - Berg Elctrns.
Bergpac - reed relay terminal - Berg Elctrns.
BergPost - wire wrap pins - Berg Elctrns.
Berlon - beryllium oxide epoxy resin materials - National Beryllia
Berlox - pure oxide ceramics, composite systems, ceramic-to-metal assemblies - National Beryllia
Berlox-strate - pure beryllia substrates - National Beryllia
Besponder - transponder - Vega Precision Labs.
BET - rf power transistors - Motorola Semiconductor Prods.
Betalight - self-luminous light sources - Canrad Precision Inds.
Beveloid - conical involute gears - Invincible Gear
BEWCO - instrumentation - Beukers Labs.
Bezelmate - indicators - Westmoreland Plastics
BG - magnetizable powder - Stackpole Carbon
Bicalex - winding wires and strips - British Insulated Callender's Cables,
Bicaloc - winding wires - British Insulated Callender's Cables,
Biccastrip - flat conductor cable - British Insulated Callender's Cables,
Bicon - bi-state, solid state controller - Robicon
Bicor - tank level sys - Trans-Sonics
Bicronite - epoxy coating process - Bicron Elctrns.
Biflex - type of speaker - Altec
Big-Bertha - antenna support mast - Telrex Labs.
Big Inch - motors - Haydon Switch & Instr.
Big Mike - rectifiers - American Rectifier
Big Pac - magnet wire - New Haven Wire & Cable
Bigun - quick disconnect connector - Joy Mfg.
Big-7 - wiring tool - Holub Inds.
Bimet - clad metals - Handy & Harman
Bimini VHF - marine radiotelephone - Pearce-Simpson
Bimini 550 - marine radiotelephone - Pearce-Simpson
Bimode Diodes - microwave multiplier diodes - Varian
Bimorph - piezoelectric transducer - Vernitron Piezoelectric Div.
Bina-View - binary-input self-decoding readout - Ind'l Elctrn. Engrs.
Biode - silver/silver chloride electrode (af/agcl) - Biocom
Biofilm - semi-permeable fluorocarbon membranes - Dilectrix
Bio Sentry - radiation shield - Nuclear Data
Bio-Solv - solubilizers - Beckman Instrs., (AISSD)
BIPAX - flexible package - Tra-Con
Bipco - nixie tube driver module - Burroughs
Bi-Planar - flat speaker sys. - Electronic Resch. Assocs.
Biraco - tubing - Birnbach
BI/Scan - record/reproduce system - Himmelstein, S.
Biscuit - blower - Rotron
Bit Error - rate test sets - Digitech Data Inds.
B&J Light - photographic copy lighting - Burke & James
B&J Porta-Strobe - portable electronic flash - Burke & James
B & K - test equipment - Dynascan
Black Beauty - molded case capacitor - Sprague Elec.
Black-Daylite - television receivers - General Elec.
Blaco - graphite dispenser - Servwell Prods.
Blakblack - black dye for anodized aluminum surfaces - Colonial Alloys
Blak-Ray - black light lamps & fluorescent materials - Black Light Corp. Amer.
Blak-Ray - ultraviolet lamps & fluorescent mat'ls. - Ultra-Violet Prods.
Blendalloy - alloys - Magnetics
Blendmaster - metering, mixing, dispensing machines - Hull
Blend-Ohm - screenable resistance paste - Methode Elctrns.
Blendtrol - digital blending sys. - Foxboro
Blinc - inspection comparator - Ragen Precision Inds.
Block-Stor - buffer storage devices - Remex Elctrns.
Bloc-Lite - indicators-lighted - LVC Ind's.
Blo-Master - portable ventilators - Cincinnati Fan & Ventilator
Blue Chip - resistor - Erie Technological Prods. (EEM)
Blue Dot - flashcubes - flashbulbs - GTE Sylvania
Blue Dot - coaxial connector - Maury Microwave
Blue Flash - grinding wheel - Avco Bay State Abrasives Div.
Blue J - static logic modules - Jordan Controls
Blue Jacket - vitreous enamel resistor - Sprague Elec.
Blue Poly - photo screenprinting film - Ulano Prods.
Blue Ribbon - connectors - Amphenol Ind'l. Div.
Blue Top - projector lamps - GTE Sylvania
Bobbin Cores - magnetic cores - Infinetics
Bolt-Lite - aircraft instr. post light - Glar-Ban
Bolt-O-Matic - automatic weight counter - Exact Weight Scale
Bomb-Tail - closed-end splice - Amp
Bondaid - teflon etchant - Shamban, W.S.
Bondex - iron-on fabric - Permacel
Boomerang - sediment corer - Benthos
BoostiVac - sublimation pumping - Ultek Div.
Boralloy - pyrolytic boron nitride - Union Carbide
Borotec - mesh alloys - Eutectic
Boss - metal enclosures - Superior Switchboard & Devices Div.
Bostgard - high temperature soaking pit cables to 2100f - Boston Insulated Wire & Cable
Bostomatic - n/c machine tools - Boston Digital
Bostomatic - numerical controls - Boston Digital
Bostplex - high flexibility industrial cables - Boston Insulated Wire & Cable
Bostrad - fire & radiation resistant elec. cables - Boston Insulated Wire & Cable
Bostron - belts - American Biltrite Rubber
Bo'sun - bottom mapping equipment - General Instr.
Bouyoucos - soil moisture meas. inst. - Beckman Instrs.
Boxer - axial fan - IMC Magnetics
Box Switch - push button switches - Switchcraft
Boyd Bolt - self-retained bolts - Tridair Inds.
Bradylite - luminous markers - Brady, W.H.
Brazaloy - flux - ARC Prods. Div.
Break Safe - high voltage cable terminator - Joy Mfg.
Bright Point Illuminator - illumination technique for tc-1 - Wild Rover
Bright Spot Illuminator - illumination technique for tc-1 - Wild Rover
Britebore - rust-resistant plating - Fafnir Bearing
Brite-Gard - protective coating - Republic Steel
Broadband - matched coax-t - Microwave Labs. America
Broadmaster - manual drafting machines - Universal Drafting Mach.
Bronco 66 - cable - Teledyne Western Wire & Cable
Bronzochrom - overlay rods/electrodes - Eutectic
BronzoTec - mesh alloys - Eutectic
Brooksmite - flowmeter - Brooks Instr. Div.
Brook - Tel - telephone accessories - Telephone Comps.
Brown Devil - resistors - Ohmite Mfg.
Brute - dc power supply - Wanlass Div.
B Temp - asbestos filled nylon - Precision Paper Tube
Btr - mountings - Lord Mfg.
Bubbltrol - pressure operated control - Autocon Inds.
Buddybuzzer - dual alarm system - Tapeswitch Corp. Amer.
Budelman - microwave & multiplex equipment - Cardion Communications
Bug Eye - indicator lights - Circon
Bug-In-The-Ear - inductive prompting device - Farrall Instr.
Bull Dog - tapes - American Biltrite Rubber
Bull Driver - screw driver - Vaco Prods.
Bullet Bond Clip - cable bonding device - Communications Tech.
Bullet - sealing hub connector - Thomas & Betts
Bullseye Trouble-Tracer - line detector - Electro-Alarm Safety Devices
Bulplate - printed ceramic - base network - Sprague Elec.
BurgAlert - inexpensive burglar alarm system - Bionic Instrs.
Burgun-D - connector - ITT Cannon Electric
Burn-Eze - elctrn. burn-in equip. - Ogden Technology Labs.
Buss - fuses & fuse mountings - Bussmann Mfg.
Butal - wide angle process lenses - Rank Precision Inds.
Butox - elastomeric compounds - Hardman
Butterfly - double-break mechanism - Licon Div.
Butterfly - double-break switches - Licon Div.
Buttite Spacers - tubular spacers - C.E.M.
Button-Switch - push button switches - Switchcraft
Buzit - continuity checker - Workman Elctrn. Prods.
Bytac - pressure-sensitive FEP overlays - Chemplast
Bytrex - semiconductor strain gage transducers - Tyco Instr. Div.

C

C - switching assemblies - Clare, C.P.
Cabinetrol - motor control - General Elec.
Cable Hound - cable locator - Superior Continental
Cable Maker - terminals - Amp
Cable-Mate - r.f. connectors - D-Cemco
Cable-Rap - plastic spiral wrap - Transcon Mfg.
Cadco - plastic sheet, rod, tubes, films, blocks, adhesives - Cadilac Plastics & Chems.
Cadence - musical instr. speakers - Utah Elctrns.
Cadillac Quik Air - blowers & suction cleaners - Clements Mfg.
Cadillac Quik Heat - gas blowtorches & electric flameless torches - Clements Mfg.
Cadillac Quik Vac - industrial vacuum cleaners - Clements Mfg.
Cadis - computer aided design information sys. - Macrodata
Caeon #27 - solvent - Caig Labs.
Cage-Trol - induction-motor controls - Electric Machinery Mfg.
Cal-A-Sal - sal-ammoniac blocks - Shanda Labs.
Calcerite - plastic bound gyspsum - Furane Plastics
CalComp - computer peripheral equip. - California Computer Prods.
Calfax - speciality fasteners - Tridair Inds.
Calico - dvms, monitor oscilloscopes - California Instrs.
Calico - multi-channel oscilloscopes, digital multimeters, digital panel meters,digital ohmmeters - Calico Div.
Caliper - thickness tester - Branson Instruments
Calorimixer - gas mixing controls - Cutler-Hammer
Calrod - heaters - General Elec.
Cambi-Card - circuit boards - Cambridge Thermionic
Cambion - elctrn. comp. & swagers - Cambridge Thermionic
Cam-Loc - lampholders - Westmoreland Plastics
Cam-Loc - starter socket & wire assembly - Westmoreland Plastics
Cam-Rac - connector - ITT Cannon Electric
Camseal - fluorocarbon seal - Shamban, W.S.
Cam-Vac - air filter - Cambridge Filter
Canex - electrical meters - Canadian Research Institute
Cannon - pen systems - Kingmann-White
Canoe Clips - fasteners - Shakeproof Div.
Canoe Clips - plastic snap-in fastener - Fastex Div.
Capa - Phosphoric Acid - Colonial Alloys
Capable - logic tester - Computer Automation
Capcoder - a/d converters - Bendix Environmtl. Sci.
Capcon Reg. U.S. Pat. Office - capacitors, condensers - Capcon
Capitol - sound tape, cassettes, cartridges - Audio Devices
Caplet - rivets-insulated - Pylon
Caplexer - multiplexers - Bendix Environmtl. Sci.
Capri - hi-fi speaker sys - Hartley Prods.
Capri, Monaco, Riviera - electronic dimmers - Lutron Elctrns.
Capro - batteries - Photo Tech. Prods.
Caps - authorized plug specialist - ITT Cannon Electric
CAPSIL - variable capacitance diodes (silicon) - General Instr.
Capsular - insulation systems - Allis Louis
Capsulex - insulation system - Allis, Louis
Cap-Sure - component holders - Ind'l. Devices
Captain - lighting prods. - Union Carbide
Captivated Shield - shields - Staver
'Carbolator' - carbon & filter purification - Sethco Mfg.
Carb-O-Lock - toolholder-insert combinations - General Elec.
Carboloy - cemented carbide material & products - General Elec.
Carboloy '500' - cemented carbide material & products - General Elec.
Carbolube - carbon products - Carbone
Carbon-istor - carbon film resistor - Kidco
Carbo Weld II - preconstruction weldarle primer - Carboline
Carbo Zinc II - inorganic zinc protective coating - Carboline
Carcinotron - m-type backward wave oscillator - Thomson-CSF Electron Tubes
Cardec 125 - miniature plate-type printed circuit card edge connector - Malco Mfg.
Cardec 200 - plate-type printed circuit card edge connector - Malco Mfg.
Cardiline - microphone - Electro-Voice
Cardio/Sentinel - cardiac monitor - Mennen-Greatbatch Elctrns.
Cardmatic - automatic tube tester - Hickok Elect. Instr.
Carousel - dispenser - Permacel
Carousel IV - inertial navigation systems - Delco Electrns. Div.
Carpitron - locked backward wave oscillator - Thomson-CSF Electron Tubes
Carson Tape Splicer - splicing magnetic tape - Magnecessories
Cartridge Lamps - indicator light - Drake Mfg.
Casemaster - controlled atmosphere furnace - Sunbeam Equip.
C.A.S.H. - dip/ic packaging (computer automated sys hardware) - Standard Logic
C.A.S.H. - dip/ic packaging automatic systems (computer hardware) - Standard Logic
Castolin - electrodes, solders, fluxes - Eutectic
Castordag - graphite in castor oil - Acheson Colloids
Catabond - copperclad laminates - NVF
Cathaloys - alloys - Superior Tube
Cavalav - cleaning solutions and chemicals (aqueous) - Lewis
Cavasolv - cleaning solvents - Lewis
Caviderm - tests plating in holes of P.C. board - Unit Process Assemblies
CB-3 - P.C. board surf. plating tester - Unit Process Assemblies
CCL - capacitors - Callins Inds.
CCR - dimmers - Century Strand
C-Dek - computer data entry keyboard - Colorado Instrs.
CDF - vertical epitaxial reactor - Hugle Inds.
CDM - terminal blocks - Curtis Dev. & Mfg.
CDP - p.a. horn - Electro-Voice
CEE - cassette duplicators & attachments - Computerized Elctrn. Education
C-E Elctrns - elctrn control devices - Ametek/Instrs. & Controls
Celanar - polyester film - Celanese Plastics
Celanex-917 - aromatic condensate - Celanese Plastics
Celcon - acetal copolymer - Celanese Plastics
Celesta - diecast speakers - Utah Elctrns.
Cell-O-Air - polyethylene dielectric - Superior Continental
Celoron - molded products - Budd
CEM - flow computer & computing modules - Bristol Div
Cemco - switches - Columbus Elec. Mfg.
Cenco - registered trade name-all products - Central Scientific
Centaur - fan - Rotron
Centers - answering equipment - Ford Industries
Centi-K - connector - ITT Cannon Electric
Centi-Loc - connector - ITT Cannon Electric
Centra Gap - laminations - Thomas & Skinner
Centre - connector - Bendix
Cen-Tri-Core - energized rosin filled core solder - Alpha Metals
Centrimax - blower - Rotron
Centrisafe - centrifugal accelerator (centrifuge) - Trio-Tech, Inc. of Calif.
Cent-R-Line - drafting scale - Devonics
Centronic - photomultipliers - Bailey Instrs.
Centura - wallplates, switches, outlets - Leviton Mfg.
Ceracircuit - ceramic circuit - Sprague Elec.
Ceradot - cermet fixed resistor - CTS
CerAlloy - getter - Ronson Metals
Ceramabond - ceramic adhesive - Aremco Prods.
Ceramacast - castable ceramics - Aremco Prods.
Ceramacoat - ceramic coatings - Aremco Prods.
Cerama-Dip - potting ceramic - Aremco Prods.
Ceramag - soft ferrites - Stackpole Carbon
Cera magnet - permanent magnet - Stackpole Carbon
Cerama-Probe - measuring instr/coatings - Aremco Prods.
Cerameterm - terminal - Fansteel
Ceramicon - capacitor - Erie Technological Prods. (EEM)
Ceramin - miniaturized ceramic capacitors - "The Potter Co."
Ceramo - thermocouple wire - Thermo Elec.
Ceramocouple - thermocouple wire - Thermo Elec.
Ceramolithic - ceramic capacitors - USCC/Centralab, Elctrns. Div.
Ceramvar - controlled expansion alloy - Driver, Wilbur B.
Ceratrim - cermet trimmers - CTS

CeraTrols - cermet potentiometer - CTS
Cerco - lenses - Heitz, Karl
Cerelene Waxe's - special wax compounds - Stevenson-Bro
Cerfak - detergents - Houghton, E.F.
Cerfa-Kleen - metal cleaners - Houghton, E.F.
C-E Rivets - rivets - Stimpson
Cermide - variable & fixed resistors - CTS
Cerro - wire and cable - Cerro
Cerro-Flex - printed circuits - Cerro
Certavolt - voltage ref - Computer Diode
Certi-Crimp - crimping tools - Amp
Certi-lok - insertion tools - Amp
Certi-Seal - splice - Amp
Cesco - elctrn. prods. - New-Tronics
C-H - educational products - Hallowell
Challenger - amplifiers & sound sys - Bogen Div.
Chambron - garage door opener - Chamberlain Mfg.
ChamferTrode - chamfer & gouging electrodes - Eutectic
ChA-MP - tool - Amp
Champion - generators, generator sets - Winpower Mfg
Change-A-Cycle - frequency changers - Carter Motor
Change Out - quick disconnect connector - Joy Mfg.
Channel Commande - signal processors - Jerrold Elctrns.
Channel Commande - modulators - Jerrold Elctrns.
Channeleer - catv signal processor - Ameco
Channelite - piezoelectric ceramics - Channel Inds.
Channellight - room construction - Hotpack
Channeltron Electron Multiplier - continuous channel electron multiplier - Bendix
Chart/Checker - recorder, strip-chart editors - Nuclear Supply
Chart-o-Matic - battery charges, tube testers - Fedtro
Chartpak - pressure-sensitive graphic aids - Avery Prods. Graphics Div.
Chase Amidester - insulation - Chase & Sons
Chasebestos - insulation - Chase & Sons
Chaseflex - insulation - Chase & Sons
Chase - nipples - Thomas & Betts
Chasekote - tape - Chase & Sons
Chasemat - insulation - Chase & Sons
Check-Line - tension meters, tachometers - Electromatic Equip.
Check-Lite - pilot light push button - Adalet Mfg.
Checkmaster - refrigeration products - Mueller Brass
Cheer Lites - decorative lamp - Aerolux Light
Chek-it - continuity checker - Workman Elctrn. Prods.
ChemAdd - automatic chemical addition system for plating baths - Selectrons,
Chemalyzer - analyzer - Milton Roy
Chemcor - chemically strengthened glasses - Corning Glass Works
ChemEngrave - photoetching - Miller Dial
Chemfluor - prods. of TFE (prods. of TFE (teflon/halon), other fluorocarbons - Chemplast
Chem-Gard - flex-plug valves - Vanton Pump & Equip.
Chem-Gard - gauge-gards - Vanton Pump & Equip.
Chem-Gard - pump and filter systems - Vanton Pump & Equip.
Chem-Gard - strainers - Vanton Pump & Equip.
Chem-Gard - centrifugal plastic pumps - Vanton Pump & Equip.
Chemgrip - epoxy cement TFE bondable - Chemplast
Cheminax - coaxial cables - Raychem
Chemistry of Color - wire color coding inks - Formulabs Ind'l. Inks
Chemloy - bearing mat'l - Crane Packing
Chem-o-seal - can end sealing compound - Chemical Prods.
Chem-o-sol - p.v.c. dispersion-coating, gasketing - Chemical Prods.
Chem-o-thane - two-part polyurethane elastomer - Chemical Prods.
Chemoxide III - conversion coating for aluminum surfaces - Colonial Alloys
Chemputer - circular chemical computer - Coleman Instrs.
Chemtron - reed relays - Self-Organizing Sys.
Chemware - lab. ware TFE (teflon/halon) - Chemplast
Cherry - rivets - Cherry Rivet Div.
Cherry Lock - rivets - Cherry Rivet Div.
Cherrylock - blind rivets - Townsend
Chico - connector - ITT Cannon Electric
Chinalak - varnishes - Dolph, John C.
Chlorothene Nu - chlorinated solvent - Dow Chemical
Chobert - rivets - Avdel
Cho-Bond - conductive adhesives and caulks - Chomerics
Cho-Foam - emi/rfi shielding foam - Chomerics
Cho-Seal - emi/rfi shielding material - Chomerics
Cho-Shrink - conductive heat-shrinkable tubing - Chomerics
Cho-Sil - emi/rfi shielding material - Chomerics
Cho-Welt - emi/rfi strip gasket - Chomerics
CHP - ac torque motors - Hobbs Mfg.
Chromafix - television synchronization-color - Tracor
Chromalox - electric heaters - Wiegand, Edwin L.
Chromato-Vue - portable u-v darkroom - Ultra-Violet Prods.
Chroma 80 - video tape - Memorex
Chrometex - for nickel activation agents - Mac Dermid
ChromiCoat - coating - Oakite Prods.
Chrom-o-Scope - color monitor - Milletron
Chronistor - elapsed time indicators - Bergen Labs.
Chronocon - miniature connector pin - Chronomatic Div.
Chronodyne - resonator - Armec
Chrono-Lok - modems & keyers - Western Telematic
Chrono-spray de-frost-it - time control - Paragon Elec.
Chronotrol - a indicating program controller - Barber-Colman
Cinema Series - Audio products - Shallco
Cintel - metal detection equipment - Rank Precision Inds.
Cinticon - camera tubes - ITT Electron Tube
Cintra - electronic calculator - Cintra
Cintra statistician - electronic calculator - Cintra
Circa-Tin - immersion tin process - Conversion Chem.
Circle Seal - valves, check, relief, shutoff, special, solenoid - Circle Seal
Circlok - interlocking devices - Circle "F" Industries
Circuit-Deck - precision cermet switches - Beckman Instrs.
Circuitester - audio facilities checker - Ultra Audio Prods.
Circuitflex - circuits - Flexible Circuits
Circuit Ground - computer ground planes - Flexible Circuits
Circuitip - level tips for printed-circuit components - Amp
Circuit Master - automation control - Wintriss Controls
Circuitracer - continuity tester - Desco Mfg.
Circuit Ryder - portable infrared thermometer - Raytek
Circuitstrip - cable - Flexible Circuits
Circuit Zaps - pc prototype material - Bishop Graphics
CJ - cold junction reference source - Omega Engrg.
Clampipe - ground clamp - Mueller Elec.
Clamp-Lock - clamp-action-hubs for brakes-(non-burring) - Electroid
Clareed - switching assemblies - Clare, C.P.
Claspcon - terminals - Molex Prods.
Classette - tape recorders - Audiotronics
Classic - motors and gearmotors - Carter Motor
Clauss - shears, scissors, tweezers, snips - Clauss Cutlery
CLC-60 Freeflight - area navigation sys. - Narco Avionics
Cleanline - all products - Controlled Environment Equip.
Clearglass - glass tubing prod. - Celluplastics
Clearsite - one-time plug fuses - Economy Fuse Div.
Cleenline - work stations - Pressteel
Cletaloy - copper/silver-tungsten contact materials - Superior Carbon Prods.
Cletron - speakers, yokes, & deflection coils for tv cameras - Cleveland Elctrns.
Cletron - custom engrd. loudspeaker - Cleveland Elctrns.
CLF - fuses - General Elec.
Climate Controlled - wire color coding inks - Formulabs Ind'l. Inks
Climate-Lab - environmental chamber - American Instr.
Climax - shoe machinery brushes - Felton, S.A. & Son
Clinac - accelerator - Varian Assocs.
Clinch-Loc - terminals, feed through - Lundey Assocs.
Clini-Call - medical data management systems - Sanders Data Sys.
CLIP-AC - voltage regulators - AMBAC Inds.
Clip AC - voltage regulator - Wanlass Div.
Clip Loc - plug-in captivated lead form - Radio Materials
Clipper Pak - encapsulating compound kit - Communications Tech.
Clip-Sleeves - wire markers - Brady, W.H.
Clorinol - dielectric - Sprague Elec.
C.L.T.S. - cryogenic linear temperature sensor - Micro-Meas. Div.
CMV Teflon - teflon parts - Dixon
Coaxiclamp - connectors and splices - Amp
Coaxicon - connector - Amp
Coaxitube - coaxial cable - Precision Tube
Coaxwitch - coaxial switches - Bird Elctrn.
Coballoy (TM) - bearings - Fafnir Bearing
Cobra - portable power tools - Portable Elec. Tools, Div.
Cobra - citizens' band 2 way radio - Dynascan
Cobreflex - horn - University Sound
Cobrid - coaxial - Sage Labs.
Code-a-phone message - automatic telephone - Ford Industries
Codemaster - wire color coding console - Formulabs Ind'l. Inks
Coder-Lite - combination readout & decoder/driver - Pinlites
Codetyper - morse encoder - Computronics Engrg.
Codistor I - low voltage regulators - Computer Diode
Codistor II - high voltage silicon rectifiers - Computer Diode
COE Line - compatible, operational, element (analog computing type modules) - GPS Instr.
Cojax - coaxial jack - Cooke Engrg.
Coladene - degreaser - Colonial Alloys
Coldsicle - portable immersion cooler - Jersey Tech. Consits.
Cold-Snap - transport refrigeration - Fermont Div.
Cole-Hersee - automotive switches & electrical accessories - Cole-Hersee
Coleman - industrial ovens & parts - Feco
Colidar - laser rangefinder - Hughes Aircraft
Collectadata - data collection network - Friden Div.
Collectric Rings - slip rings - Ind'l. Elec. Reels
Collimizor - allignment meter - Materials Resch.
Color Bright 85 - color tv picture tubes - GTE Sylvania
Color Cal - nameplates - GM Nameplate
Colorcaps - key identification caps - Seton Name Plate
Color Captain - CATV receiving antennas - TACO Div.
Color Cord - cord sets - Pacific Electricord
Colorede - on line colorimeter - Kollmorgen-Color Sys. Div.
Color-Eye - tristimulus colorimeter/spectro photometer - Kollmorgen-Color Sys. Div.
Color/Izer - color analyzer - Lektra Labs.
Color-Keyed - connectors, tools & dies - Thomas & Betts
Color Rad - spectroradiometer - Kollmorgen-Color Sys. Div.
Colorspan - plastic architectural prod - Laminated Sheet Prods.
Colorvolt - transformer - Sola Elec. Div.
Colorvue - CATV equipment - American Elctrn. Labs.
Colourtronic - photo emulsion, developer - Crimpco Engrg.
Colplast - potting compound - Topper Mfg.
Columax - magnets - Thomas & Skinner
Columbia - all products - Columbia Elec. Mfg.
Columbia Torches - tig welding torches - American Electric & Machine
Combo Gasket - emi shielding gasket - Metex
Combo Strip - emi shielding strip - Metex
Comco - silver solder pots - Precision Elctrns.
Comco Acro-Match - base station antenna - Communications
Comco Basecom - base station 2-way radio - Communications
Comco Com-Pak - portable 2-way radio - Communications
Comco Fleetcom - mobile 2-way radio - Communications
Comco Flightcom - fm aircraft 2-way radio - Communications
Comco Maricom - marine radiotelephone - Communications
Comco Portacom - portable 2-way radio - Communications
Comcor - analog, analog/hybrid prods. - Astrodata
Comco Repcom - repeater station (vhf & uhf) - Communications
Comco Trans-Com - transistorized mobile radio - Communications
Comco Trans-Fleetcom - mobile vhf radio - Communications
Comfordome - handles - Vaco Prods.
Comic - digital colorant mixture computer - Kollmorgen-Color Sys. Div.
Comline - tandem monolithic crystal filters - Piezo Technology
Commander Communicator - intercom sys - Nelson-Hershfield Elctrns.
Commando - electronic megaphone - Chamberlain Mfg.
Commercial View - cameras - Burke & James
Communo-Phone - intercom sys - Bogen Div.
Compac - silicon bridge rectifiers - Semtech
CompaC - electric impulse counter - ENM
Compack - miniaturized controllers - API Instrs.
Com-Pak - power supplies - Lambda Elctrns.
Com-Pak Mark II - power supplies - Lambda Elctrns.
Comparatron - comparator gage - Empire Sci., Ind'l. Elctrn. Gage
Compare - IR NDT equip. - Dynarad
Complimiter - peak limiting amplifier - Spectra Sonics
Complot - plotting systems - Houston Instr.
Compro II - elctrn. instr., weighing - Elctrns.,
Compton - clamps - Price & Rutzebeck
Compu-Dac - programmable voltage standard and comparator - Compu-Systems
CompuLogIC - ic logic - Computer Prods.
Compulytic - aluminum electrolytic capacitor - Sprague Elec.
Compuprinter - addressing equip. - Midwest Automatic
CompuREED - reed relays - Computer Prods.
Computerminal - data terminal - Wyle Labs.
Compu-Therm - temperature sensor - RDF
Computing RMS - RMS converter - Dana Labs.
Comput-O-Matic - automatically adjusts sound level for perfect hi fi record - Roberts Div.
Computrain - computers - Components Specialties
Computyper - billing machine - Friden Div.
Conacure - curing agents - Conap
Conapoxy - epoxy compounds - Conap
Conathane - polyurethane compounds - Conap
Concentrikit - put together potentiometer - CTS
Concertape - recording tape - Allied Elctrns.
Concert Jr. - hi-fi speaker sys - Hartley Prods.
Concertmasters - hi-fi speaker sys - Hartley Prods.
Conco-Color-Ax - color tv cable - Consolidated Wire & Assoc. Corps.
Conco-Foam - color tv cable - Consolidated Wire & Assoc. Corps.
Condor - tube axial fan - IMC Magnetics
Conduct-A-Coat - electroless copper - Etchomatic
Conducting Twenty/Twenty - epoxy/conductive - Packaged Resins
Conducting Twenty/Twenty - conductive epoxy - Allaco Prods.
Condux - electrically conductive elastomers - Hardman
Co-Netic - shielding material - Perfection Mica
Confidencer - telephone transmitter - Roanwell
ConFlat - flanges - Varian Assocs.
Conflex - interconnection systems - Icore
Conflex - electrical interconnector - Icore Electro-Plastics
Conflex - laboratory furniture - Blickman, S.
Confuzz - conductive tapes and closures - Technical Wire Prods.
Conhex - sub-miniature r.f. connectors - Sealectro
Conitel - digital data acquisition & control sys. - Leeds & Northrup
Conmax - conductive nickel/silicone - Technical Wire Prods.
Connecto-Blok - wiring system - Thomas & Betts
Connectron - family of splice/connector machines - Connectrol
Con-O-Clad - thermocouple assemblies - Conax
Conoflux - oil quantity system - Trans-Sonics
Consil - conductive silver/silicone - Technical Wire Prods.
Consotrol - instruments - Foxboro
Constavolt - battery chargers - La Marche Mfg.
CONtac - harness assembly - Berg Elctrns.
Contempo - Pama - housing - Par-Metal Prods. Div.
Contempo - Peds - consoles - Par-Metal Prods. Div.
Contempo - Racks - cabinet racks - Par-Metal Prods. Div.
Con-Thru - plated thru hole p.c.b. - Conductorlab
Contour Projector - optical comparator - Optical Gaging Prods.
Controflex - flexible ribbon - Tapeswitch Corp. Amer.
Control-A-Matic - spring testing servo - Rockwell Engrg.
Controlarc - welder - National-Standard
Control-O-Matic - battery chargers, multiple outlet - Fedtro
Control-Pak - solid state relays - Hamlin Elctrns.
Convenience Wear - disposable apparel - Angelica Uniform
Convert-A-Ballasts - fluorescent ballasts - Jefferson Elec.
Converti-Fuse - panelboards, safety switches, switchboards - General Elec.
Cooke - photographic lenses - Rank Precision Inds.
Cool Dual - metal dual-in-line package - Isotronics
Coolermet - tri-layer contact tape. - Improved Laminated Metal
Coolshield - welding headshield - Lincoln Elec.
Cooltong - insulated electrode holder - Lincoln Elec.
Co-Ord Switch - matrix boards - LVC Ind's.
Copaco - electrical insulating paper - Cottrell Paper
Copaco-125 - electrical insulating paper - Cottrell Paper
Copad - coaxial attenuator - Sage Labs.
Copalam - electrical insulation - Cottrell Paper
Copalum - terminals and splices - Amp
Coparex - electrical insulating paper - Cottrell Paper
Coparex-125 - electrical insulating paper - Cottrell Paper
Copperbrite - cleaner - London Chemical
Coppergard - shielded coaxials - Superior Continental
Copperply - lead wire - Nat'l-Standard
Copper Sweat - plumbers solder - Bow Solder Products
Copper-Tex-5 - knitted copper wire - Metex
Copperweld - wire, strand & rods - Copperweld Steel
Copy-Corder - blank recording cassettes - Magnetic Video
Copyphone - facsimile - Telautograph
Cor-Bond - vinyl pipe coatings - Polymer
Cordec - coatings & sealants - Paisley
Cordette - push button switches - Switchcraft
CORDEX - reenforced paper - Mosinee Paper
CordMASTER - push button switches - Switchcraft
Cords Limited - cord sets - Essex Int'l
Cord-Switch - push button switches - Switchcraft
Core-Thane - impregnated packings - Houghton, E.F.
Corex - chemically strengthened labware - Corning Glass Works, Lab. Prods. Dept.
Coricone - coating for metals - Coricone
Corning - resistors, capacitors & memories - Corning Glass Works
Cornwall - loudspeaker sys. - Klipsch & Assocs.
Coroflex - tubing, fluorocarbon, flexible - Co-Operative Inds.
Corona Coated Ceramics - metallized ceramic substrates - Electrotec
Corotron - high voltage regulator - Victoreen Instr.
Corrgard - polyester film - Superior Continental
Corrib - resistors - Ohmite Mfg.
Corvel - plastic coating powders - Polymer
Cosmicar - lenses - Cosmicar Optical Co.,
Cosmoline - rust preventives - Houghton, E.F.
Cosmolubric - lubricant - Houghton, E.F.
Coterm - coaxial self terminating jack - Cooke Engrg.
Coulter Counter - particle size analyzer - Coulter Elctrns.
Counter Facts - parts replacement listings - Sams, Howard W.
Count Modules - printers - Practical Automation
Courseline Computer - area navigation sys. - Narco Avionics
Coweco - coil winding machines and accessories - Coil Winding Equip.
C-P - battery charger - Power Conversion Prods.

CPPC - synchros & servo motors - Clifton Div.
Cradleclip - wire/cable harness - Electrovert
Cradle-Switch - lever switches - Switchcraft
Craig - film editing equipment - Kalart Victor
Cramolin - contact cleaner - Caig Labs.
Crescent - rings, retaining - Waldes Kohinoor
CRI - controlled rectifier inverter - Warren Communications
Cricket - audible digital monitor - Industrial Inventions
Cris-Pic - TV image impressor - Kalart Victor
Criterion - electrical meters - Canadian Research Institute
Critic - ic test equipment - Motorola Semiconductor Prods.
Crofon - fiber optics - E.I. DuPont DeNemours
Cromir - high quality rear view mirror - Liberty Mirror Div.
Cross Field Head (X-Field) - records extra high frequency - Roberts Div.
Crossflo - transverse flow blower - Torin
Crossreed - electronic switching equipment - Stromberg Carlson
Crown - all products - Crown Int'l.
CRR - controlled rectifier ringer - Warren Communications
Crydomatic - dc motor speed controller - International Rectifier
Cryo-Panel - thermal shroud tubing - High Vacuum Equip.
Cryosorb - cold trap - Granville-Phillips
Cryoterm - noise sources - Maury Microwave
Cryo-Tip - cryogenic cooling tip - Air Prods. & Chems.
CrysCoat - coating - Oakite Prods.
Crystal-Cap - film capacitors - General Instr.
Crystal-Clear - optically clear epoxy adhesive - Packaged Resins
Crystal Clear - optically clear epoxy adhesive - Allaco Prods.
Crystolon - silicon carbide - Norton
C, S, Z Markers - cable/wire marking - Electrovert
Cual-Aid - inhibitor - Teledyne Penn-Union Elec.
Cubond - copper brazing paste - Glidden-Durkee Div.
CuDep - additive process for pc - Advanced Circuitry Div.
Cuelift - automatic tape lifter - United Resch. Lab.,
Cue/Splice - magnetic tape splice - Tapecon
Cue-Switch - conbination switch and rear-projection readout - Ind'l Elctrn. Engrs.
Cufil - semi-rigid cable - Phelps Dodge Comm.
Cuflex - semi-rigid cable - Phelps Dodge Comm.
Cufluorex - copper plating chems. - Sel-Rex
Cunip - copper-nickel-phospherous alloy - Handy & Harman
CuPAC - silicon rectifier - Semtech
Cupron - resistance alloy - Driver, Wilbur B.
Cupronel - thermocouple alloy - Driver, Wilbur B.
Cuprox - analytical reagent - Coleman Instrs.
Currentrol - remote current control - Lincoln Elec.
Curristors - current sensing resistor - General Resistance
Curtain of Light - power press guard - Electronic Control
Curtis Indachron - low cost elapsed time indicato - Curtis Instrs.
CURVAC - fittings & connectors - Ultek Div.
Curve-Back - bar clamps and terminal lugs - Teledyne Penn-Union Elec.
CuSeal - bakeable high vacuum flange - Granville-Phillips
Cu-Sil - high temperature p.c.b. - Conductorlab
Cusil - brazing alloys - Western Gold & Platinum
Custom - converters and dynamotors - Carter Motor
Custom designs - built to customer's specifications - Honeywell
Cut-Max - cutting oils and bases - Houghton, E.F.
CutTrode - oxygenless cutting electrode - Eutectic
Cut '67 - screen film - Podgor, Joseph E.
CV-D - microphone - Electro-Voice
CV-Jax - phone jacks - Switchcraft
CV-Plug - phone plugs - Switchcraft
Cy-An-In - indium cyanide plating bath - Indium Corp. America
Cybermatics Inc. - on-line systems - Cybermatics
Cybertran - amplifier circuit - AMF Electical Prods.
Cycle Log - controller - Foxboro
Cycl-Flex - reset timers and counters, plug-in - Eagle-Signal Div.
Cyclodiene - degreaser - Colonial Alloys
Cyclohm - fans-axial & propeller - Howard Inds.
Cyclonome - pulse counters & stepping motors - Sigma Instrs.
Cyclotar - lenses - Gordon Alan Entprs.
Cylonair - blower - Rotron
Cyl-Tal - oils - Houghton, E.F.

D

Daburn CRT - special formulation corona resistant teflon - Daburn Elctrns. & Cable
Daflex - plastic tubing - Daburn Elctrns. & Cable
Daflon - teflon tubing - Daburn Elctrns. & Cable
Dag - various lubricants and coatings - Acheson Colloids
Dage - coax connectors - Bendix
Dage - tv cameras & acc - Visual Educom
Dagor - lenses - Goerz Optical
Dakaware - plastic knobs and handles - Davies, Harry Molding
Dalic - plating process - Sifco Metachemical
Dalite - light weight h film wire - Daburn Elctrns. & Cable
Danielson - drill extension - Price & Rutzebeck
Dantec 100 - automatic transistor analyzer - Dantronics
Dantec 500 - programmable digital timer - Dantronics
Danyon - special formula plastic insulation for retractile cords - Daburn Elctrns. & Cable
Dapon - resin - FMC
Daprene - shrinkable neoprene tubing - Daburn Elctrns. & Cable
DA-Switch - pushbutton switches - Switchcraft
Databs - computer printed wire markers - Brady, W.H.
Datacel - optoelectronic relay - Sigma Instrs.
Datacolor - recording paper - Bell & Howell
Data Commander - curve following programmer - T & T Controls
Datacord - magnetic tape transport - Data Recording Sys.
Datacoupler - data acquisition system - Datatron
Datadigit - oscillographic digitizer - Bell & Howell
Datafile - mass memory - Burroughs
Dataflash - recording paper - Bell & Howell
Datagraph - recording oscillographs - Bell & Howell
Data Guard - transformer - James Elctrns.
Datakoat - spray coatings - Datak
Data Krome - optics system - Kollsman Instr.
Datalamp - ultra-min lamps - Dialight
Data-Line - modular switch/indicator - TEC
Datalites - ultra-min indicator lights - Dialight
Datalock - magnetic tape transport - Bell & Howell
Datamark - kits for marking elctrn. equip. - Datak
Datamaster - digital equipment - Bristol Div
Datamatrix - ultra-min indicator lights in group - Dialight
Data-Monitor - annunciator system - TEC
Datanet - (data communications equipment) - Honeywell Information Systems
Datapak - digital cassette recorder - TEAC Corp. of Amer.
Data-Panel - display panel - TEC
Datarite - recording paper - Bell & Howell
Data-Rite - data contact - T-Bar
Data-Screen - crt display terminal - TEC
Dataseeker - modem/comm. terminal interface test set - Dataprobe
Data-Stor - tape transports, data storage equipment - Cook Electric
Datastrip - ultra-min indicator lights in group - Dialight
Dataswitch - reed relay - Wheelock Signals
Datasyn - digital readout system - Data Technology
Datatape - magnetic tape recorders - Bell & Howell
Datatel - data transmission - GTE Lenkurt
Datatone - tone transmitters and receivers - Trepac Corp. America
Datatrace - recording paper - Bell & Howell
Data-Trak - analog programmer - Research
Datatwin - group of 2 datalites - Dialight
Data-Verter - data acquisition, recording, & transmitting equip. - Digitronics
Data Vox - video character generator - Data Technology
Datecon - cold cathode tube, digital display modules - Integrated Circuit Elctrns.
Datos - data transfer sys. - Data Graphics
Daubond - adhesives - Daubert Chem.
DAX - digital-to-analog converter - Dynalex
DAZIC - direction and zero indicating contactor - Winterburn Mfg.
D Cables - special cables - Standard Wire & Cable
DCF - dynamic coupling factor - Pickering
DCL-Designer's Choice Logic - monolithic integrated circuits (digital) - Signetics
D-Das - data acquistion sys. - Vidar
ddc - direct digital calibration - LogiMetrics
DDR-3300 - recording sys. - Leach
Dead/Front - back illuminated invisible data - N/P
DeAeriator - gas/air removal apparatus (from fluids) - Nold, Walter
De-Airex - defoamers - Houghton, E.F.
Decap - epoxy solvent - Dynaloy
Deci-Cap - ceramic capacitor axial leaded - Nytronics
Deci-Ductor - non-shielded inductor - Nytronics
Deci-Line - indicators - Clifton Div.
Decimal Keeper - slide rule - Devonics
Decision Processor - automatic test system - Willard Labs. (E)
Decitrak - digital control sys. - Theta Instr.
Decitron - counters - Post Elctrn. Prods.
Decohm - relays - open and hermetically sealed - Davis Elec.
Dectron - flaw detector - Microwave Instrs.
Deeceeducer - pressure-to-dc converter - Solid State Elctrns.
Defectometer - ndt - eddy current equipment - Automation Inds.
Defiance - all listed prods. - All Star Prods.
Deflectron - yokes - CELCO
DeKabox - decade resistors and capacitors - Electro Sci. Inds.
DeKabridge - bridge circuit - Electro Sci. Inds.
Dekacon - camera - HLC Mfg.
DeKadial - decade dials - Electro Sci. Inds.
DeKapacitor - decade capacitor - Electro Sci. Inds.
Deka-Pak - chips carrier - Motorola Semiconductor Prods.
DeKapot - decade potentiometers - Electro Sci. Inds.
DeKastat - decade rheostat - Electro Sci. Inds.
DeKavider - decade voltage divider - Electro Sci. Inds.
Dekoron - tubing and wire - Moore, Samuel
Dektak - surface elevation measuring equip - Sloan Technology
Del-Con - ind'l. elctrn. controls comps. & sys. - Delco Elctrns. Div.
Deli-Cut (registered) - miniature electronic-assembly (hand) tools - E.T.M.
Deltabeston - asbestos-insulated wires - General Elec.
Deltadyne - differential press, ind, switches & gages - Pall
Deltadyne - pressure switches - Pall Trinity Micro
Deltafilm - film capacitors - Dearborn Elctrns.
Deltakit - electronic kits - Delta Products
Delt Alert - alarm system - Delta Products
Deltaply - fluorocarbon capacitors - Dearborn Elctrns.
Deltaseal - fluorocarbon seal - Shamban, W.S.
Delta-Star - electrical transmission equipment - Porter, H.K.
Delta T - transistor heat dissipators - Wakefield Engrg.
Delta Valves - t.f.e. solenoid valves - Fluorocarbon
Deluxe Molded - indicator light - Drake Mfg.
Demco - generator sets - Fermont Div.
Demister - mist eliminator - York, Otto H.
Demod - demodulator - General Magnetics
Denflex - plastisols, organosols, epoxies, polyurethanes adhesives - Dennis Chem.
Denfoil - foil strain gage and temperature sensors - Dentronics
Den-nex - hand cleaner - Dennis Chem.
Densichron - densitometers - Sargent Welch Sci.
Densicord - densitometer - Photovolt
Densi-Lux - enlarging meter - Lektra Labs.
Densi-Meter - color analyzer - Lektra Labs.
Densi-Timer - darkroom control - Lektra Labs.
Densitocolor - controls, density - Heitz, Karl
Densitocolor, Rebikoff - colorimeters - Heitz, Karl
Densitrol - density control instrument-electric or direct reading - Princo Instrs.
Depend-A-Bell - electric bell - Autocall Co., The
Depend-a-Bond - soiders - Alpha Metals
Dependex - vacuum components - High Voltage Engrg.
Depthometer - depth sounder - Bludworth Marine Div.
Derivimeter - data reduction instrument - Gerber Sci. Instr.
Derma Shield - hand cream - General Sci. Equip.
Dermitron - coating thickness tester - Unit Process Assemblies
Desicote - water-repellent coating compound - Beckman Instrs., (AISSD)
Designers - data sheets - Motorola Semiconductor Prods.
Design 101 - input/output writer - Design Elements
Design 79 - acoustic coupler - Design Elements
Design 80 - hardwire coupler - Design Elements
Desktopper - manual drafting machines - Universal Drafting Mach.
Desoltex - desoldering equipment - Atlantic Instrs.
De Solv - resin solvent - Ram Chems.
Despard Line - combination wiring devices - Pass & Seymour
Detecta - film area measuring device - Etchomatic
Detect-A-Fire - fire detectors - Fenwal
Detecto-Lite - neon tester - Eagle Elec. Mfg.
Detectotemp - temperature indicating paint - Brady, W.H.
Determohm - resistance box - Ohmite Mfg.
Develocorder - 16 mm film recorder - Teledyne Geotech
Dewey - microphone stands & holders - Carpenter
D-Frost-It - time switch - Paragon Elec.
D-I - differential ion pump - Ultek Div.
Diactor - voltage regulator - General Elec.
Diagraph - impedance plotter - Rohde & Schwarz Sls.
Dial-A-Amp - constant current adaptor - General Resistance
Dial-A-Bridge - dialable wheatstone bridge - General Resistance
Dialac - dial access equip. & sys. - Merchant, Robert C.
Dial-A-Gain - voltage amplifiers - Unholtz-Dickie
Dial-A-Lite - high-intensity lamp - Eagle Elec. Mfg.
Dial-An-Ohm - dialable resistance decade - General Resistance
Dial-A-Source - dialable current source - General Resistance
Dial-A-Stat - dialable resistance decade - General Resistance
Dial-A-Vider - dialable voltage divider - General Resistance
Dial-A-Volt - dialable voltage reference - General Resistance
Dialco - indicator lights - Dialight
Dial-Flo - oven air velocity control - Hotpack
Dialife Bands - special formulated print bands - Monarch Marking Sys.
Dialogic - slide base telephone lamps in grp. - Dialight
Dial-O-Verter - data communication equip. - Digitronics
Dial/Power - dial intercomm - Action Systems
Dial-Set - pricing & coding mach. - Dennison Mfg.
Dialtel - slide base telephone lamps in grp. - Dialight
Diamfile - diamond contact cleaner - Jonard Inds.
Diamond - impregnated wire - Laser Technology
Diamond - vulcanized fibre - Budd
Diamond - flashers - Eagle Elec. Mfg.
Diamond Grip - terminals and splices - Amp
Diamond-4 - CATV receiving antennas - TACO Div.
Diamonite - high alumina ceramic mtl. - Diamonite Prods. Mfg.
Diazo-Jet - print machine - Rotolite, Teledyne
Dice Cube - relay - Hi-G
Di-Clad - laminated plastics - Budd
Diclan - digital clinical analyzer - Honeywell
Dictafilm - dictating machine - Miles Reproducer
DIDS-400 - digital information display sys. - Raytheon Data Systems
Diekut Stik-Ons - drafting aids - Bishop Graphics
Diffaxial - speaker - University Sound
Diffraction Horn - tweeter - Electro-Voice
Diffuzor Furnace - diffusion furnace - BTU Engrg.
Difilm - dual dielectric capacitor - Sprague Elec.
Di-Formed - rectangular dielectric tube - Precision Paper Tube
Difus - circuit breakers - Electrey, S.A.
Difus - small fuses - Electrey, S.A.
Digiac - digital computer trainers - Digiac
Digicard - ic packaging - Digitronics
DigiCette - magnetic tape cassette - Int'l. Computer Prods.
Digichek - digital logic analyzers - Applied Control
Digichron - digital clock - Aerospace Resch.
Digi-Clock - decade timer - Veeder-Root
Digicom - stepping commutator - General Devices
Digi-Con - totalizing counters - Veeder-Root
Digicord - ph meter - Photovolt
DigiCorder - cassette recorder - Int'l. Computer Prods.
Digicounter - digital counter - Keltron
Digidapter - digital voltmeter for conversion of arolog instruments - Abbey Elctrns. Div.
Digidecade - switch, resistance decade - Digitran
DigiDeck - magnetic tape transport - Int'l. Computer Prods.
Digidial - digital turns-counting dial - Beckman Instrs.
Digi-Flex - predetermining counter - Veeder-Root
Digi-Klips - printed circuit connectors - Components
Digi-Mark - electronic frequency counter - Chadwick-Helmuth
Digi-Master - electronic counters - Veeder-Root
Digi-Met - digital meteorological transducer - Control Equip. Corp., New England
Digimeter - digital voltmeter - Abbey Elctrns. Div.
Digimetrics - weld schedule monitors - Falstrom
Digi Net - data comm. equip. - General Elec.
Digiphase - digital frequency synthesizers - Dana Labs.
Digiphone - gsc digital grade geophones - Geo Space
Digi-Point - position meas. - Tyco Instr. Div.
Digipower - lab power supply - Astro-Space Labs.
Digiprinter - digital recording voltmeter - Abbey Elctrns. Div.
Digiprinter - digital printer - Keltron
Digi-Probe - pulse & logic detection & analysis - Telesciences
Digiprop - zero crossing control circuit - Oven Inds.
Digisee - optical encoders - Itek
Digi-Shaft - shaft/digital converter - Computer Conversions
Digi-Sort - conveyor controls - Noble Elctrns.
Digiswitch - switch, thumbwheel - Digitran
Digitac - digital switching & access equip. - Merchant, Robert C.
Digitac - airborne digital computer - Hughes Aircraft
Digital Data - distortion analyzers - Digitech Data Inds.
DigitAmp - ampere hour meters - Selectrons,
DigiTec - digital test equipment - United Sys.
Digitemp - digital temperature indicators - Instrulab
Digitrak - signal tracking device - Edo Western
Digitronic - welding control - Weltronic
Digitstor - solid-state counter accumulator - Moore Inds.
Digivac S/G - vacuum readout tube - Wagner Elec.
Digivider - switch, voltage divider - Digitran
Digi-Vit - transducer support equip. - Kaman Nuclear
Dilecto - laminates - Budd
Dimatrol - dimmer switches - Eagle Elec. Mfg.
Di-Met - contact plating - Gordos
Di-Met - cut-off machines, diamond blades, diamond cone drills - Avco Felker
Dimie - capacitors - Dearborn Elctrns.
Di-Min-Ode - miniature silicon zener diode - General Semiconductor
Di/Namic Gate - silicon controlled rectfiers - Westinghouse Elec.
Diotestor - circuittester - Britec
Di Pak - dual-in-line packaging sys - Scanbe Mfg.
Dipatan - dipped epoxy solid tantalum capacitors - Components
Dip-Bit - filters - Cambridge Thermionic

Dip-Lite - digital readout with dual-in-line mounting - Pinlites
Dip-Lock - dip transformer package - Pulse Engrg.
Diploit - cable - Dielectric Materials
Dip-Pac - dual-in-line i.c. socket board - ELFAB Crop.
Dip-Pak - hot melt peelable plastic coating - Fidelity Chem. Prods.
Dipswitch - packaged selector switch - Edison Elctrns. Div.
Directron - selenium rectifiers - Miller, Sanford
Direk Read - bridges - General Elec.
Discaps - ceramic capacitors - Radio Materials
Discfile - disc memory system - Data Prods.
Discohm - disc type power resistors - Ward Leonard
Disc-O-Torque - hydraulic disc clutches - Formsprag
Discstore - disc storage - General Instr.
DiSealing Sealer - sealer for anodized aluminum surfaces - Colonial Alloys
Displex - time multiplexed telemetering sys. - Moore Inds.
Displex - cryogenic refrigerator - Air Prods. & Chems.
Disposa - clean room clothing - General Sci. Equip.
Dissopad - wash away spacers - Bivar
Distat - liquid level sys - Trans-Sonics
Ditran - a/d converters - Clifton Div.
Ditrecon - diffusion transfer - HRB-Singer
Divco - all products - Division Lead
Divider Box - material handling & storage container - Lewis G. B.
Dividohm - resistors - Ohmite Mfg.
Docufax & Alpurfax - facsimile systems - Alden Elctrn. & Impulse Record. Equip.
Dodge - screw thread inserts for plastics - Heli-Coil Prods.
Dolflex - enamels & compounds - Dolph, John C.
Dolphon - epoxy resin compounds, polyester resins - Dolph, John C.
Dolph's - Dolph, John C.
Dolphseal - water repellent - Dolph, John C.
Dolph-Spray - lacquer, enamel, varnish - Dolph, John C.
Domino Chips - micro modules - Space Age Microcircuits
Doorbell - hv rectifier module - Unitrode
Doranic - reed relays - Douglas Randall Div.
Doriodal - coils - Cambridge Thermionic
DOT - memory sys., thin film - Cambridge Memories
Double/Bubble - package for 2-part epoxies - Hardman
Double Delta - fluorocarbon seal - Shamban, W.S.
Double Diamond - engraved stem thermometers - H-B Instr.
Double Talk - communications antenna system - New-Tronics
double-wipe - switch - Switchcraft
d/p Cell - transmitter - Foxboro
DPR - potting & encapsulating compounds - Hardman
DPS-6 - digital plotting system - Milgo Electrn.
DPS-7 - digital plotting system - Milgo Electrn.
Draftrite - gauge - AMBAC Inds.
Dragon - rubber and friction tape - Okonite
Draws-A-Lot - coloring markers - Carter's Ink
Draw-Temp - heat treating salts - Houghton, E.F.
Dri-Control - corrosion resistant valves - Valcor Engrg.
Dri-Kote - epoxy coating powders - Hysol Div.
Dri-Lok - fluorescent ballasts - Jefferson Elec.
Dril-Tec - surfacing rod - Eutectic
Dri-Solenoid - corrosion resistant sol. valve - Valcor Engrg.
Drital - pressure sensitive adhesive - Adhesive Prods.
Dritherm - carbon filament infra-red ray lamps - North American Elec. Lamp
Drod - digital display unit - Rank Precision Inds.
Dry-Blow Comp. Air - dry freon for laboratories - Heeger
Drygalv - protective coating - Force Chems. Div.
Drymaster - refrigeration products - Mueller Brass
Drymaster - refrigeration products - Mueller Brass
DSX - digital-to-synchro converter - Dynalex
DTI - thermocouple indicator - Ircon
DU - null-balance spectrophotometer - Beckman Instrs., (AISSD)
Dualatch - connectors - Amp
Dualay - self-supporting aerial cables - Okonite
Dual Hi/Lo Filter - double high pass/low pass filter - Rockland Sys.
Dual-Jax Block - phone jacks - Switchcraft
Dual Power - vehicle power converter - Techsonics
Dual-Shore - connector - ITT Cannon Electric
Dual-Source - power supply - Elasco-Eastern
Dub-L-Loc - straps-grommets - Budwig Mfg.
Dubo - plastic lock washer & seal - Nylogrip Prods.
Ducati - capacitors - United Mineral & Chem.
Duco - paints, lacquers, finishes - E.I. DuPont DeNemours
Duet - matched transistors - Sprague Elec.
Dulux - paints, lacquers, finishes - E.I. DuPont DeNemours
Dumas - test instruments - Semimetals
Dumas - resistivity probes - Semimetals
Dummy-Plug - phone plugs - Switchcraft
Dumont - tubes - Dutrex Inds.
Dumont - tweezers - Hammel, Riglander
Dunco - relays - Struthers-Dunn
Duodial - turns-counting dial - Beckman Instrs.
Duo Disc - recording disc - Duotone
Duolastic - screen/elastomer gaskets - Technical Wire Prods.
Duo-Lok - impedance type self retained bolts - Tridair Inds.
Duo/Met Film - capacitor film - Metallized Prods.
Duo-Mode Logic - auto crossover lab power supplies - BECO Solid State Systems
Duopak - meter & sensor - AMF Electical Prods.
Duo-Seal - vacuum pumps - Sargent Welch Sci.
'Duo Sensor' - reserve junction thermocouple - Sensor Dynamics
Duosil - extruded mesh/elastomer - Technical Wire Prods.
Duostat - power supply - Beckman Instrs., (AISSD)
Duostrip - mesh/elastomer gaskets - Technical Wire Prods.
Duotape - recording tape - Duotone
Duotrol - pressure operated control - Autocon Inds.
Duo-Tyne - connector - Amp
Duplex - type of speaker - Altec
Duplex Servo Motor - induction & servo motor - Yaskawa Elec. America
Duplican - photo marked dials and panels - Canrad Precision Inds.
Duplicart - materials handling system - Barry Controls
Dura - a high temperature resin for electrical insulation - Natvar
Durabestos - reinforced asbestos paper - Natvar
Dura-Blue - ion sensitive bulbs of glass electrodes - Beckman Instrs., (AISSD)
Durac - hydrometers - H-B Instr.
Duracell - batteries - Mallory Battery
Duraclad - insulation - Electric Machinery Mfg.
Dura Clad - transformers - Aladdin Elctrns.
Duracolor - foil shielded coax - Columbia Eletrn. Cables
Duracut - grinding wheel - Avco Bay State Abrasives Div.
Duradel - spark plug boot - Whitaker Cable
Duraflex - waveguides - Co-Operative Inds.
Durafoam - patented foam tv transmission line - Columbia Eletrn. Cables
Duraglas - polyester coating, fiberglas base - Natvar
Dura-Ink & Sharpie - felt tip markers - Markal
Dura-Ink & Sharpie - felt tip markers - Lake Chemical
Duralite - booster cable - Whitaker Cable
Dura-Mag - magnetic equipment - Dura Magnetics
Duranove - impregnated nomex paper - Natvar
Durapak - form of hyper-pure epoxy, impervious to moisture. - Dickson Elctrns.
Duraplate - finish - ITT Gremar
Durapro - booster cable - Whitaker Cable
Duraprobe - microelectrode - Transidyne-General
Durasel - rectifier - Alpha Comps.
Dura-Sleeve - tubing - General Plastics
Dura-Strand - copper plated alloy conductor - International Wire Prods.
Duratrak - adjustable autotransformer - General Radio
Durcopump - duriron chemical pump - Duriron
Duricon - dielectric fluid - Coricone
Durimet - duriron alloy for chem. svc. - Duriron
Duromid - coating - General Elec.
Durotec - tfe material - Shamban, W.S.
Durotherm - soldering tips - Hexacon Elec.
Durst - enlargers - Photo Tech. Prods.
Dur-X-Thane - extruded polyurethane cable jacket - Whitmor Wire & Cable
Dustamatic - cartridges - Pickering
Dust-Master - dust collector - Cincinnati Fan & Ventilator
Dutch Boy - soldiers - Nat'l. Lead
Duty-Master - a-c motors - Reliance Elec.
Duzall - flux - ARC Prods. Div.
D & W - fixe vacuum capacitors - Dolinko & Wilkens
DW Multi-Switch - switches - Switchcraft
Dyclene - die casting electro cleaners - Mac Dermid
Dycon - remote control - Mobil Elctrns.
Dye Laser Solutions - laser materials - Pilot Chemicals
Dyflon - bearings, rod end bearings, bushings - Southwest Prods.
DyGleam - zinc die casting polishing process - Mac Dermid
Dylastir - magnetic lab stirrer - VWR Scientific
Dylatherm - lab hot plate - VWR Scientific
DYNABLAST - deburring & deflashing equipment - Wells Elctrns.
Dynac - stationary accumulators - Leclanche S A
Dynac - traction accumulators - Leclanche S A
Dynaclad - batteries - Exide Power Sys. Div.
Dynaco - stock prec. gears - Dynamic Gear
Dynacor - silicon nickel iron cores - Dynacor
Dynacote - accelerator - Radiation Dynamics
Dyna-Crimp - hydraulic crimping unit - Amp
Dyna-Damp - damping material - Lord Mfg.
Dynaflex - couplings & joints - Lord Mfg.
Dynafocal - engine suspensions - Lord Mfg.
DYNA form - 360 series RF switches - Amphenol RF Div.
Dynagen - accelerator - Radiation Dynamics
Dynagrip - solder/flux kit - ARC Prods. Div.
Dynalectric - controller module - Bristol Div
Dynalloy - special copper base alloy - Mueller Brass
Dynaload - power testing equipment - Transistor Devices
Dynalog - recorder/potentiometer - Foxboro
Dynamag - duo-plasmatron ion source - Radiation Dynamics
Dynamaster - potentiometers - Bristol Div
Dyna-Mate - plugs and connectors - General Elec.
Dynamax - battery packs - Gordon Alan Entprs.
Dynamic - starter accumulators - Leclanche S A
Dynamic Electrocardiography - long term environmental ecg's - Avionics Resch. Prods.
Dyna-Mike - hi-k ceramic capacitor - Marshall Inds.
Dyna-Mite - vibrator - Automation Devices
Dynamitron - accelerator - Radiation Dynamics
Dyna-Mod - audio/video modulator - Dynair Elctrns.
Dynamonitor - acceleration voltmeter - Endevco
Dyn/Amp - hi-level ac/dc non-contacting current metering systems - Halmar Elctrns.
Dynapac - temperature indicators and controllers - Lab-Line Instrs.
Dynapar - digital control equipment - Allis Louis
Dynapar - digital control equipment - Allis, Louis
Dyna Path - numerical control - Bendix
Dynaphase I - dynamic headsets - Stanton Magnetics
Dynapore - laminated wire cloth - AMBAC Inds.
Dyna-Q - loading coils - K-W Engrg. Works
Dyna-Race - aluminum ball bearing slides - Grant Pulley & Hardware
DynaRad 150 - x-ray inspection system - Torr Labs.
Dynaray - emergency lighting equip. - Electro Powerpacs
Dynasil - high purity fused silica - Dynasil Corp. America
Dynasolve 150 - polysulfide solvent - Dynaloy
Dynasolve 160 - epoxy solvent - Dynaloy
Dynastrip 400 - photoresist solvent - Dynaloy
Dynasurge - batteries - Catalyst Resch.
Dyna-Switch - overload prevention switches - Dillon, W.C.
Dynatach - electric tachometers - Electric Tachometer
DynaTrode - mild-steel electrode - Eutectic
Dynatrol - controls - Automation Products
Dynatrol - temperature indicators and controllers - Lab-Line Instrs.
Dyna-Trol - furnaces - L & L Mfg.
Dynawood - plastic laminate cabinets - Taylor Millwork & Stair
Dynayoke - yokes - CELCO
Dynetic - phono cartridge - Shure Bros.
Dynograph - balancing machines - Annis, R.B.

E

EAC - relay markings - Elctrn. Applications
Eagalok - caps & connectors - Eagle Elec. Mfg.
Eagle Brand - pressed felt - Felters
Easitrak - optical bench - Electro Optics Assocs.
Eastern - batteries - General Battery
Eastern Scientific - laboratory magnets - Magnetic Sys. & Instrs.
Eastobond - hot-melt adhesives - Eastman Chem. Prods.
Easy-Flo - brazing alloy - Handy & Harman
Easymatch - matching network - Alford Mfg.
Easypoxy - epoxy adhesive kits - Conap
ECC - quick disconnect connector - Joy Mfg.
Eccentrix - adjustable shear/alignment pin - Tridair Inds.
Eccobond - adhesives, sealants - Emerson & Cuming
Eccoceram - ceramic dielectrics - Emerson & Cuming
Eccocoat - surface coatings - Emerson & Cuming
Eccoflo - dielectric powders and fluids - Emerson & Cuming
Eccofloat - buoyant oceanography materials - Emerson & Cuming
Eccofoam - plastic and ceramic foam - Emerson & Cuming
Eccogel - plastic gels - Emerson & Cuming
Eccomold - molding powders & laminating resins - Emerson & Cuming
Eccoseal - impregnating resins - Emerson & Cuming
Eccoshield - rf shielded chambers - Emerson & Cuming
Eccoshield - nuclear and rf shielding materials - Emerson & Cuming
Eccosil - silicone resins - Emerson & Cuming
Eccosorb - anechoic chambers - Emerson & Cuming
Eccosorb - waveguide & coax absorbers - Emerson & Cuming
Eccosorb - free space absorbers - Emerson & Cuming
Eccospheres - hollow glass, ceramic and plastic spheres - Emerson & Cuming
Eccostock - plastic rod and sheet - Emerson & Cuming
Eccotherm - thermally conductive dielectrics - Emerson & Cuming
E-Cell Integrators - electrochemical integrators - Bissett-Berman
E-Cell Timers - electrochemical timers - Bissett-Berman
Echoplex - time diversity system - Kahn Resch. Labs.
Echorder - tape recorder - RIL Elctrns.
Echordette - tape recorder - RIL Elctrns.
Eckoustic - modular panels - Eckel Inds.
Ecliptic - tach generators - Carter Motor
ECO - onetime non-renewable fuses - Economy Fuse Div.
ECOA - materials handling equip - Equipment Co. of America
Ecom Series - core memory - Standard Memories
Econ - dual-element, time-delay fuses - Economy Fuse Div.
Econistor - inexpensive resistors - General Resistance
Econ-Limiter - dual-element class k-5 fuses - Economy Fuse Div.
Econocaire - heat exchangers, air-to-air - Cargocaire Engrg.
Econocap - capacitance diodes - Motorola Semiconductor Prods.
Econo-Coder - wire color coding console - Formulabs Ind'l. Inks
Econocounter - elec. counters - Veeder-Root
Econofire - pastes-thick film microcircuits - Electro Mats. Corp. Amer.
Econo-Flex - electronic counters - Veeder-Root
Econoflux - liquid inorganic acid flux - Alpha Metals
Econogide - p.c. card guides; guides circuit board - Bivar
Econoglass - standard fiberglass - Brooks & Perkins
Econoglo - indicator light - Drake Mfg.
Econo Grid - pvt. circuit card - Elgin Elctrns.
Econo-Heat - furnaces - Aremco Prods.
Econo-King - portable oven - Hotpack
Econolim - current limiting fuses - Economy Fuse Div.
Econoline - plastic transistor - Sprague Elec.
Econo-Merc. - mercury ballasts - Jefferson Elec.
Econ-O-Mite - hose reels - Aero-Motive Mfg.
Economy - renewable cartridge fuses - Economy Fuse Div.
Econopot - potentiometer - New England Instr.
Econ-O-Pump - centrifrigal & canned motor pumps - Eastern Inds. Div.
Econoscope - economic input-output forecasting software package - Cybermatics
Econo-Sil - low-cost emi/rfi shielding material - Chomerics
Econo-Sync - synchros - IMC Magnetics
Econotan - commercial type solid tantalum capacitors - Components
Econo-Trim - trimmer potentiomers - Dale Elctrns.
Econovap - vacuum deposition unit - T-M Vacuum Prods.
Econ-S - s base plug fuses - Economy Fuse Div.
ECR Sys. - court recorder - Leach
ECS - electronic enclosures, cases - Environmental Container Sys.
Eddystone - communications receivers - Marconi Instrs.
Eder-Lites - inspection lamps - Eder Instrument
Edex - student response sys. - Visual Educom
Edgecon - printed circuit edge connectors - Molex Prods.
Edgegard Hood - dust-free work bench - Baker
Edge-On - card receptacle connectors - Burndy
Edge-Pac - p.c. connectors & back panels - ELFAB Crop.
Editab - pre-aligned die-cut tape splice - Tall Joel
Editall - tape splicing block - Tall Joel
Editall - tabs and splicers - Ortofon Div.
Edkotron - dimming system - Century Strand
Educated Hoist - automatic plating machs. - Sel-Rex
Educom - language labs, switching - Visual Educom
EDU-Fone - wireless headphones - Superex Elctrns.
ED 1 - transformers - Electronic Devices
EECO - discontroller - Electronic Engrg. Co. Cal.
EECO - hotel computer systems - Electronic Engrg. Co. Cal.
EECologIC - digital logic cards - Elctrn. Engrg. Co. Cal.
EECo Logic-Ware - hardware & software - Elctrn. Engrg. Co. Cal.
EECOSWITCH - rotary thumbwheel switches - Elctrn. Engrg. Co. Cal.
e-Gun - evaporation source - Varian Assocs.
840 Flux - submerged arc flux - Lincoln Elec.
88 - surfacing rod - Eutectic
Ekolog - ecological monitoring system - General Dynamics
Ektacom - wired intercom systems - Fisher-Berkeley
El - thyratrons & gas filled rectifiers - Electrons
Elasto-Prene - neoprene cord type so-sjo-svc - Plastic Wire & Cable
Elastoseal - o-ring - Shamban, W.S.
Elasto-Syn - rubber cord type s-sj-sv - Plastic Wire & Cable
Elcon - counters - Hecon
Elctrn. Weatherstrip - emi shielding strip - Metex
El Dorado - hi fi speaker sys. - University Sound
Electone - phonographs - amplifiers - Electron Enterprises
Electrace - recording chart paper - Gubelman Chart Div.
Electra-Lab - electronic training systems - Electraid
Electricity's Safety Valve - fuses - Bussmann Mfg.

Electric Lacquer - lacquer - Dolph, John C.
Electricord - wire, cord and cable - Pacific Electricord
Electriduct - over-the-floor extension cord - Ideas
Electrim - trimming potentiometer - Electra/Midland
Electrion - line operated ph meter - Sel-Rex
Electro - power supply - Electro Prods. Labs.
Electro-Alarm - crane safety device - Electro-Alarm Safety Devices
Electrobond - coatings and cements - Electrofilm
Electro-Cap - air filter - Cambridge Filter
Electro-Ceroplast - high temperature plastic - Topper Mfg.
Electro Clean - tape head cleaner - Electronic Engrs.
Electrocom - solid state commutator - General Devices
Electrocom - teletypewriter term. equip. & filters. - Electrocom Inds.
Electrocraft - plugs, jocks, adapters, binding posts - GC Elctrns.
Electro-Crimp - electronic crimping machine - Crimpco Engrg.
Electrocular - portable crt display - Hughes Aircraft
Electrocurtain - electron beam curing equipment - Energy Sciences
Electrodag - conductive and resistive coatings - Acheson Colloids
Electrofilm - film lub. - Electrofilm
Electro Flashcote - steel sheet - Republic Steel
Electroflex - reset timer, electronic - Eagle-Signal Div.
Electro-Flo - air filter - Cambridge Filter
Electro Form - coil forms-bushing mounted, moulded printed circuit - Electro Assemblies
Electrogram - educational electronics game - ATV Research
Electro-Graph - oils & greases - Electrofilm
Electro-Graphic - graphic recorders - Midg-Line Instr.
Electro Guard - transformer - James Elctrns.
Electro Ion - getter-ion pump - Granville-Phillips
Electro-Lap Seal - cable joint and terminal kit - Okonite
Electro-Larm - unit type annunciator - Electro Devices
Electro-Lert - annunciator - Electro Devices
Electro-Lite - indicators - Electro Devices
Electrolube - film lub. - Electrofilm
Electrolung - underwater breathing apparatus - Beckman Instrs., Advanced Tech.
Electro-Ma - air filter - Cambridge Filter
Electromate - ion measuring instrument - Beckman Instrs., (AISSD)
Electro-Matic - traffic control equip. - Automatic Signal Div.
Electromax - signalling controller - Leeds & Northrup
Electro-Medical - sub-miniature wire - Standard Wire & Cable
Electro-Mite - electric insect killers - Fedtro
Electro Module - packaged clutch & brake - Warner Elec. Brake & Clutch
Electro-Moly - oils & greases - Electrofilm
Electronic Servicing - trade magazine - Sams, Howard W.
Electro Pack - packaged clutch & brake - Warner Elec. Brake & Clutch
Electro Paintlok - steel sheet - Republic Steel
Electro-Pane - electro-mechanical annunciator - Electro Devices
Electroplanar - operator's control panel - Hughes Aircraft
Electroplast - cryogenic raw material - Topper Mfg.
Electropulse - electron beam sterilizers - Energy Sciences
Electro-Roll - air filter - Cambridge Filter
Electroscan 30 - electroanalytical system - Beckman Instrs., (AISSD)
Electro-Shield - rfi shielding components - Estes Engrg.
Electroshift - gearchangers - Bowmar Instr.
Electro-Stat - solid-state annunciator - Electro Devices
Electrostat - static dc adjustable speed drives - Wer Ind'l.
Electro-Time - solid state devices - Clare, C.P.
Electro-Ty Cable Tie - wire/cable harness - Electrovert
Electro-Vize - annunciator - Electro Devices
Electro-Wipe - record cloth - Duotone
Electro Zincbond - steel sheet - Republic Steel
Electrunite - electrically welded tubing - Republic Steel
Elf - thyristors - Motorola Semiconductor Prods.
Elhygen - generator - Milton Roy
Eliminator - dc power supply - Wanlass Div.
Elin - ac power sources, ac line correctors - Elin Div.
Elin - ac power sources, ac power correctors - California Instrs.
Elin - dynamic ac line correctors - Calico Div.
Elinco - ac and dc sub-fractional and fractional hp motors and generators. - Electric Indicator
Elipticon - ellipticon-diamond needle - Duotone
Elipti-Grip - terminals - Thomas & Betts
Elkaloy - copper base alloy - Mallory Metallurgical
Elkonite - impregnated refractory metal - Mallory Metallurgical
Elkonium - precious metal based alloy - Mallory Metallurgical
Ellanar - jewelry cleaner and silver polishes - L & R Mfg.
Ellimatic - presur & flow control - Ellison Draft Gage
Elmco - coil winding machinery - Elden Mfg.
El-Menco - fixed and variable capacitors - Electro Motive Mfg.
Elmet - molybdenum and tungsten - Philips Elmet
Elmo - (photographic equipment) - Honeywell
El Paso - hi fi speaker sys. - University Sound
EL-100 - 1/12 - 1 hp scr controls - Electrol
EL-120 - 1/4 - 5 hp scr controls - Electrol
EL-20 - 1/1000 - 1 hp shaded pole motor control - Electrol
EL-30 - 1/25 - 1/2 hp scr controls - Electrol
EL-320 - 2 - 75 hp scr controls - Electrol
EL-340 - 5 - 200 hp scr controls - Electrol
EL-50 - 1/100 - 1/2 hp scr controls - Electrol
EL-75-MO-TO-RATE - 1/15 - 1 hp scr controls - Electrol
EMA iron - microwave absorbing material - Electronautics
EMC - ceramic capacitor - Electro Mat'ls.
EMC - epoxy molding compound - Pacific Resins & Chems.
EMCEE - all products - Electronics Missiles & Comms.
EMC-Glas - shielded viewing windows - Technical Wire Prods.
Emcon I & Emcon II - control systems - Elctrn. Modules
Emcor - cabinets - Ingersoll Prods.
Emico - electrical meters - Electro-Mechanical Instr. Div.
Emiz - krypton lamp power supply - Elctrn. Meas.
EML - metal locator - Electro-Alarm Safety Devices
Emlock - miniature connector for flexible cable - Phelps Dodge Comm.
Empco - electromagnetic transducers - Carolina Medical Elctrns.
Empirical-Log - log periodic antennas - Telrex Labs.
Emralon - ptfe - dry-film lubricant - Acheson Colloids
Emtrol - comm. control equipment - Virginia Elctrns.
Enbond - alkaline cleaners - Enthone
Endeco - desoldering/resoldering tools - Enterprise Development
Endogas - gas generator - Sunbeam Equip.
Endoprobe - optical inspection device - GCO
Enduro - stainless steels - Republic Steel
Energized - core solder - Alpha Metals
Energizer - power amplifier - Lansing, James B. Sound
Enginator - engine-generator sets - Waukesha Motor
Engravograph - pantograph engraving machs. - New Hermes Engraving Mach.
Enhancetron - signal averager - Nuclear Data
Enplate - electroless plating solutions - Enthone
Enplox - environmental protection - Oakite Prods.
E-N Rings - rings external notched - Reliance Div.
Ensolite - pvc sponge mat'l. - Uniroyal
Enstrip - metal stripping compounds - Enthone
Entek - rust preventives - Enthone
Envir-Aseptic - uniforms - Angelica Uniform
Enviro-Bond - compound - Superior Continental
Environ-Cab - environmental chambers - Lab-Line Instrs.
Environette - environmental chambers - Lab-Line Instrs.
Environmental growth chambers - humidity chambers, temp. chambers, environmental rooms - Integrated Dev. & Mfg.
Environ-Rooms - environmental chambers - Lab-Line Instrs.
Enviro Vac - thermal control system - High Vacuum Equip.
Enxl - kenon lamp power supply - Elctrn. Meas.
E-Pak Modules - electrochemical timers/integrators - Bissett-Berman
EPC - bobbins & cases - Electrical Plastics
E-PHASE - airborne geophysical instrument - Barringer Research,
Epi Base - die fabrication process - Motorola Semiconductor Prods.
Epibond - epoxy adhesives - Furane Plastics
Epic - integrated-circuit process - Motorola Semiconductor Prods.
EPICAP - capacitance diodes - Motorola Semiconductor Prods.
EPICAP:10 - capacitance diodes - Motorola Semiconductor Prods.
Epicyc Motor - rotary actuator - Yaskawa Elec. America
Eplab - scientific instruments - Eppley Lab.
EPO - shopscopes, profile projectors coordinate measuring machines - Ehrenreich Photo-Optical Industries
Epocap - epoxy compounds - Hardman
Epocast - epoxy compounds - Furane Plastics
Epocel - filter cartridge - Pall Trinity Micro
Epocel - filter medium - Pall
Epoch Monitor - synchronizer - Aerospace Resch.
Epocure - epoxy curing agents - Hardman
Epolast - epoxy compounds - Hardman
Epomarine - under water protection epoxy - Hardman
Epomn - evaporated metal film resistors - EMC Technology
Eposet - epoxy compounds - Hardman
Eposolve - solvent for epoxy clean-up - Hardman
Epoweld - epoxy compounds - Hardman
Epoxer - hand tools, dispensing - Kenics
Epoxi-Patch - adhesives - Hysol Div.
Epoxylite - products are numbered - Epoxylite
Epxoy-Lockt - epxoy-secured hammers - Channellock
Equi-Flo - air filter - Cambridge Filter
Equi-Line - modular enclosures - Equipto Enclosure Sys.
Equiphase - triple-point of water cell - Trans-Sonics
Equipt-Air - blowers and fans - Equipto Enclosure Sys.
Erectohm - wirewound resistor - Workman Elctrn. Prods.
Erectomatic - shelving, steel - Hallowell
Erectospan - shelving, steel, wide span - Hallowell
ER Eyelets - eyelets - USM
ERIC - eddy current inspection equip. - Magnetic Analysis
Erickson - couplings - Thomas & Betts
ERSA - soldering irons - Edsyn
Ersin - solder, fluxes, cleaners & testing machine - Multicore Sls.
Escon - special relays - Guardian California
Escorp - rotary switches - Electro Switch
Escort 110 - low-priced vhf nav-com unit - Narco Avionics
Escosil - optical fused quartz & silica - Esco Products
ESL - temperature, millivolt meters a-c meters - Electro-Standards Labs.
ESlok nuts - commercial self-locking nuts - Elastic Stop Nut Div.
ESlok screws/bolts - self-locking externally threaded fasteners - Elastic Stop Nut Div.
ESM - connectors - Indit
ESPI - high purity chemicals & metals - Elctrn. Space Prods.
E Stane - polyurethanes - Goodrich B. F. Chem.
Estarel - established reliability component - Sprague Elec.
Estoril - hi fi speaker sys. - University Sound
Etcho-Rak - processing rack - Etchomatic
Etch/Path System 100 - semiconductor (aluminum) etching system - NuTek Industries
Etco - attaching equipment - Electric Terminal
Etco - terminals, connectors, blades, splices - Electric Terminal
Ethafoam - polyethylene foam - Dow Chemical
Ethocel - ethylcellulose resin - Dow Chemical
Eucleen - cleaning compound - Eutectic
Eus - electrodes - Eutectic
Eutaloy - torch process - Eutectic
EutecArc - welding power sources - Eutectic
EutecBor - torch overlay rod - Eutectic
Eutechrom - rods and electrodes - Eutectic
Eutec-Liquitor - liquid flux - Eutectic
EutecRod - torch rods - Eutectic
Eutecsil - silver brazing alloys - Eutectic
Eutec-Silver-Weld - silver type alloy - Eutectic
Eutec-SilWeld - silver alloy/flux - Eutectic
Eutecsol - liquid soldering fluxes - Eutectic
Eutec-Stainrod - stainless-steel torch alloy - Eutectic
Eutec-Tin-Weld - solder alloy/flux - Eutectic
Eutectofilm - electrotrode coating - Eutectic
Eutecto-Mask - spatter prevent. compound - Eutectic
Eutectonium - overlay electrode - Eutectic
Eutector - fluxes - Eutectic
EutecTrode - electrodes - Eutectic
EuteCushion - shim stock - Eutectic
Evabrite - front surface mirrors - Bache, Semon
Evalast - second surface mirrors - Bache, Semon
Evanohm - resistance alloy - Driver, Wilbur B.
Eventemp - temperature controllers - Instrulab
Evenvolt - voltage units - Instrulab
Everdur - conduit - Anaconda American Brass
Eveready - batteries, flashlights, lanterns & rechargeable lighting prods. - Union Carbide
Everlasting Fastenings - corrosion-resistant fasteners - Harper, H.M.
Exact-O-Masts - exact replacement auto antennas - New-Tronics
Excellite - connectors - Amphenol Ind'l. Div.
Excluder - fluorocarbon seal - Shamban, W.S.
Exec-u-Flite - altimetry systems - Kollsman Instr.
ExFlux - flux remover aid - Eutectic
Exogas - gas generator - Sunbeam Equip.
ExpandaCore 18 - memory sys. core, expandable - Cambridge Memories
Expand-A-Dim - dimming system - Decor Elctrns.
Expanda-Flex - cabinet benching - BFC-Bernard Franklin
Expandofoam - polyurethene insulation - Armstrong Cork
Expando Grip Panel Fasteners - expandable fasteners - Adjustable Bushing
Expando Grip Pins - expandable diameter quick acting fasteners - Adjustable Bushing
Expandomatic - ph measuring instruments - Beckman Instrs., (AISSD)
Expeediter - print machine - Rotolite, Teledyne
Extended Range - heat guns - Sigma Sys.
Extend-o-let - multiple outlets - Fedtro
Extension Jax - phone jacks - Switchcraft
Extra - liquid scintillation sample vials - Beckman Instrs., (AISSD)
Extralytic - electrolytic capacitor - Sprague Elec.
Eye-24 - closed circuit TV sys. for 24-hour surveillance - Westinghouse Elec.
E-Z - stretch frames - Podgor, Joseph
E-Z-Code - wire markers - Thomas & Betts
E-Z-Duo - 2 in 1 circuit breaker - Wadsworth Elec. Mfg.
Eze-Stik - pressure sensitive label stock - Fitchburg Coated Products
E-Z Hook - test connectors - E-Z Hook, Test Prods.
E-Z-Mini-Hook - miniature test connectors - E-Z Hook, Test Prods.
E.Z. Peel - masking discs - By-Buk
E-Z-Red - circuit breaker - Wadsworth Elec. Mfg.
E-Z Release - contact - Continental Connector
Ezsol - magnet wire; nylon - Hudson Wire
E-Z Splice - splicing tape strips - Duotone
E-Z-Trim - potentiometer - Bourns
E-Z Wire - switches & receptacles - Eagle Elec. Mfg.

F

FA - fluid adhesives - Bacon Inds.
Fabco Closures - configurated sealing strips - Townsend
Fabco Tools - power or hand tools for fasteners - Townsend
Fabmika - mica capacitor - Sprague Elec.
Fabri-Therm - varnished glass cloth - General Elec.
Faceloid - involute face gears - Invincible Gear
Faceweld - hardsurfacing electrode - Lincoln Elec.
FACT - flexible automatic circuit testing machine - Hughes Aircraft
Factrol - height gage - Minnetech Labs.
Fade-Ometer - accelerated lightfastness instrument - Atlas Electric Devices
Fafcote (TM) - coating - Fafnir Bearing
Faflon - bearings - Fafnir Bearing
Fail Safe - spring applied electro-magnetic brakes - Electroid
Fairloc - integral fastener - Sterling Instr.
Fame - ferro acoustic recorder - General Dynamics
Fandial - fan speed control - Lutron Elctrns.
Fanfare - C.B. Rigs - Fanon Elctrns.
Fan Spray - aerosol valve - Sprayon Prods.
Fansteel - metals, wire, tubing - Fansteel
Fantork - semiconductor heat sink - Fansteel
FAO - 109 - flourescent oil additive - American Gas & Chemicals
Far Infrared - lasers, detectors, spectrometers - Molectron
Farrowtest - tubing and pipe tester - Republic Steel
Fascon - connector, test, vacuum operated - Program Data
Fasglo - fireplace - Fasco Inds.
Fastall - brackets, anchors - Fastex Div.
Fastax - rotating prism camera - Red Lake Labs
Fastcon - fast connect terminal - Doran Mfg.
Fastee - subscriber tap - Entron
Fastemp - electronic thermometers - Amprobe Instr.
Fastin-Faston - connectors - Amp
Faston - receptacle and tab terminals - Amp
Fastrak - markers - General Radio
Fast Stepper - step & repeat film printer - Grover Photo Prods.
Fast-Switch* - over-voltage (precision) starter (solid-state) - Neill Engrg.
Fat Phoebe - outlet box - Waber Elctrns.
Fazeguard - phase failure sensor - Opad Elec.
FC Board - terminal board - Doran Mfg.
FCR - rectifiers - American Rectifier
F.C.S. Seal - spring loaded t.f.e. seal - Fluorocarbon
Feather - fan - Rotron
Feather-Fone - headphone - Superex Elctrns.
Featheride - cartridge - Electro-Voice
Feather-Lever - lever switches - Switchcraft
Feathertouch - push button - Gordos
Fedis - front end design information sys. - Macrodata
Feralex - ferrite ring cores - Connolly
Ferrex - emi shielding mat'l. - Metex
Ferricore - ferrite prods. - National Moldite
Ferroflow - microwave absorber (liquid) - Microwave Filter
Ferrograph - tape recorders - Ortofon Div.
Ferrosorb - microwave absorber (solid) - Microwave Filter
Ferrotron - ferromagnetic plastics - Polymer
Ferroweld - steel electrod for cast iron - Lincoln Elec.
Feutron - synthetic fiber felt - GAF
FFA - fluid flexible adhesives - Bacon Inds.
FFB - friction brake - General-Electro Mechanical
FFC - friction clutch - General-Electro Mechanical
FFRB - fail-safe friction brake - General-Electro Mechanical
FF Switch - pushbutton switches - Switchcraft
Fiber-Lite - fiber optic illuminators - Dolan-Jenner Inds.
Fiberloc - needled felt - Felters
Fibertemp - fiber temperature sensor - Trans-Met Engrg.
Fibrolight - fiber optics - Rank Precision Inds.
Fibrox - fiber optics - Rank Precision Inds.
Fi-Cord - recorders, magnetic tape - Heitz, Karl

Fidelex - metal strippers - Fidelity Chem. Prods.
Fidelplate - electroless plating solutions - Fidelity Chem. Prods.
Fieldial - magnetic field regulator - Varian Assocs.
Fieldlab - oxygen analyzer - Beckman Instrs., (AISSD)
Fiesta - film leader - Neumade Prods.
Filamite - filament wound parts - NVF
Fil-Cap - miniature feed-thru capacitors - Filtron
Filmatic - (elmo camera) - Honeywell
Filmatic - polyesters film capacitor - Paktron Div.
Filmcard - resistance card - Filmohm Div.
Filmex - epoxy tape - Mansol Ceramics
Filmgraph - 8/16 mm recorder - Miles Reproducer
Filmite - film capacitor - Sprague Elec.
Film-Met - trimming potentiometer (metal film) - Amphenol Controls Div.
Fil-Shield - shielded enclosures - Filtron
Filtairette - respirator - General Sci. Equip.
FilterCap - feedthru capacitor - USCC/Centralab, Elctrns. Div.
Filtercon - filter - Erie Technological Prods. (EEM)
Filter Point - steel needle - Duotone
Finco - amplifiers, matv equipment - Finney
Fine Line - precision etching - Flexible Circuits
Fire Ball - safety gloves - Edmont-Wilson
Firefly - instrument light - Western Indicator
Firefly - indicator lights - Aerospace Knob
Firepac - portable fire suppression system - Fenwal
Firerod - cartridge heater - Watlow Elec. Mfg.
Firezone - aircraft wire - Cerro
Firezone - high temperature wire - Cerro Wire & Cable
Firmaline - fiberglass grading - Ryerson, J.T. & Son
Firon - pastes-thick film microcircuits - Electro Mats. Corp. Amer.
Fisherman - depth finders - Ross Labs.
Fisher M-Scope - locators - FRL
5-Way - binding posts - Superior Elec.
503-1 - gasket material - Cottrell Paper
5700 - display tape system - Sanders Assocs.
Flakeglas - glass flakes - Owens-Corning Fiberglas
Flamatic - flame heating equip. - Tocco Div.
Flameless Torch - hot air gun - Henes Mfg.
Flamenol - polyvinyl chloride-insulated wires - General Elec.
Flamon - flame detector - Bailey Meter
Flangette Unit - power transmission unit - Fafnir Bearing
F-Lar - coated polyester film - Natvar
Flashalarm - annunciator - PPM
Flash Flow Welder - tap welder - Ewald Instrs.
Flash Stripper - shielding stripper - Ewald Instrs.
Flat Plate - slot array antenna - Rantec Div.
Flat-Plug - phone plugs - Switchcraft
Flat-Store - core memory sys - Standard Logic
Flat-Tran - microminiature pulse transformer - Pulse Engrg.
Fleetweld - steel electrode - Lincoln Elec.
FleetWeld-Electrode - welder - Lincoln Elec.
Flex-A-Lite - light source - Dyonics
Flexall - flexible kraft tubing - Precision Paper Tube
Flexall - creped, flexible, tubing - Resinite Corp. Div.
Flex-A-Plug - plug-in type power take-off devices - General Elec.
Flex'ator - constant force compression spring - Hunter Spring
Flex-Con - flat flexible electrical cable - Micro Elctrns.
Flexcon - connector, test - Air-O-Tronics Prods.
Flexfoam - foam dielectric microphone cable - Columbia Eletrn. Cables
Flexhot - air duct joints - Southwest Prods.
Flexible Abrasive - abrasive stick - Ideal Industries
Flexicom - intercommunication system - Edison Elctrns. Div.
Flexi-Kard - breadboarding module - Electraid
Flexi-Klip - solderless connector - Electraid
Flexil - tape - Leico Inds.
Flex-i-liner - pumps, sealless plastic - Vanton Pump & Equip.
Flexite - extruded plastic tubings - Markel, L. Frank & Sons
Flexitite - molded rubber push button station - Joy Mfg.
Flexitorch - tig welding - Falstrom
Flexitorq - dc motors & generators - Allis, Louis
Flexitorq - dc motors & generators - Allis Louis
Flex Key - key input modules - Flex Key
Flexlead - high temperature wire & cable - Markel, L. Frank & Sons
Flexlife - flexible high gloss cable jackets - Columbia Eletrn. Cables
Flexline - clutch and brake controls - Fawick Airflex Div.
Flex-Loc - butt-on lampholders - Westmoreland Plastics
Flexmax - multilayer circuit - Sanders Assocs.
Flexobond - epoxy adhesive - Allaco Prods.
Flexobond - epoxy adhesvie - Packaged Resins
Flex-O-Fire - gas exploder firing unit - Geo Space
Flex-O-Gun - gas exploder for immersion applications - Geo Space
Flexolon - insulated wire & cable - Tensolite
Flexoprene - cable & cord - Standard Wire & Cable
Flexopulse - repeat cycle timer - Eagle-Signal Div.
Flexowriter - automatic writing machine - Friden Div.
Flex-Pak - amplifiers & sound sys - Bogen Div.
Flexprint - flexible circuit - Sanders Assocs.
Flexsafe - clutch & brake controls - Fawick Airflex Div.
Flex-Shielded Boot - emi shielding comp. - Metex
Flex-Strip - current carrying flat cable - Ansley Elctrns.
Flexstron - high tensile bi-directional & monofilament stapping tapes - Mystik Tape, Borden
Flex/Switch - flexible switching - N/P
Flex-weld - welding process - Ansley Elctrns.
Flex-Weld - termination system - ITT Cannon Electric
Flicker Flame - glow lamp - Aerolux Light
Flip Chip - modules - Digital Equip.
Flip-Dip - L.C. mounting method - Berg Elctrns.
Flip-Lok - grommets and bushings - Western Sky Ind.
Flipper - wire cutter - Clauss Cutlery
Flip-Seal - weatherproof cord connector - Rodale Mfg.
Floating Stylus - styli - Pickering
Floatrol - float operated control - Autocon Inds.
Flo-Prover - fuel pump tester - AMBAC Inds.
Floret - air velocity indicator - AMBAC Inds.
Florite - air velocity meter - AMBAC Inds.
Flotect - flow controls (switches) - Anderson, W.E.
Flotectic - rods and fluxes - Eutectic
Flotrac - displacement instrumentation - Hull
Flotube - vinyl tubing - Natvar
Flowrator - variable-area flowmeter - Fischer & Porter
Flowtronic - velocity flowmeters - CGS/Datametrics
Fluoralloy - solutions and mixes - Beckman Instrs., (AISSD)
Fluoroetch - treatment for fluoro plastics - Acton Assocs.
Fluorofilm - fluorocarbon films & tapes - Dilectrix
Fluoroglide - spray film dry-lubricant - Chemplast
Fluorojel - tetrafluoroethylene lubricant - Dilectrix
Fluorolloys - t.f.e. bearing alloys - Fluorocarbon
Fluoropel - fluorocarbon finishes - Dilectrix
Fluorosint - fluorocarbon stock shapes - Polymer
FluoroSpar - compounded tfe fluorocarbon resins - Sparta Mfg.
Fluoroweld - fused fluorocarbon constructions - Shamban, W.S.
Fluor-X - nuclear gauges - Nuclear Resch.
Flushlite - indicator light - Drake Mfg.
Flush-Seal Pressure Plugs - socket head plugs - Allen Mfg.
Flux Check - tape data verification - Kennedy
Fluxducer - torque transducers - Bergen Labs.
Flux-'N-Solder - solder and flux in paste form - Johnson Mfg.
Flux-O-Tran - regulators, stabilizers, voltage transformers, constant - Kepco
Fly-By-Night - aircraft stobe sys - Advanced Energy Conversion
Foamaze - air filter - North American Rockwell
Foamcone - radar-augmentation device - Teledyne Micronetics
Foamflex - semi-rigid cable - Phelps Dodge Comm.
Foam/Foil - RFI shielding - Tapecon
Foam Wrap - packaging material - Sealed Air
FOCAL - programming language - Digital Equip.
Focalray - ultraviolet lamp - Black Light Prods.
Focatron - elec. optical focusing equip. - Photomechanisms Div.
Focused Field - narrow head gap for highest freq. response - Roberts Div.
Fohmline - transmission line - Superior Insulated Wire
Foilcals - aluminum foil nameplates - Miller Dial
Foil Flx - power, control, instrumentation - Cerro Wire & Cable
Fold-A-Fone - telephone handset - Roche, Paul C.
Folded & Formed Units - electric resistance heating elements - Trent
Fomat - general floor mat - Controlled Environment Equip.
Fonex - intercomm equip. - Encom Prods.
Fono-Magic - chemical - R-Columbia Prods.
Footrol - foot switches - General Control
Form-A-Jig - jig molding compound - Eutectic
Form-Flex - metallic disc shaft coupling - Formsprag
Form-Lock - torque limiting reverse locking clutches - Formsprag
Formsprag-Heid - electro magnetic multiple disc clutches & brakes - Formsprag
Formulabs - wire coding inks, wire marking/handling equipment - Formulabs Ind'l. Inks
Formulae AR-A1 - antistatic chem. - Rogers Anti-Static Chems.
Formulae AR-8 - anti-stat-anti-fog - Rogers Anti-Static Chems.
Formulae AR-9 - anti-static chem. - Rogers Anti-Static Chems.
Formula 99 - stripping chemicals - Arnold Labs.
Forticel - cellulose propionate - Celanese Plastics
Fortiflex - polyethylene - Celanese Plastics
Fostoria - infrared & lighting equipment - Fostoria-Fannon
Fotaflex - photographic reproduction - Gentape
Fotoceram - glass-ceramics - Corning Glass Works, Fluidic Products Dept.
Fotoeye - (strobonar lighting equipment) - Honeywell
Fotofoil - anodized aluminum sheets - Miller Dial
Fotoform - light sensitive glasses - Corning Glass Works
Fo-To-Kot - direct emulsion - Podgor, Joseph
Fotolectric - electronic controls - Worner Elctrn. Devices
Fotonic Sensor - optical proximity detector - Mechanical Technology
Foundation - panel instrument line - Westinghouse Elec.
4 - AC-DC electrode - Eutectic
4-Bit - screw driver - Holub Inds.
4-in-1 - screwdrivers, nutdrivers - Upson Tools
4J - speaker baffles - Fourjay Inds.
44 Wire - wire and cables - Raychem
Fox Venturi - venturi meters - Fox Valve Dev.
Frahm - resonant reid frequency meters, tachometers - Biddle, James G.
Franklin Fibre - vulcanized fibre sheets, rods & tubes - Franklin Fibre-Lamitex
Franklin Insulation & Plastics - industrial plastics sheets, rods & tubes - Franklin Fibre-Lamitex
Franplas - industrial plastics sheets, rods & tubes - Franklin Fibre-Lamitex
FRC Fab-Ri-Cable - woven ribbon cable - Zippertubing
Free-Flex - flexible circuits - Ansley Elctrns.
Free Flex - flexible etched circuitry - Ansley Div. ACI
Free Flex - flexural pivot - Bendix
Freon - solvents - E.I. DuPont DeNemours
Freqmeter - frequency-to-dc converter - Solid State Elctrns.
Frescan - radar - Hughes Aircraft
Frescanar - radar - Hughes Aircraft
Fresnelites - spotlights - Century Strand
Frigid-Air - circuit coolant - Elctrn. Chemical
FrigidArc - flux coating electrode - Eutectic
Frigidri - refrigerated dryer for air/gas - Pall Trinity Micro
Frigisol - cleaning solvents - Moore John B.
Friskem - magnetometer devices - Infinetics
Fritch - frequency responsive switch - Douglas Randall Div.
Frixtrode - overlay electrode - Eutectic
Froil - rust preventive oil - Octagon Process
Frost Aid - coolant - Chemtronics
Frost-Off - de-icer - Merix Chem.
FS Floating Seal - shear seal solenoid valve - Valcor Engrg.
Full-View - flowmeter - Brooks Instr. Div.
Fulscope - controller - Taylor Instr. Process Control Div.
Fume-Master - fume exhauster - Cincinnati Fan & Ventilator
Funelet - funnel flanged eyelets - Circon
Furfasol - cleaning solvents - Moore John B.
Fusa-Fab - tape - General Elec.
Fusa-Flex - putty - General Elec.
Fusa-Flex - tape - General Elec.
Fusa-Mat - tape - General Elec.
Fusecor - glass reinforced vinyl cable filler - Whitmor Wire & Cable
Fuse-Lite - indicating fuse holders - Master Specialties
Fusetron - fuses - Bussmann Mfg.
Fusionbrazed - brazed steel tubing - Higbie Mfg.
Fusionweld - welded steel tubing - Higbie Mfg.
Fustat - type "s" base time-delay fuses - Bussmann Mfg.
Futura - ion measuring electrodes - Beckman Instrs., (AISSD)
Fuz-Ion Sealed - metalized polycarbonate capacitors - Dearborn Elctrns.
Fuzit - fused resistor - Workman Elctrn. Prods.
Fuzz Button - electrical contacts - Technical Wire Prods.
Fyrebrand - high temperature airframe wire - Tensolite
Fyrite - analyzers - AMBAC Inds.
Fyr-Lace - lacing tape - Gudebrod Bros. Silk

G

GAC - relay armature - General Automatic
Gacor - flashers - Eagle Elec. Mfg.
Gafac - cleaner, surface-active agent - GAF
Gage-it - electro-optical gaging sys. - Physitech
Gai-Phone - anti-noise telephone - Gai-Tronics
Galaxie - tv antennas - S & A Elctrns.
Galvite - steel conduit - Republic Steel
Galvo-Corda - stylus chart recorder - Tensitron
Gamewell - potentiometers, precision - Eagle-Signal Div.
Gammatrol - nuclear gauges - Nuclear Resch.
Gammatron - electronic tubes - Heintz & Kaufman,
Garalease - mold release agent - Ram Chems.
Garalyst - resin curing catalyst - Ram Chems.
Gard - resistive testor - Dale Elctrns.
Gard-A-Matic - phono cartridge - Shure Bros.
Garde - components, arc-traps, connectors - Staffall
Gardsman - temperature controllers - West Instr. Div.
Garox - resin curing catalyst - Ram Chems.
Gas-Kit - gas detection kit - Bacharach Instr.
Gas-Pointer - detector, gas leak - Bacharach Instr.
Gas-Pointer - gas indicator - AMBAC Inds.
Gastron - gas detectors - AMBAC Inds.
Gat - flight trainer - Link Div.
GB - relays - Grigsby-Barton
G/CO - laboratory and industrial ovens and environmental test equipment - Gruenberg Elec.
Gearmotor - subfractional hp gearmotor - Motoresearch Mfg.
GEC Brillo-Lock - air filter - Evans, George
Gecos - (gen comprehensive operative supur) - Honeywell Information Systems
Gel/Cell - rechargeable power - Globe-Union
Gelibloc - radiation detector - Quartz & Silice
Gemcor - clutches & brakes - General-Electro Mechanical
Gemlite - indicator light - Drake Mfg.
Gemon - resin-containing material - General Elec.
Genal - injection moldable thermoset - General Elec.
Genalex - Metropolitan Supply
Genalex - toroid cores - Connolly
Genalex - instruments - General Elec.
Genclad-G - printed circuit boards - General Plastics
Gencote - specialized coatings - General Plastics
Genemotor - dynamotor - Carter Motor
General - hand tools magnets - General Hardware Mfg.
General Technology Corp. - time & frequency instrumentation - Tracor
Generation II - work stations - Hallowell
Genesolv - cleaning compounds - Allied Chemical
Geneva - industrial portable electric tools - Portable Elec. Tools, Div.
GenReed - miniature reed switch capsules, miniature reed relays - General Reed
GenRez - reference standards, precision resistors - Chronetics
Gentl-Therm - lab warm plate - VWR Scientific
Gentron - tantalum capacitors - Gentronics
Geodolite - measuring instr. - Spectra-Physics
Geoformer - transformer-seismic exploration - Triad Distributor Div.
Geon - vinyls - Goodrich B. F. Chem.
GE/PAC - computing apparatus - General Elec.
GEPOL - electrical insulators - General Elec.
Gernsback Library - technical books - G/L Tab Books
G-Fuse - shock indicator - Bergen Labs.
GIANT - general instrument advanced nitride technology - General Instr.
Giantview - tv large screen projector - General TV Network
Giant Voice - public address and warning systems - Altec
Gibraltar - tv chassis - GTE Sylvania
Gibraltar - amplifiers, wideband - Jerrold Elctrns.
Gibsiloy - electric contacts - Gibson Elec.
Gibson Girl - tape splicers - Robins Inds.
GIFETS - gen'l instr. field effect transistors - General Instr.
Gitzo - tripods - Heitz, Karl
Glare-Check - architectural polarized glass - Polacoat
Glare-Stop - light source polarizers - Polacoat
Glascote - protective coating - Dolph, John C.
Glas-Grip - dead-end antenna fitting - Preformed Line Prods.
Glasrod - pultruded rod shapes - Glastic
Glass-Amp - glass rectifier diode - General Instr.
Glass-Amp II - glass rectifier diode - General Instr.
Glass-K - glass-ceramic capacitors - Corning Glass Works
Glassmike Capacitors - capacitor, glass housing - Condenser Prods.
Glass Mould Aid - mould lubricant - Houghton, E.F.
Glasterra - insulation - Chase & Sons
Glastimat - sheet molding compound - Glastic
Glaswitch - glass switch - Revere Elctrn. Div.
G-Line - transmission lines - Surface Conduction
Glo-Annunciator - indication lights & annunciators - Switchcraft
Globar - resistors, thermistors, varistors - Carborundum
Globemaster - refrigeration products - Mueller Brass
Globe Stationary Battery - stationary/communications battery - Globe-Union
Glo-Button - switches - Switchcraft
Glo-Coil - heater elements - Eagle Elec. Mfg.
Glo-Dial - clocks - outdoor display - Time-O-Matic
Glo-Dot - pilot lights - Ind'l. Devices
Glo-Drop - fused resistor - Workman Elctrn. Prods.
Glo-Lite - indicator light - Drake Mfg.
Glo-Quartz - immersion heaters & infra red ovens - Glo-Quartz Elec. Heater
Glyco Neats - tanners oils, greases - Houghton, E.F.
Glyd Ring - fluorocarbon seal - Shamban, W.S.
Glyptal - paint varnish enamel lacquer - General Elec.

Glyptal - resin adhesive - General Elec.
Go Count - counters - General Equip. & Mfg.
Gold Crest - outdoor t.v. antennas - Gavin Instrs.
Gold Crown Sys - navigation/communication eqpt. - King Radio
Golden Grab-It - rubber coated gloves - Edmont-Wilson
Golden Guardsman - drier - Mueller Brass
Golden Zephyr - phased array antenna - Trio Mfg.
Goldlamps - miniature lamps - Precision Lamp Engrs.
Gold Seal - capacitor - Erie Technological Prods. (EEM)
Gordent - cameras - Gordon Alan Entprs.
Gorman Spin Winder - bobbin winder - Gorman Machine
Go Switch - switches - General Equip. & Mfg.
Go Tronic - counters & controls - General Equip. & Mfg.
Gozinta - cleaning tool - Workman Elctrn. Prods.
GR - general radio - General Radio
Grab-It - rough finished gloves - Edmont-Wilson
Grafacon - input device - Bolt Beranek & Newman
Grafatran - translator - Bolt Beranek & Newman
Grafoil - all-graphite gaskets - Union Carbide
Graftran, Symbolpoint - programs for upd series digitizer systems - Data Technology
Gra Lab - electric timers - Dimco-Gray
Grand - transformer - Grand Transformers
Grand Tran - transformers - Grand Transformers
Graphallast - submerged bearing - Graphite Metallizing
Graphalloy - bearing or elec brush - Graphite Metallizing
Graphic-Biast - mechanical etch process - Best Mfg.
Graphic Controller - preamplifier - Lansing, James B. Sound
GraPhik - numeric and alphanumeric display - Penn Keystone
Graphilm - lubricant - Graphite Metallizing
Graphlon - bearing - Graphite Metallizing
Graphmetex - insulating material - Graphite Metallizing
Grapple - heavy-duty gloves - Edmont-Wilson
Grav-A-Count - counters - Marathon Instrs. Div.
Grav-A-Graf - impact recorder sys - Marathon Instrs. Div.
Grav-A-Switch - switches - Marathon Instrs. Div.
GravoFLEX - plastic laminate - Hermes Plastics
GravoPLY - plastic laminate - Hermes Plastics
Greenbilt - weather proof outlet boxes - Equipment & Svc.
Greencaps - ceramic capacitors - Radio Materials
Green Dot - galvanized sheet - Republic Steel
Grenadier Speaker Sys. - loudspeakers - Empire Scientific
Gridpak Protoboards - gridpaks for 1c & hybrid circuit b - Gridcraft
Gridpaks - printed circuit boards - Gridcraft
Grille Cloth - sound transmissable - Acoustone
Griplet Connector - terminal - Berg Elctrns.
Grip-Lock - clamping tool (self-adjusting) - Channellock
Gripon - magnet wire; polyurethane with friction surface - Hudson Wire
GriprinG - rings, retaining - Waldes Kohinoor
Griptite - clinch nuts - C.E.M.
Griswold - splicers - Neumade Prods.
Gritcloth - abrasive sanding fabric - Avco Bay State Abrasives Div.
Gritzner Typewriter - drafting board typewriter - Mechanical Enterprises
Grommet Strip - strip grommeting - Electrovert
Gromstrips - continuous length u-channel - Ico/Rally
Groov-Pin - grooved pins - Groov-Pin
Grover - cameras - Burke & James
Gruve-Mate - diamond styli - Aldshir Mfg.
Gruv-Top - pilots - Black & Decker Mfg. Co., The
GR874 - coaxial connectors - General Radio
GR900 - precision coaxial connectors - General Radio
G-String - uhf home receiver line - Surface Conduction
GTC - industrial intercom system - Gai-Tronics
GTC-59 - glass & plastic cleaner - Industrial Formulations
Guardette - motor overload protectors - General Elec.
Gude-Dial Cord and Champion-Dial Cord - dial cord - Gudebrod Bros. Silk
Gude-Glass - lacing tape - Gudebrod Bros. Silk
Gudelace - lacing tape - Gudebrod Bros. Silk
Gude-Nylace - lacing tape - Gudebrod Bros. Silk
Gude-Q - lacing tape - Gudebrod Bros. Silk
Gude-Space - lacing tape - Gudebrod Bros. Silk
Gude-Ties - lacing tape - Gudebrod Bros. Silk
Guide-Lined - metallic tubing - Republic Steel
Guide-O-Matic System - guidance system - Barrett Elctrns.
Gulper - sorption pumps - Hughes Aircraft
Guy-Grip - dead-end antenna fitting - Preformed Line Prods.
Gyratherm - hot plate & stirrer - VWR Scientific
Gyrex - centrifuge - Goerz Optical
Gyrofin - ship stabilization - Sperry Marine Sys.
Gyro Flux Gate - remote indicating compass sys. - Bendix Aerospace-Elctrns.
Gyropilot - auto. ship steering - Sperry Marine Sys.
Gyropoise - turntable - Stanton Magnetics
G63 - aersol burn spray - General Sci. Equip.

H

Half Mile Hailer - electronic megaphone - Chamberlain Mfg.
Half Pint - relay - Hi-G
Hall-Ohm - wire resistors - Hamilton Hall Resistor
Hallowell - shop equip & shelving - Hallowell
Hall-Rite - wire resistors - Hamilton Hall Resistor
Halltiplier - electric power transducers, power instrumentation, etc. - Scientific Columbus
Halltron - hall effect devices - Ohio Semitronics
Hal Pak - hall generator - Bell, F.W.
Haltata - test equip-environmental-servo - Muirhead
Ham-D-Mag - demagnetizers - Annis, R.B.
Hamicote - mold releasing coating - Miller, Harry
Hamidraw - drawing compound - Miller, Harry
Hamiterge - ultrasonic cleaner - Miller, Harry
Hammerbits - masonry drills - Tilden Tool Mfg.
Hand-Hole - buried plant enclosure - Superior Continental
Hand-Omatic - contact electrodes - Eutectic
Handy-Bins - parts bins - Corrugated Paper Prods.
Handy Flux - brazing fluxes - Handy & Harman
Handy Hi-Temp - high temperature alloys - Handy & Harman
HANDYLab - prepacked devices - Motorola Semiconductor Prods.
Handy Totes - tote bins - Corrugated Paper Prods.
Handy-Wrap - wire wrapping tools - Ostby & Barton
Hanscom-Ties - wire & tubing ties - Hanscom, H.F.
Hardwick Hindle Products - resistors & rheostats - LTV Electrosystems
Harmonic Drive - power & motion transmission - USM
Harosyn - brushless synchros - Harowe Servo Controls
Hascrome - wear-resistant alloy - Cabot
Hastelloy - corrosion-resistant alloys - Cabot
Hastelloy - corrosion-resistant alloys - Cabot
Hatseal - fluorocarbon seal - Shamban, W.S.
Havar - alloy - Hamilton Watch
Havelex - glass bonded mica insulating material - Haskon
Haydon - timing motors - General Time
Haynes Stellite - high temp alloys - Cabot
Haysite - polyester laminated sheet, custom molded items & laminated shapes - Haysite Div.
Haystellite - tungsten carbide - Cabot
HBP - varnish - General Elec.
HC-Tran - pulse transformer - Pulse Engrg.
HDDR - high density digital recording - Leach
HDT - hitemp adhesive - Allaco Prods.
HDT - high temp adhesive - Packaged Resins
HD-102 - data converter - Leach
H. E. A. - antireflection optical coating - O & S Research
Heathkit - electronic kits - Heath
Heat-Les - air dryer - Pall Trinity Micro
Heat-Les - desiccant dryer - Pall
Heat Prover - combustion analyzer - Bailey Meter
Heatrace - recording chart paper - Gubelman Chart Div.
Heatran - heat transfers - Power Designs
Heatrax - heat shrinkable tubing - Ico/Rally
Heat-Seal Stik - sealant and pipe thread compound - Lake Chemical
Heatzone - high temperature wire - Cerro Wire & Cable
Heetstrip - heating element - Therm-O-Lab
Heliax - coaxial cable - Andrew
Heliax - cable & waveguide - Andrew
Heliax - elliptical waveguide - Andrew
Helibloc - block - Helitronics
Heli-Cal - flexible shaft coupling - Helical Prods.
Heli-Coil - screw thread inserts and kits for repair of stripped threads - Heli-Coil Prods.
Helicorder - multistylus paper recorder - Teledyne Geotech
Helidel - delay lines - Beckman Instrs.
Heliflux - magnetometers - Schonstedt Instr.
Helilube - potentiometer lubricant - Beckman Instrs.
Helinut - nut - Helitronics
Heliotek - solar cells - Heliotek
Helipot - precision potentiometers - Beckman Instrs.
Helisert - helical carbide inserted mill cutters - Ind'l. Tools
Helishaft - shaft - Helitronics
Helisphere - spherical bearings - Ind'l Tectonics
Helitrim - trimming potentiometers - Beckman Instrs.
Heli-Tube - spiral cable wrap - Newman, M.M.
Heliwhip - mobil antennas - Mark Products
Helix Design - potentiometers, transducers and delay lines - Beckman Instrs.
Helmer - gauge - Varian Assocs.
Helsyn - sleeving & markers - Ideal-Hellermann Can.,
Helvin - sleeving & markers - Ideal-Hellermann Can.,
HEP - hobby devices - Motorola Semiconductor Prods.
Hepa - hoods - Clean Rooms Constr.
Herco - gaskets, packings, adhesives, tubing, mats & matting, hose - Hecht Rubber
Herculeads - beam lead diodes - General Instr.
Hercules - holders & steel marking type - Acromark
Herculoy - sheet, rolls, strips tubing - Revere Copper & Brass
Heresy - loudspeaker sys. - Klipsch & Assocs.
Hermeflex - hermetic rotary seals - Singer-General Precision
Herringbone - sheet metal lath - Republic Steel
Hexacon - elec. soldering irons - Hexacon Elec.
Hex-o-let - multiple outlets - Fedtro
Hexseals - switch boots - Multi-Flex Seals
HGA/Transtech - amplifiers-powerpacks - HGA Elctrns.
HGX - mercury decontaminant - Acton Assocs.
H & H - specification grade wiring devices - Arrow-Hart
H/I - scientific instruments - Hacker Instrs.
Hiac - automatic particle counters - High Accuracy Prods.
Hi*Amp - welding accessories - Lenco
Hi-Break - electric circuit breakers - General Elec.
Hi-Brite - paints - Shannon Luminous Mat'ls.
Hi-Cap - fuses - Bussmann Mfg.
Hi-Cap - air filter - Cambridge Filter
Hickory Brand - wire & cable - Superior Continental
HICO - relays - Hoagland Instr.
Hi-Cor - organic flux filled solder - Alpha Metals
Hi-D - 6:2 density lead glass - Penberthy Div.
Hi-Damp - elastomer with strong damping characteristics - Barry Controls
HI-D Jax - phone jacks - Switchcraft
HI-D Switch - pushbutton switches - Switchcraft
Hi-Etch - capacitors - General Elec.
Hi-Field - demagnetizers - Annis, R.B.
Hi Fi Green - screen printing photo stencil films - Ulano Prods.
Hi Fi Red - screen printing photo stencil films - Ulano Prods.
Hi-Flo - air filter - Cambridge Filter
Hi-Flux - magnetic equipment - Annis, R.B.
High-Breds - hybrid integrated circuits - General Instr.
High-Cap - extra high capacitance varactor - Eastron
Hi-Jul - energy capacitors - Dearborn Elctrns.
Hikool - axial blower/fan - HICO (Horizons Int'l.)
Hi Lab - Holt Instr. Labs.
Hilger Watts - analytical instruments - Rank Precision Inds.
Hi-Lo - fasteners - Shakeproof Div.
Hi-Lo Eye - liquid level indicator - Fastex Div.
Hi/Lo Filter - high pass/low pass filter - Rockland Sys.
Hi-Meg - insulator - Dolph, John C.
Hi-N-Dri - outdoor weatherproof fluorescent ballasts - Jefferson Elec.
Hi-N-Dri - ballasts - Jefferson Elec.
Hinjon - lugs - Thomas & Betts
Hipac - metal base p.c. boards - Solitron Devices
Hipernom - soft magnetic alloy for magnetic shielding - Westinghouse Elec.
Hipotrode - high voltage sparker electrode - Hipotronics
Hi Pow - high power dummy loads - Electronautics
Hippo - clips - Mueller Elec.
Hi-Q - pushback wire - Consolidated Wire & Assoc. Corps.
Hi-Speed Circuit Etch - etchants for production of printed circuits - Hunt, Philip A. Chemical
Hi-Temp - high temperature oils - Houghton, E.F.
Hi-Temp Cuform - copper electroforming bath - Materials Development
Hi-Therm - varnish - Dolph, John C.
Hitron - height gage - Empire Sci., Ind'l. Elctrn. Gage
HiTronic - high voltage testers - Bliss Elctrn.
Hi-Volt - voltage testers - Ind'l. Devices
Hi-Volt Analyst - automotive testing equipment - Delta Products
Hivox - oxide - Welwyn Int'l.
Hi-Z - voltmeter & accessories - Ross Engrg.
HKP - cutting machine - Porter, H.K.
HLD - elec. insulators - General Elec.
HLT - stressed panel fastener - Tridair Inds.
Hockey-Puk - pressure assembled & controlled rectifiers - International Rectifier
Hocut - cutting oils - Houghton, E.F.
Hogan Faximile Faxpaper - recording paper - Telautograph
Hold-E-Zee - screwdrivers, nutdrivers - Upson Tools
Hole-in-the-Head - tamper-proof screws - Pan-L-Fast
Holgun - drill - Black & Decker Mfg. Co., The
Holton A & B & Jr. - hi-fi speaker sys - Hartley Prods.
Homosil - fused quartz - Amersil
Honey Bee - audio-video recording motor - Hurst Mfg.
Honeycombe - dehumidifiers, industrial - Cargocaire Engrg.
Hook-a-Round - current transformers - Annis, R.B.
Hook-N-Push - component mounting boards - Electraid
Hook Switch - lever switches - Switchcraft
Hopline - fiber glass liner for foundry usage - Haysite Div.
Hopper Staker - swaging machines - Cambridge Thermionic
Horizon Line - voltmeters & ammeters - General Elec.
Hornet - miniature soldering iron - Hexacon Elec.
Hotip - thermal wire strippers, resistance soldering tools - Contact
Hot Linobate - linobate composition - Crystal Technology
Hot Rod - electric furnace heating elements - Norton
Hot Shot - dry batteries - Union Carbide
Hot-Shot, Solder-Ette - soldering iron - Fedtro
Hot Tip - soldering accessory - Air-O-Tronics Prods.
Hotvac - vacuum furnace - Vacuum Inds.
Houghto-Black - steel blackener - Houghton, E.F.
Houghto-Clean - cleaners - Houghton, E.F.
Houghto-Draw - compounds - Houghton, E.F.
Houghto-Grind - grinding fluid - Houghton, E.F.
Houghto-Quench - quenching oil - Houghton, E.F.
Houghto-Safe - fire-resistant fluids - Houghton, E.F.
Houghto-Size - warp size compounds - Houghton, E.F.
Houghto-Solv - sludge solvent - Houghton, E.F.
Houghto-Wax - warp wax - Houghton, E.F.
Houpoid - extreme pressure oils - Houghton, E.F.
Hoz-Fas-Ner - hose clamp - Reliance Div.
HR - tools and equipment - Hammel, Riglander
HT Rubber - high-tensile unsupported gloves - Edmont-Wilson
HT-1000 - co2 economizer - Hafstrom Tech. Prods.
Hub-Clamp - fastener - Sterling Instr.
Hubloc - antenna structure - Andrew
Hub-Lock - fastener - Sterling Instr.
Hudsol - magnet wire; polyurethane - Hudson Wire
Humdicator - audibile circuit continuity tester - Circon
Humidigard - humidity control sys. - AMBAC Inds.
Humidolain - ceramic products - Star Porcelain
Humiseal - coatings - Columbia Tech.
Humistat - relative humidity controller - Hygrodynamics
Humitex - recording chart - Foxboro
Hum-mer - screening machine - W. S. Tyler
Hunter - flashlights - Ray-O-Vac
Hunter - force gages - Ametek/Testing Equip. Sys.
Hurriclean - steam cleaning gun - Oakite Prods.
Hus-Key - connector - Bendix
Husky - automotive wire - Berkshire Elec. Cable
Hustler - comms. antennas - New-Tronics
HVI - high voltage instrs. - Amp
Hy-A-Sil - silicon rectifiers - Miller, Sanford
Hybridge - rf bridge - Alford Mfg.
Hybritronics - hybrid electronics capability - Fabri-Tek
Hy-Bute/60 - butyl gum, for insulation - General Elec.
Hycam - rotating prism camera - Red Lake Labs
Hy-Cap - high capacitance ceramin capacitor - Nytronics
Hydensel - wrapping paper - Mosinee Paper
Hydrashaker - vibration exciter - Wyle Labs.
Hydratorq - industrial clutches & brakes - Fawick Airflex Div.
Hydrive - high output amplifiers - Infodex
Hydrive Amplifiers - linear & pulse hygain amplifiers - Indofex
Hydro-Drive - hydraulic oils - Houghton, E.F.
Hydrofeed - recording lathe - Components
Hydrokool - mercury switches - Durakool
Hydrolok - cable connector - Teledyne Mecca
Hydrolubric - additive for water hydraulic sys - Houghton, E.F.
Hydrosolv - liquid organic water soluble flux - Alpha Metals
Hydro Squeegee - solder leveling/cleaning mach. - Lear Siegler
Hydrotector - package r-h inspection system - Hygrodynamics
HYEN - gas generator - Lindberg Hevi-Duty
Hye-Que - antenna connector - Budwig Mfg.
Hyfen - crimp removable contacts - Burndy
Hyflo - epoxy molding powders - Hysol Div.
Hygeaire - lamps - Atlantic Ultraviolet
Hygrade - fabric base sleevings - Markel, L. Frank & Sons
Hygro-Cel - cup r-h sensor device - Hygrodynamics
Hygro-Champ - clamp r-h measuring device - Hygrodynamics
Hygromite - hygrometer - Beckman Instrs.
Hygrosensor - relative humidity transducer - Hygrodynamics
Hygrotran - converters, humidity signal (resistance) - Hygrodynamics
Hyjoule - fault locators - Associated Resch.
Hylug - terminals - Burndy
Hymonogas - gas generator - Sunbeam Equip.
Hypac - high voltage power pack - Electronic Resch. Assocs.

Hypalon - synthetic rubber insulating mat'ls - E.I. DuPont DeNemours
Hypass - coaxial capacitor - Sprague Elec.
Hyper Sel - rectifier - Alpha Comps.
Hypertac - connectors - Hypertronics
Hypertac - connectors - Industrial Elctrn. Hardware
Hypot - hipotential testers - Associated Resch.
Hyprez - diamond abrasive compounds - Engis
Hyrel - high reliability component - Sprague Elec.
Hyring - sheath connectors - Burndy
Hyshrink - shrinkable tubing - Port Plastics
Hysteresis - synchronous & torque motors - Beau Motor Div.
Hytafill - apparatus & devices - General Elec.
Hy-Ten - core oil - Houghton, E.F.
Hy-Ten Quik-Sett - core oil - Houghton, E.F.
Hy-Therm - calorimeter - Hy-Cal Engrg.
Hythermco - ovens, baths and chambers - Hydor Therme
HyTReSS - mag. tape control - Dynamic Precision Controls
Hyvac - pumps, vacuum - Vacuum Resch. Mfg.
Hyvac - gauges, vacuum - Vacuum Resch. Mfg.
Hyvac - mechanical vacuum pumps - Central Scientific
H-Zone - high temperature wire - Cerro Wire & Cable

I

Iatron - storage tubes - ITT Electron Tube
IBR - integrated bridge rectifier - Varo
Ice Pack - metal high reliability flat package - Isotronics
Ickypic - jelly compound - Communications Tech.
ICP - transducer with built in IC amplifier - PCB Piezotronics
Idealarc - ac & ac/dc welder - Lincoln Elec.
Idealarc-ArcWelder - arc flux - Lincoln Elec.
Identa-Sleeve - wire markers - General Plastics
Idigraph - display terminal - Information Displays
Idiiom - computer controlled display - Information Displays
IEE - timers and push button switches - International Electro Exchange
IEI - capacitors - Callins Inds.
I E I - capacitors - International Elctrn. Inds.
Igepal - cleaner, washing & scouring agent - GAF
I-Lite - light sources - American Atomics
Imacon - image converter camera - Red Lake Labs
Imcair - centrifugal blower - IMC Magnetics
Imcair - propeller fan - IMC Magnetics
Imidex - polyimide-containing composition - General Elec.
ImLec - electronic components - Inter-Market
Immersit - immersion testing chemicals - American Gas & Chemicals
Immunol - metal cleaner & rust preventative - Miller, Harry
Impac - magnet wire - New Haven Wire & Cable
IMPAC - 1-amp general purpose rectifier - Semtech
Impact-O-Graph - omni-directional recording accelerometer - IMPACT-O-GRAPH Div.
Impact-100 - automatic computer - Lorlin Inds.
Impellor - magnetic tape loop transport - Himmelstein, S.
Imperial - audio equipment - Components Specialties
Imperial - catv receiving antennas - TACO Div.
Imperv-X - hard coating of aluminum - Cambridge Plating
Impsol - magnet wire - New Haven Wire & Cable
Impsolon - magnet wire - New Haven Wire & Cable
Impvar - magnet wire - New Haven Wire & Cable
Impvaron - magnet wire - New Haven Wire & Cable
IMP-155 - modified polyester - New Haven Wire & Cable
IMP-200 - polyester coated magnet wire - New Haven Wire & Cable
IMP-200N - polyester coated magnet wire - New Haven Wire & Cable
Imverter - miniature inverter - Advanced Energy Conversion
Inch-Marked - metallic tubing - Republic Steel
Incoflux (00100) - welding flux - Huntington Alloy Products Div.
Incoloy (00150) - nickel-iron chromium alloys - Huntington Alloy Products Div.
Inconect - modular sys. - Molex Prods.
Inconel (00200) - nickel-chromium alloys - Huntington Alloy Products Div.
Inco-Weld A (00050) - welding electrodes - Huntington Alloy Products Div.
Incusil 10 - brazing alloys - Western Gold & Platinum
Incusil 15 - brazing alloys - Western Gold & Platinum
Indalloy - name applied to over low melting alloys - Indium Corp. America
Indomica - mica - Columbia Tech.
Inductosyn - encoder - Del Elctrns.
Inductrol - induction voltage-regulator - General Elec.
Induflux - analyzers, magnetic - Irwin Labs.
Industrial - batteries - Ray-O-Vac
Industrial Balancer - dynamic balancing mach. - Balance Technology
Industrite - abrasion, heat, chem., oil & flame resistant cable - Boston Insulated Wire & Cable
Industrol - ac scr power controllers - International Rectifier
Inertia-maze - air filter - North American Rockwell
InerTic - welding compounds - Eutectic
Infinit-Indexer - phase adjusting coupling - USM
Infinitron - conductive plastic potentiometer - Bourns
Infinity Brand - corrosion-resistant fasteners and extruded shapes - Harper, H.M.
Inframike - apparatus & devices - General Elec.
Infrascan - radiometers - Infrared Inds.
Infrascope - infrared thermometer - Barnes Engrg.
Infrasil - fused quartz - Amersil
Infratron - infrared detector - Infrared Inds.
Infratron - detectors - Infrared Inds.
Injectorall - Injectorall Elctrns.
Injectron - switch tubes - Litton Inds.
Inkswell Pads - stamp pads - Independent Ink
Inktronic - terminals - Teletype
Inmanco - wedges-fabricated parts - Inmanco
Innershield - shielded arc welder/electrodes - Lincoln Elec.
Innershield-Electrode Wire - electrode holder - Lincoln Elec.
Innovac - vacuum sys. - Varian Assocs.
Inpower - fluid centrifugal clutch - Formsprag
Input - airborne mineral prospecting system - Barringer Research,
Inresco - reed relays - Instrument Resistors
I-N Rings - rings internal notched - Reliance Div.
Insa-Lute - adhesive cement - Sauereisen Cements
Inspectroscopes - borescopes - Eder Instrument
Instacase - all weather/underwater camera housing - Beckman Instrs., Advanced Resch.
Insta-Gel - chemical - Packard Instrument
Instamatic - multiple outlets, compasses & warning devices - Fedtro
Instant Lettering - dry transfers - Datak
Insta-Test - breakdown testers - Grand Transformers
In-Stop - brakes - Midwest Automatic
Instramatic - controllers, power supplies & transmitters - Beckman Instrs.
Instrumate - rack housing - Computer Dynamics
Insul-Bolt - fastener-insulated - Pylon
Insulcaps - heat shrinkable caps - Burlington Opers. Div.
Insulcon - hi-temp. thermistors, infrared sources - Carborundum
Insulet - rivets-insulated - Pylon
Insulets - outlet fittings - Thomas & Betts
Insulflex - creped kraft elec. insulating tape - Dennison Mfg.
Insulgrease - silicone dielectric compound - General Elec.
Insuliner - sleeves - Thomas & Betts
Insuljel - silicone spray lubricant - General Elec.
Insulkrimp - solderless terminals & connectors - Waldom Elctrns.
Insulkrinp - insulated pvc terminal - ETC
Insul-Mate - test adapters - Air-O-Tronics Prods.
Insuloop - wire & cable tie - Ideal-Hellermann Can.,
Insuloop - gun sys. - Tyton
Insulstrip - magnet wire insulation stripper - LEA Mfg.
Insultape - heat shrinkable tape - Burlington Opers. Div.
Insultek 445 - insulating finish - Int'l. Elctrn. Resch.
Insultite - heat shrinkable tubings - Burlington Opers. Div.
Insulube 448 - insulating finish - Int'l. Elctrn. Resch.
Insulug - nylon insulated terminals - Burndy
Insurok - laminated plastics - Richardson
Integrated Mica - mica paper - Acim Paper
Integrid - int. circuit p.c. cards - Elgin Elctrns.
Intensitron-Lamps - Perkin-Elmer
Intercheck - thermal switch - Guildline Instrs.
Interflux - flux-cored solder coated strip - American Silver Co. Div.
Intermatic - time switches, photo electric controls, solid state timers - Int'l. Register
Interphone - comm sys - Action Systems
Interpolator - LA-80 lab power supply - Technipower
Interresponder - tracking radar interrogator - Vega Precision Labs.
Interswitch - thumbwheel switches and matrix boards - Interswitch
Interzone - polyimide insulated wire - Cerro Wire & Cable
Inter-8-Wire - shielded cable - Perfection Mica
Intex - instrumentation - International Tech. Svc.
Intramax - multilayer circuit - Sanders Assocs.
Intrud-Alarm - intrusion detection sys - Bogen Div.
Int-Serter - feed for envelopes - Midwest Automatic
Invert-A-Stat - static inverter - Gould
Invert-A-Volt - inverter - La Marche Mfg.
Inverted-Vee - radio kits - Telrex Labs.
Inverto-Tran - ferrite inverter transformer series - Pulse Engrg.
Invertron - ac power supplies - Behlman Div.
Involoid - internal rack generated gears - Invincible Gear
Ionic - spray equipment - Ionic Electrostatic
Iotron - deposition control sys. - Sloan Technology
Ipac - timing sequence control - Instr. & Control Sys.
IPT-600 - comp. test handler - IPT
IPT-900 - comp. test handler - IPT
I-Rad - radiation sources - American Atomics
Irascope - editing crt display - Spiras Sys.
Iriditron - gamma radiography machines - Automation Inds.
Iriditron & Multitron - gamma radiography equipment - Automation Inds.
Irish - magnetic recording tape - Irish Magnetic Recording Tape
IRN - iron powders, iron oxides - Pfizer-Minerals
Ironclad - battery plates - Exide Power Sys. Div.
Irrasil - tape - General Elec.
Irrathene - irradiated polyethylene - General Elec.
Irrathene SPT - tape - General Elec.
Irricon - tape - General Elec.
IRT - interrupter ringing tone unit - Warren Communications
ISO - low loss ceramic - Isolantite Mfg.
Isobase - accelerometer - Endevco
Iso-Curve - thermistors - Fenwal Elctrns.
Iso-Elastic - temperature compensated alloy - Chatillon John & Sons
Iso-Elastic Drive System - peripheral reel-to-reel tape drive - Echo Science
Isofilm - electronic capacitors - General Elec.
Iso Fork - philamon fork resonator - Philamon
Isoformer - transformer - Elcor Prods. Welex Elctrns.
Isoglas - isocyanate-coated glass fabric - Natvar
Isokraft - capacitors - General Elec.
Isolantite - insulators - Isolantite Mfg.
Isolastane - isocyanate elastomer coated glass fabric - Natvar
Isolector - power transistor process - Motorola Semiconductor Prods.
Isomelt - enamels - Schenectady Chems.
Isomid - enamels - Schenectady Chems.
Isomode - vibration isolation pad - MB Elctrns/Textron
Isonel - varnishes - Schenectady Chems.
Isonel 200/A - magnet wire; polyester-dual polyester - Hudson Wire
Isopad - special purpose insulators - Microwave Magnetics
Isophase - electrostatic headset - Stanton Magnetics
Isoplex - three-layer glass/polyester-resin combinations - Natvar
Isoply - isolated power supply - Elcor Prods. Welex Elctrns.
Isopolar - DVM referemce supply - Data Precision
Isorex - transformer - Elcor Prods. Welex Elctrns.
Iso-Seal - temperature compensated scale - Chatillon John & Sons
Isotab - molded plastic scr's & triacs - Hutson Inds.
Isoteraglas - isocyanate elastomer coated dacron-glass fabric - Natvar
Isotherm - thermistors - Victory Engrg.
Isovar - insulated power supply - Elcor Prods. Welex Elctrns.
ITECO - test equipment - Ind'l. Test Equip.
ITI-Ultra Thin Saws - thin solid carbide saws used to slot magnetic memory heads - Ind'l. Tools
IWI - irreversible warmup indicator - Artech
IXF - tandem monolithic crystal filters - Piezo Technology
Izukar - lenses - Cosmicar Optical Co.,

J

Jack Knife Connector - disconnect - Teledyne Penn-Union Elec.
Jacques - hand operated cutters - Hobbs Mfg.
Jaico Prdts - relays & switches - Jaidinger Mfg.
Janette - gearmotors & reducers - Holtzer-Cabot
Janus - bidirectional counters - Tyco Instr. Div.
Jay Glo - fluorescent ink - Podgor, Joseph
J Control - motor control - Joliet Control
Jetcal - jet engine tester - Howell Instrs.
Jetco - ovens - Jersey Tech. Conslts.
Jet Flux - liquid flux - ARC Prods. Div.
Jet-Hard - build-up electrode - Lincoln Elec.
Jetlac, Copad and Bopad - varnishes - Sterling
Jet-Lit - low hydrogen electrodes - Lincoln Elec.
Jet Pak - self-powered spray gun - Sprayon Prods.
Jet Plater - self-contained plating unit - Sel-Rex
Jet Set - self-locking honeycomb panel fastener - Elastic Stop Nut Div.
Jetstream - axial blower/fan - HICO (Horizons Int'l.)
Jet - Tec - leak detector - American Gas & Chemicals
Jet-Temp - thermocouples - General Elec.
Jet-Tron - detector - Automation Devices
Jetweld - powdered iron coated electrodes - Lincoln Elec.
JetWeld-Electrode - generator - Lincoln Elec.
Jiffy - drafting templates - Fisher & Crome
Jiffy - small parts cabinets - Ballonoff Home Prods.
Jiffy Push-Pull - caps & connectors - Eagle Elec. Mfg.
J-Jacks - connectors, r-f coaxial - Jerrold Elctrns.
J-Lar - film tape - Permacel
Jobmaster - rubber grip - Stanley Tools
Johnston - vision screening - Tracor
Jolta - shock test machines - Jan Hardware Mfg.
Jones Tachometers - tachometers & speedometer - Jones Motrola
JotDraft - printed circuit symbols - Datak
JS-68 - high strength, heat treatable aluminum tubing alloy - Smith, Judson A.
JT - connector - Bendix
Judco - insulated wire & cable - Judd Wire Div.
Junior Spectrophotometer - low cost uv-visible-spectrophotometer - Coleman Instrs.

K

Kalar - elastomeric compounds - Hardman
Kalavox - sound slide system - Kalart Victor
Kalene - elastomeric compounds - Hardman
Kalex - polyurethane elastomers - Hardman
Kalotron - temperature-limited diodes - Thermosen
Kanigen - licencee electroless nickel - Cambridge Plating
Kanry-Tex Rubber - canners gloves - Edmont-Wilson
Kantlink - washer-helical - Reliance Div.
Kapseal - low friction seal - Minnesota Rubber
Kapton - film, polyimide - E.I. DuPont DeNemours
Karadio - auto radio - ATR Elctrns.
Karak - carbon-graphite mechanical parts - Ohio Carbon
Karbo-Matic - heat treating furnace - Pacific Scien.
Karen - precision altitude system - Kollsman Instr.
Kasil - potassium silicate - Philadelphia Quartz
Kathabar - dehumidification sys. - Ross Engrg. Div.
Kaylock - self-locking metal fastener - Kaynar Mfg.
KCS-31 - tristimulus data processor - Kollmorgen-Color Sys. Div.
KCS-32 - process control computer - Kollmorgen-Color Sys. Div.
KCS-33 - process control computer-formulator - Kollmorgen-Color Sys. Div.
KCS-40 System - computer controlled spectro photometer sys. - Kollmorgen-Color Sys. Div.
Keenserts - inserts & studs - Tridair Inds.
Keeper - cables for ion measuring electrodes - Beckman Instrs., (AISSD)
Kelpot - plastic potentiometer - Keltron
Keltrack - plastic potentiometer - Keltron
Kelvin Klamps - four-terminal clamps - Electro Sci. Inds.
Kelvin Klips - four-terminal clips - Electro Sci. Inds.
Kemet - capacitors - Union Carbide
Kenbrite - zinc plating bath - Conversion Chem.
Kencad - cadmium plating bath - Conversion Chem.
Kencor - magnetic drum memories - Kenton Engrg.
Ken Kop - solid state static mach. - Podgor, Joseph
Kennametal - hard carbide alloys - Kennametal
Kennertium - heavy tungsten alloys - Kennametal
Kenn Kleaner - screen washer - Podgor, Joseph
Kenn-Kwik - silk screener - Podgor, Joseph
Ken-Rad - radio tubes - General Elec.
Kentanium - hard carbide alloys - Kennametal
Ken-Tel - telephone cables and wires - Okonite
Kent Klip - automated spot ties - Kent
Kentron - micro-hardness tester - Ametek/Testing Equip. Sys.
Kenvert - sealers, acids, dry powders - Conversion Chem.
KEP - electrical impulse counters - Kessler-Ellis Prods.
Keps - lock washer and nut - Shakeproof Div.
Kern - lenses - Heitz, Karl
Key-ABX - inside-outside communicating systems - Stromberg Carlson
KeyCette - tape data acquisition - Int'l. Computer Prods.
Keynet - key to tape remote data entry - Honeywell Information Systems
Keyplex - disk to tape data entry - Honeywell Information Systems
Keytap - wireway cable connecting block - Keystone Columbia
Keytape - keyboard-to-magnetic-tape recorder - Honeywell Information Systems
Keytran - keyboard data entry sys. - Systems Engrg. Labs.
K.G.M. - indicators, legend displays - Inter-Market

K-Grip - crimp adapter - Kings Elctrns.
K-Grip JR - rf crimp conn. - Kings Elctrns.
Kheentrol - chemical - R-Columbia Prods.
Kilo-Pac - power supply - Velonex
Kilovac - relays & switches - Kilovac
Kimberley - diamond blades - Avco Felker
Kimco - antenna towers - Kline Iron & Steel
Kimfol - polycarbonate film - Schweitzer, Peter J. Div.
Kinamatic - machines electric motors and generators - General Elec.
Kinatrol - machines and controls - General Elec.
Kine-Finish - roll-finishing dies - MPB
Kineform - roll forming dies - MPB
Kinelogic - instrumentation recorders - Echo Science
Kine-Miser - roll-roll-forming and roll-finishing attachments on turning machines - MPB
Kine-Roller - roll-forming and roll-finishing machines - MPB
King - floated rate integrated gyros - Singer-General Precision
Kingsley Machines - marking machines - Kingsley Mach.
Kingsplice - large size splice/connector machine - Connectrol
Kink Loc - plug-in captivated lead form - Radio Materials
Kinoptik - lenses, collimator - Heitz, Karl
Kinoptik - lenses for image intensifiers, scanners - Heitz, Karl
Kintrac VII - kinetic rate monitoring instruments - Beckman Instrs., (AISSD)
Kirpack - sheet rubber packing - Kirkhill Rubber
Kistler - accelerometer - Sundstrand Data Control
Kit-Veyor - parts packaging conveyor - Automated Packaging Sys.
Klearall - degreasers - Octagon Process
Kleenflo - air filter - North American Rockwell
Kleen-Sweep - record brush - Duotone
Klein - pliers & other hand tools - Klein, Mathias & Sons
Kliplok - fuse & test clamps - Trico Fuse Mfg.
Klipring - rings, retaining - Waldes Kohinoor
Klipschorn - loudspeaker sys. - Klipsch & Assocs.
Klip-Sel - surge protector - International Rectifier
Klipsocket - socket for miniature lamp - Chicago Switch
Klipvolt - (suppressors) - Sarkes Tarzian
Klixon - solid-state controls - Texas Instruments
K-Logger - analogue display of up to 400 variables - Telmar
KMC (registered trade mark) - Kevlin Mfg.
Kodacel - plastic film & sheet - Eastman Chem. Prods.
Koil-Klip - solderless connector - Electraid
Kom-Pak - portable H/F transceiver - Brelonix
Koncel - a structural foam plastic molding process - Westmoreland Plastics
Konkrete-Kore - masonry drills - Tilden Tool Mfg.
Kontact 60 - aerosol contact cleaner - Jonard Inds.
Kool Klamps - tube clamps, heat dissipating transistors & diode - Birtcher
Koolohm - power resistor - Sprague Elec.
Kool Tainers - heat dissipating retainers - Birtcher
Korless Electrodes - edm electrodes - Uniform Tubes
Koroseal - all plastic products - Goodrich, B.F. Ind'l. Prods.
Kote-Alume - brass finish - American Nickeloid
Kovar - glass-to-metal sealing alloy - Westinghouse Elec.
*** K-Pak** - chips carrier - Motorola Semiconductor Prods.
KPMP - powdered metal parts - Kwikset Powdered Metal Prods.
K-Prene - urethane material - Di-Acro
Krak-Stik - sealant and pipe thread compound - Lake Chemical
Kralastic - electroplating chem. - Uniroyal
Kreco - communications antennas - Kreckman, Herb
Krimptite - uninsulated terminal - ETC
Krimptite - solderless terminals & connectors - Waldom Elctrns.
Kris-Tel - cathode ray tubes - Kriss Elctrns.
Kristel - cathode ray tubes - Kriss Elctrns.
K-Set - magnetic tape head - Michigan Magnetics
KSR - capacitors - General Elec.
KSR - general purpose gloves - Edmont-Wilson
Kuhlmann - pantograph milling machines - Wilkens, Alwin Fr.
Kurmelec - relays - Kurman Instrs.
Kurminst - relays - Kurman Instrs.
kwik change - miscellaneous - Switchcraft
Kwikmold - mold making latex - Adhesive Prods.
Kwiky-Dots - overlapping masking discs - By-Buk
Kylosphere - spherical bearings - Ind'l Tectonics
Kynar 500 - protective coating - Pennwalt
Kyread - magnetic tape developer - Kyros

L

Lab-Line - transformers - James Elctrns.
Lab-On-Wheels - instrument carriers - Waber Elctrns.
Lab-Volt - power supp. & meters - Buck Engrg.
La-Co - fluxes and sealing compounds - Lake Chemical
Lake - solenoid valves - Laketown Mfg.
Lakin - hickey - Thomas & Betts
Laminex - multilayer p.c. - Advanced Circuitry Div.
Laminol - laminates - American Nickeloid
Lamitex - laminated plastics sheets, rods & tubes - Franklin Fibre-Lamitex
Lamp-Jax - phone jacks - Switchcraft
Lamp Lighter - converter/battery charger 12n. dc - Permavolt Transformers
Lancelok - terminals - Amp
Lancer - adj. freq. ac drive - Allis, Louis
Lancer - adj. freq. ac drives - Allis Louis
Lanolubric - wool lubricant - Houghton, E.F.
La Perle - watch & clock oils - Hammel, Riglander
Lapix - hot top insulator - Houghton, E.F.
Laredo - hi fi speaker sys. - University Sound
La Scala - loudspeaker sys. - Klipsch & Assocs.
Laser Sentry - intrusion detection sys. - Laser Sys.
Laser-trol - laser interferometer - Optomechanisms
Lastec - wire saws, wire, polishing machines, sieve shakers - Laser Technology
Laticrete - coatings, anti-static & conductive - Uniroyal
Lauda - constant temperature circ - Brinkmann Instrs.
Lavolain - ceramic products - Star Porcelain
LCA - low coefficient of expansion adhesives - Bacon Inds.
LCS - mass memory sys. - Data Prods.
LC Tuners - miniature & subminiature tuners - JFD Elctrns./Sub. Riker-Maxson
LDS - disc memory sys. - Data Prods.
LDS-500 - damping material - Lord Mfg.
LD-400 - damping material - Lord Mfg.
Lea Compound - greaseless abrasive for satin finishing - LEA Mfg.
Leader - all products - Leader Instr.
Leadtex - lead coated copper - Revere Copper & Brass
Leak - speaker sys - Ercona
Leakator - halogen gas detector - Bacharach Instr.
Leakator - halogen leak detector - AMBAC Inds.
Leak-Pruf - acid core solder - Alpha Metals
Leak - Tec - leak detector - American Gas & Chemicals
Learok - bright buffing compound - LEA Mfg.
Leatherlubric - tanners oils, greases - Houghton, E.F.
Le Carbone - brushes & contacts - Carbone
Le Carbone-AD - batteries - Carbone
LectroDuct - shielded electrical raceways - LectroMagnetics
Lectroetch - electrochemical metal marking equipment & supplies - Lectroetch
Lectrofilm - capacitors - General Elec.
Lectroless AU - electroless gold plating process - Sel-Rex
LectroMagnetics - rf shielding - LectroMagnetics
Lectro-Nic - nickel plating process - Sel-Rex
LectroShield - shielded room & cabinets - LectroMagnetics
Lectro Spot - spot welders - Miller Elec. Mfg.
LectroVent - shielded air ventilators - LectroMagnetics
Led - light emitting diode - Allaco Prods.
L.E.D. - light emitting diode - Packaged Resins
Leishield - thermocouple sealant - Leico Inds.
Lekolites - spotlights - Century Strand
Lektra/Lite - diffusion light source - Lektra Labs.
Lemo - electrical connectors - Lemosa
Lenscreen - rear projection screen - Polacoat
Lesa - audio equipment - Components Specialties
Lestra-Lite - ophthalmic lens coating - Pacific Universal Prods.
Level-Loc - audio level controller - Shure Bros.
Level Master - liquid level controller - Jo-Bell Prods.
Levelometer - hydrostatic remote reading gauge - Simmonds Precision Prods.
Level-Tek - detection & control sys - Robertshaw Controls
Level-Tel - detection & control sys - Robertshaw Controls
Levelwrap - silicone rubber tapes - Budd
Lever-Lite - lever switches - Switchcraft
Lever-Lock - lever switches - Switchcraft
Lev-o-Let - switches, outlets - Leviton Mfg.
Levolier - switches - McGill Mfg.
Lev-o-Lock - plugs, connectors - Leviton Mfg.
Lev-R - lever switches - Switchcraft
Lewis Vertical - vertical amateur antenna - Universal Prods. Engrg.
Lexan - polycarbonate resins, polycarbonate sheet and film - General Elec.
Lexor - delay lines - Pace-Tronics
LF-Jax - phone jacks - Switchcraft
LGH - high voltage leads and receptacles - Amp
LGH - high voltage lead - Amp
Lifeguard - silicon diffused-alloy junction - Dickson Elctrns.
Life-Island - hospital patient isolation sys. - Matthews Resch.
Lifeline - marine radio - Atlantic Instrs.
Life-Lite - indicators & sensors - AMBAC Inds.
Lifewood - wood-backed brushes - Jenkins', M.W. Sons
LIFT - counting computor - Dynamic Precision Controls
Liftmaster - garage door opener - Chamberlain Mfg.
Light-A-Matic - light sensitive controls - Eagle Elec. Mfg.
Light Conditioning TM - dimmer control - Leviton Mfg.
Lightguard - emergency lighting aparatus - Exide Power Sys. Div.
Limitamp - motor control - General Elec.
Limitron - fuses - Bussmann Mfg.
Limitstat - safety thermostat - Hotpack
Limpander - automatic audio control - Elctrn. Sys. Engrg.
Linatron - accelerator - Varian Assocs.
Lincguard-Induction Motor - welder - Lincoln Elec.
Lincolnductor - welding cable - Lincoln Elec.
Lincolntrol - welding current control - Lincoln Elec.
Lincolnweld - arc welders, flux/electrodes - Lincoln Elec.
Lincwelder - arc welder - Lincoln Elec.
Linde - alumina powders - Union Carbide
Lindsay - rare earths - Kerr-McGee Chem.
Lindstrom - pliers and nippers - Hammel, Riglander
Line-A-Gear - gearmotor drives - Allis Louis
Line-A-Gear - gearmotor drives - Allis, Louis
Lin-E-Air - pneumatic isolation sys. - Ling Elctrns.
Line-A-Spede - gearmotor drives - Allis Louis
Line-A-Spede - gearmotor drives - Allis, Louis
Linemaster - refrigeration products - Mueller Brass
Line-O-Life - brushes - Carter Motor
Line-O-Lite - pilot lights - Ind'l. Devices
Line/Printer - computer output printer - Data Prods.
Line-Volt - voltage testers - Ind'l. Devices
Linobate - lithium niobate - Crystal Technology
Linurmass - linear flowmeter - Technology/Versatronics
Linvar - linear variometer - Muirhead
Liquid Heat - heat treating salts - Houghton, E.F.
Liquidometer - hydraulic remote reading gauge - Simmonds Precision Prods.
Liquidometer D.R. - direct reading gauge - Simmonds Precision Prods.
Liquilite - liquid level controller - Controlotron
Liquitec - level detector - Trans-Sonics
Lite/Gard - photo electric control - Weldotron
Lite-Mike - light meter - EG&G
Lite-Mike - light instrumentation - EG & G
Lite-Pak - ditial readout on PCB for edge connector mounting - Pinlites
Lite-Panels - indicator light - Drake Mfg.
Lite-Rite - conductivity testers - Anderson, W.E.
Litestrip - indicator light decade - Circon
Lite-Tron - sensor - Automation Devices
Lithafrax - ceramic filler for incapsulants - Carborundum
Litho-Plates - nameplates - Brady, W.H.
Littel-Jax - phone jacks - Switchcraft
Littel-Lite - push button switches - Switchcraft
Littel-Plug - phone plugs - Switchcraft
Littel-Switch - push button switches - Switchcraft
Little Caesar - retention system - ITT Cannon Electric
Little Devil - resistors - Ohmite Mfg.
Little Gem - cabinet drawers - Equipto
Little Gem - flat clips - Sjoberg, C. & Son
Little Gem - foot press - Sjoberg, C. & Son
Little Giant - 1 watt microglass regulators - Centralab Semiconductor
Little Joe - tools - MacDonald
Little-7 - wire stripper - Holub Inds.
Littl-Lytic - aluminum electrolytic capacitor - Sprague Elec.
Live-Lock - structural panel fastener - Tridair Inds.
LK Switch - lever switches - Switchcraft
Lloyd's - soldering fluxes - Johnson Mfg.
Lloyd's No. 7 Silver Brazing Flux - silver brazing flux - Johnson Mfg.
LM - spot welders - Price & Rutzebeck
LMB - boxes, cabinets, chassis, panels, stamping - Heeger
LMS-100 - linear optical encoder - Dynamics Resch.
Load-Pak - solid-state controlling device - Gems Div.
Lobo - electronic game callers - Sparks Communications
Localite - localized lighting equipment - Fostoria-Fannon
Locam - pin registered intermittant camera - Red Lake Labs
LO-CAP Switch - lever switches - Switchcraft
Lo-Cate - tracking & positioning sys. - Beukers Labs.
Locke - insulators or hardware - General Elec.
Lock-Extension Jax - phone jacks - Switchcraft
Lock-Grip - screwdrivers - Rosenberg Bros.
Lock-O-Lite - integral lamp assembly - Ackerman Engravers
Lock-On - connector & cord set - Eagle Elec. Mfg.
Lock-Plug - phone plugs - Switchcraft
Locktite - connectors - Thomas & Betts
Locore - silicon steels - Republic Steel
LOCQUIC - primer & cleaning agent - Loctite
LOCTITE - anaerobic liquid resin - Loctite
Lo-Cycle - demagnetizers - Annis, R.B.
Lodan II - elctrn. instr., crane angle & load - Elctrns.,
Lodex - permanent magnet material - General Elec.
Logalog - strobed latching monitor - Industrial Inventions
Logevue - 35mm viewer reader - Photomechanisms Div.
Logicator - readout devices - Bowmar Instr.
Logico - digital or logic monitor - Industrial Inventions
Logic-Triac - bi-directional thyristor - International Rectifier
Logmatic - printing digitizer - Dytro
Lo-High Frequency Shield - noise limiting shield - Consolidated Prods.
Lokon - locknuts - Allen Mfg.
Lokuts - lock nuts - Shakeproof Div.
Lonco Sealbrite - protective coating - London Chemical
Lonco Sonic-Solve - solvent - London Chemical
London Pressurometer - automated blood pressures - Avionics Resch. Prods.
Loner - soldering instrument - Edsyn
Longhair - record brush - Stanton Magnetics
Long John - outlet box - Waber Elctrns.
Long Service - unsupported rubber gloves - Edmont-Wilson
Lo-Noise - noise limiting cable - Consolidated Prods.
Lorchron - phase locked receiver - Aerospace Resch.
Lo-Torque - low force limit switch - Denison, R.B.
Lo-Torr - vacuum flanges, feed throughs & pumps - Hughes Aircraft
Lo-Volt - voltage testers - Ind'l. Devices
Low Amp - electrodes - Eutectic
Low-Ohm - tape - Chase & Sons
Low-Peak - fuses - Bussmann Mfg.
Low Temp - torch rods - Eutectic
Low-Var - capacitors, fixed, ceramic - Republic Elctrns.
Loxarmor - interlocked armor cables - Okonite
Loxswitch - limit switch - Denison, R.B.
Lox Thermistor - thermistors - Victory Engrg.
LPB - lighted pushbutton switch - Unimax Switch
LP Liquid Polysulfide Polymen - liquid polymens - Thiokol Chemical Div.
LPS Instant Cold Galvanize - spray on type--equal to hot dip galvanize - LPS Research Labs.
LPS Instant Contact Cleaner - no residue type electrical cleaner - LPS Research Labs.
LPS #1 - greaseless lubricant-penetrant water displacing-rust inhibitor - LPS Research Labs.
LPS #2 - oily type lubricant-rust inhibitor - LPS Research Labs.
LPS #3 - waxy-two year rust inhibitor-lubricant - LPS Research Labs.
LQ - valves - Lunkenheimer
L & R - all ultrasonic & mechanical cleaning machines - L & R Mfg.
LR120 - portable infrared thermometer - Raytek
LSD - liquid steam cleaning detergent - Oakite Prods.
LSHV - high voltage cables - Boston Insulated Wire & Cable
LST - low skin temperature oven - Hotpack
LT Switch - lever switches - Switchcraft
Lube-Lok - lubricants - Electrofilm
Lubri-Bomb - lubricants - Electrofilm
Lubri-Bond - lubricants - Electrofilm
Lubrite - elctrn. cleaner - Workman Elctrn. Prods.
Lucalox - polycrystalline ceramic - General Elec.
Lug-It - lugs - Thomas & Betts
Lug-Plug - phone plugs - Switchcraft
Luma-Cord - fiber optic cabels - Fiber Photics
Lumapac - inverter/ballasts - Electro Windings & Comps.
Luma-Switch - illuminated switches - Ind'l. Devices
LumenMeter - light instrumentation - EG & G
Lumen Meter - light measuring instrument - EG&G
Lumetron - colorimeters - Photovolt
Luminaut - underwater lighting system - Beckman Instrs., Advanced Tech.
Luminoscope ELM-2A - microscope cathodoluminescence attachment - Nuclide
Lumi-Trol - photoelectric lighting equip. - Photo-Crystals
Luncor PVC - plastic valves - Lunkenheimer
Lustre-Zinc - zinc chromate plating - Titchener, E.H.
Luxicon - light conduit - Dolan-Jenner Inds.
Luxolene - epoxy encapsulated coils - Electro Magnetic Prods.
Luxtrol - light control equipment - Superior Elec.

M

Mabuchi - fractional h.p. d.c. motors - Aristo-Craft Distinctive Miniatures
Macbond - chem. fastening sys. - Morgan Adhesives
Mac Jr. - multi application computer - Lockheed Elctrns.
Mackay-Marg - electronic tonometer - Biotronics
Mack Relays - mercury relays - Mack Elec. Devices
MACromates - chromate conversion coatings - Mac Dermid
Macrowave - oven - Radio Frequency
Mactac - films, tapes and adhesive coated prods. - Morgan Adhesives
MACuplex - plastic plating process - Mac Dermid
MAC-16 - digital computer - Lockheed Elctrns.
MAC 16 - multi application computer - Lockheed Elctrns.
Madac - a/d/a converters - Singer-General Precision
M A D T - transistor - Sprague Elec.
Magacycler - frequency to voltage converter - Pioneer Magnetics
Magaverter - voltage to frequency converter - Pioneer Magnetics
Magcam - magazine-loaded high-speed camera - Red Lake Labs
Magcentric - magnetic bearings - Cambridge Thermionic
Mag-Eye - proximity limit switch - Square D
Magflo - bath magnetic stirrer - Hotpack
Maggie - tv antennas - S & A Elctrns.
Magic - computers - Delco Electrns. Div.
Magic Arm - floating arm lamps - Acme Lite Products
Magic Circle - A.R.F. Products
Magic Mirror - one-way mirror - Pacific Universal Prods.
Magic-Tee - coaxial tee - Microwave Labs. America
Magic tip - screw holding screw driver - Hunter Tools
Magic Wand - electrostatic neutralizers - Sticht, Herman H.
Magi-T - matched tees - CES Elctrns.
Magitran - wafer thin loudspeaker systems - Era Acoustics
Magitran - magnetic/transistor power source - Electronic Resch. Assocs.
Magmod - magnetic modulator - General Magnetics
Magnacaps - ceramic capacitors - Radio Materials
Magnaglo - fluorescent particle test - Magnaflux
Magnapak - magnetostrictive spaced lamination transducers - Westinghouse Elec.
Magna-Set - thermoregulator - Princo Instrs.
Magna-Shield - noise limiting shield - Consolidated Prods.
Magna-Stick - liquid level - Roylyn
Magnatorc - d.c. motors - Hansen Mfg.
Magnatrak - ultrasonic cleaning generator - Westinghouse Elec.
Magnaviewer - ultraviolet lamp - Black Light Prods.
Magna-Weigh - dial indicator scales - Howe Richardson Scale
Magna Welder - semi-automatic wire feeder - National-Standard
Magnecell - magnetic weight detector - Yaskawa Elec. America
Magnecharger-Em & Pm - magnetizers - Thomas & Skinner
Magnecord - magnetic tape recording equipment - Telex Comm. Div.
Magneform - metal-forming equip. - Maxwell Labs.
Magne-Gage - plating thickness gauge - American Instr.
Magnelatch - permanent magnet latch valves - Skinner Elec. Valve Div.
Magneline - indicators - Veeder-Root
Magneline - digital indicator - Patwin Div.
Magnemetrics - fluxmeters - Magnetic Sys. & Instrs.
Magnepaint - magnetic paint - Micro-Circuits
Magneraser - tape demagnetizer - Amplifier Corp. America
Magnereed - power relay - Solid State Elctrns.
Magnesearch - low magnetic flux densities - RFL Inds.
Magnesil - magnetic alloy - Magnetics
Magnesplice - insulation piercing crimp-connector machine - Connectrol
Magnetic Tweezer - pick-up tool - Orbit Inds.
Magnetmetrics - magnetic instrumentation - Magnetics Sys. & Instrs.
Magnetreater - de-magnetizer (variable) - RFL Inds.
Magniphase - transmission line protection sys - Continental Elctrns. Mfg.
Magni-Whirl - baths - Blue M Engrg.
Magnum - hv aluminum case bridges - Unitrode
Magnum - high voltage aluminum case bridges - Unitrode
Magolite - insulating cement - Semicon Assoc.
Magslip - servo comp - Muirhead
Magswitch - magnet operated switch - Denison, R.B.
Mag Tech - d.c. torque motors - Magnetic Technology
Magton - solenoid - Magnuson Engrs.
Mail-Lite Shippers - shipping bags - Sealed Air
Maintenance Weldor - welding magazine - Eutectic
Major - phonographs - Major Elctrns.
Majorette - phonographs - Major Elctrns.
Malco - electronic terminals and connectors - Malco Mfg.
Mallomatic - crimping & stacking machines - Malco Mfg.
Manchex - batteries - Exide Power Sys. Div.
Mangjet - manganese hardsurfacing electrode - Lincoln Elec.
Manocoder & Microcoder - telemetry multicoders - General Devices
Manpack - mobile comms. equip. - Hughes Aircraft
Manson - friction tape - Okonite
Manuflex - manual rest timer - Eagle-Signal Div.
Manumatic - leak detector valve - Norton
Manumatic - leak detector valve - Vacuum Equip. Div.
Manu-Roll - air filter - Cambridge Filter
Mapico - iron oxides - Cities Service
Marathon - tape recorder sys - Marathon Instrs. Div.
Marcorder - information recorder - Alcor
Mari Guide - direction finder - Bludworth Marine Div.
Marine Arrow - direction finder - Bludworth Marine Div.
Marine Pilot - direction finder - Bludworth Marine Div.
Mark C - switches - Cole Instr.
Markermatic - wire marking machine - Brady, W.H.
Mark & Flux Ink - marks defective spot and fluxes it - Organic Prods.
Mark I - disc packs - Memorex
MARK II - catv cutter & stripper - Tech. Devices
Mark II - enlargers - Burke & James
Mark II - liquid scintillation counter - Nuclear-Chicago
Mark III - electrostatic polarizer - Stanton Magnetics
MARK III - circuit card fixture - Tech. Devices
Mark I, II, III - terminal attaching machines - Kent
Mark IV - wave solder mach. - Tech. Devices
Mark IX - comp. lead trimmer - Tech. Devices
Marks-A-Lot - felt tip marker - Carter's Ink
Marksman - temperature recorders - West Instr. Div.
Marksman - soldering irons - Weller
Mark-Time - mechanical timing devices - Rhodes, M.H.
Mark Two - snowmobile c.d. ignition system - Delta Products
MARK V - component lead former - Tech. Devices
Mark VI - disc packs - Memorex
Mark VIII - polyweld systems - Miller Elec. Mfg.
Mark 10 B - automotive ignition system - Delta Products
Mark 8, Mark 12B, Mark 16 Mark 24 - vhf nav-com units - Narco Avionics
Marlastic 101 - cable jacketing - Mark Prods.
Marlo - heat transfer equipment - Porter, H.K.
Marlox - metal sheathed thermocouples - Marlin Mfg.
Mars - multiplex audio response sys. - Cognitronics
Marshall - testing furnaces - Norton
Marshall - testing furnaces - Vacuum Equip. Div.
Mar-Temp - heat treating salts, oils - Houghton, E.F.
Marz - metals - Materials Resch.
Masar - antenna reflectors, fiberglass - Prodelin
Maskcoat - prot. coating - Western Coating
Mass. Gear - gears & gear mechanisms - Geartronics
Master - screw thread repair kits - Heli-Coil Prods.
Masterline - matv equipment - Blonder-Tongue Labs.
Master Screen - screen machine - Podgor, Joseph E.
Master-Shapes - printed die cut pressure sensitive labels - Master Tape Printers
Mastr Progress - two-way Radios - General Elec.
Matec - test, evaluation & class. equipt - Motorola Semiconductor Prods.
Mate-N-Lok - connectors - Amp
Matricon - multiple beam cathode ray tube - Rank Precision Inds.
Maurermatic - film processor - Maurer, J.A.
Maverick - dc power supply - Wanlass Div.
Max-C - glass & quart piston trimmer - JFD Elctrns./Sub. Riker-Maxson
Maxmeter - miniature meters - Atlantic Instrs.
Maxpax - encapsulated modules - Atlantic Instrs.
MB - microphones, headphones transformers - Stanford Int'l.
McGill - switches - McGill Mfg.
M-Chrome - 1000 hour chrome plating - Shakeproof Div.
M.C. Jones - microwave devices - Bendix
MCJ-12 - 12 circuit normal-through jack - Cooke Engrg.
MCRs - metal case resistors - Milwaukee Resistor
MCRT - rotary transformer - Himmelstein, S.
MCRT - torquemeters - Himmelstein, S.
M. D. R. - magnetic direct reading gauge - Simmonds Precision Prods.
MDTL - diode transistor logic ic's - Motorola Semiconductor Prods.
ME - ultrasonic cleaners - Mettler Elctrns.
Measuray - xray gages - Bendix
Measure Master - tapeless vules - USM
Measurrench - torque measuring wrench - Williams J.H.
Mecatorn - metal spinning - Torngren
Mechorder - Larson Aero Dev.
Mech-Tronics - cabinets, racks, PC boards - Fansteel
MECL - emitter-coupled logic ic's - Motorola Semiconductor Prods.
MECL II - emitter-coupled logic ic's - Motorola Semiconductor Prods.
MECL III - emitter-coupled logic ic's - Motorola Semiconductor Prods.
Medicall - intercom sys - Nelson-Hershfield Elctrns.
Medistat - annunciator sys - Nelson-Hershfield Elctrns.
Medwire - medical wire products - Cohn, Sigmund
Mega-Bias - duplicating equip. & access. - Int'l. Electro-Magnetics
Meg-A-Life - device & program - Motorola Semiconductor Prods.
Meg-A-Life II - device & program - Motorola Semiconductor Prods.
Megatrometer - high megohm meter - Penn Airborne Prods.
Meg-Chek - megommeters - Associated Resch.
Megger - insulation & continulty test instrs. - Biddle, James G.
Megohmer - insulation testers - Sticht, Herman H.
Meg-O-Max - resistor - Sprague Elec.
Megox - oxide - Welwyn Int'l.
MEK - controls - MEKontrol
Mekontrol - controls - MEKontrol
Mektron - printed & molded circuits, flat cable, and laminar bus assemblies - Rogers
Melcor - thermoelectric cooling module - Melcor-Materials Elctrn. Prods.
Meldin - polyimide molded shapes and parts - Dixon
Melematic - snap action switch - Meletron
Memcard System - core memory system - Sanders Assocs.
Memco - welding controls, accessories, etc. - Miller Elec. Mfg.
Memoflex - memory planes, plated wire - Flexible Circuits
Memo-Lite - indicator w/memory - TEC
Memomark - digital encoders - Leupold & Stevens
Memo-Q - solid state - automatic light control - Century Strand
Memoryline - spaghetti tubing - Shamban, W.S.
Memory Master - time control - Paragon Elec.
Memotron - direct view storage tube - Hughes Aircraft
Mempac - read-only-memory (ROM) - Datapac
Memstac - ROM system - Datapac
Mentor - multimeters, limit testers, ratio trim/test instrs. - Biddle, James G.
Mercoid - mercury switch - Mercoid
Mercontrol - temperature level control - Mercoid
Merco-Scan - relays - James Elctrns.
Merculite - ultraviolet lamp - Black Light Prods.
Mercutron - keyboard switch module - Mechanical Enterprises
Mercutronic Keyboard - computer terminal keyboard - Mechanical Enterprises
Merl - wire wound resistors - Miller Electro-Resch. Labs.
Merlon - polycarbonate resin - Mobay Chem.
Merritone - ink solvent - Phillips Process
Message Composer - data input & retreival sys. - North Elec.
Message Director - medical educational systems - Carolina Medical Elctrns.
Messenger - comms. prods. - Johnson E. F.
Metab - A.R.F. Products
Met-A-Caps - capacitors, metallized - Chicago Condenser
Metacolor - layout dye - Phillips Process
MetalAnalyzer - metal identification sys. - Sensor
Metalastic Gasket - emi shielding gasket - Metex
Metal-Cals - nameplates - Brady, W.H.
Metalert - detectors - FRL
Metalex - emi shielding strip - Metex
Metalex - metal cleaners - Mac Dermid
Metalfilm - strain guages - Automation Inds.
Metal-istor - metal film resistors - Kidco
Metallex - plastic laminate - Hermes Plastics
Meta-Logger - computing logger - Bristol Div
Metalonics - impregnated cathodes - Philips Metalonics
Metalset - cement - Smooth-On
MetalSorter - metal differentiation sys. - Sensor
Metameter - telemetering systems - Bristol Div
Metanet - thick-film resistors - Sprague Elec.
Metatone - audio tone equipment - Bristol Div
Metatronic - process control systems - Bristol Div
Met-Bel - vacuum/compressor pumps - Metal Bellows
Meter Multiplier & D.P.M.'s - pre-amplifier for V.O.M.'s & D.V.M.'s - Integrated Controls
Metex - metal finishing compounds - Mac Dermid
Metfilm - metalized film capacitor - Sprague Elec.
Methylon - protective coating compound - General Elec.
Metlkor - cylindrical brushes - Jenkins', M.W. Sons
Met-Loc - all metal self locking thread system - Deutsch Fastener
'Metox' - metal oxide resistors - Welwyn Elec.,
Metox - film - Welwyn Int'l.
Metoxilite - silicon rectifier - Semtech
Metriclene - cleaning solvents - Moore John B.
Metri-Gap - measuring gages - Lion Precision Div.
Metrion pH Meter - low cost ph meter - Coleman Instrs.
Metrohm - polarograph - Brinkmann Instrs.
Metrotube - electeon tubes & transistors - Metropolitan Supply
Metso - sodium metasilicate - Philadelphia Quartz
Me-2 - dual-in-line sockets - Scanbe Mfg.
MF - indicator light - Drake Mfg.
Mfgs. Catalog File - mfgs. & vendors on microfiche - Johnson Research
MHTL - high threshold logic ic's - Motorola Semiconductor Prods.
Micaclad - insulation - Electric Machinery Mfg.
Mical - pressure sensitive mylar - Topflight
Mica Mat - mica paper reconstituted mica - General Elec.
Micap - high voltage capacitors - Tobe Deutschmann Labs.
Micaply - high pressure laminates - Mica
Micatemp - high temperature wire - Cerro Wire & Cable
Micaver - glass bonded mica - Quartz & Silice
Michigan - loudspeakers - Electro-Voice
Micrajust - machines, silk screening for printed circuits - Tekni-Labels
Micretain - air filter - Cambridge Filter
Micrimp - crimping tool - British Insulated Callender's Cables,
Microact - cam-activated controller - Bristol Div
Micro-Balancing - balancing machines - Schenck Trebel
Microbar - power supply shutdown - Anocut Engrg.
Micro Bead - thermistor - Victory Engrg.
Micro-Cap - sub-sub-miniature varactor - Eastron
Micro-Ceil - foamed fep cable - Microdot
Microclareed - switching assemblies - Clare, C.P.
MicroCoax - miniature semiridge coaxial cable - Uniform Tubes
Microcode - digital read out - IKL
Microcom - telemetry commutator - General Devices
Micro-D - connector - ITT Cannon Electric
Microdac - i c digital/analog converter - Analog Devices
Microdac - d to a converter - Hybrid Sys.
Microdac - microwave materials tester - Microwave Instrs.
Micro-Derm - coating thickness tester - Unit Process Assemblies
Microdial - digital & concentric dials - Amphenol Controls Div.
Microdot - fluidic indicator - Micro Switch
Micro-edge - connectors - Amphenol Ind'l. Div.
Microflame - miniature gas welding torch - Microflame
Microflash - flash equipment - EG&G
Microflector - reflectors - Microflect
Microflex - reset timer/counters - Eagle-Signal Div.
Microflo - mesh form alloys - Eutectic
Micro-Fluxvalve - magnetic phono cartridge - Stanton Magnetics
Micro-Foil - heat flow sensor - RDF
Micro-Fused Quartz - substrates for thin-film deposition - Dell Optics
Microgap - replacement speakers - Utah Elctrns.
Micro-gator - clips - Mueller Elec.
Microglaze - elec. insulators - General Elec.
Micro-Guard - filters, filter-driers - Mueller Brass
MicroHeater - heating device - Circon
Microhopper - solid-state chopper - Solid State Elctrns.
Micro i - miniature rf inductors - Delevan Div., Coil Prods.
Micro-J - ceramic variable capacitor - Johnson E. F.
Micro-Jax - phone jacks - Switchcraft
Microjuster - input device for generating electrical signals - Servo Dev.
Micro-K - connector - ITT Cannon Electric
Microkon - camera - HLC Mfg.
Micro-Kool - subminiature fan - HICO (Horizons Int'l.)
Microlet - microminature eyelet - Circon
Microline - all products - Narda Microwave
Micrologic - integrated circuits - Fairchild Semiconductor
Microloss - microwave absorbing plastic - Coax Devices
Micromagnetic - cartridges - Pickering
Micro Match - monitoring & test equip. - Bendix
Micromatic - polypropylene film capacitor (axial lead) - Paktron Div.
Micromatics - software/wiring service - Scanbe Mfg.
Micromatrix - bipolar lsi circuits - Fairchild Semiconductor
Micromaze - air filter - North American Rockwell
Micro-Meg - megaphones - Fedtro
Micromemory - memory sys. - Elctrn. Memories
Micrometer - frequency meter - Lampkin Labs.
Micro-min - connectors - Amphenol Ind'l. Div.
Micro-Minac - digital computers - Singer-General Precision
Micro Mini - micro minature transformers - Consolidated Transformers Unltd.
Microminim - sub-miniature wire - Standard Wire & Cable
Micro-mod - connectors - Amphenol Ind'l. Div.
Micromosaic - mos circuits - Fairchild Semiconductor
Micron-Aire - contamination control equipment - Ray Prods.
Micronox - resistance film - Caddock Elctrns.

Micronta - test equip., panel meters, programmed timers, etc. - Allied Elctrns.
Micro-Optic - fiber optic controls - Dolan-Jenner Inds.
Micropac - sub-miniature power pack - Electronic Resch. Assocs.
Micropin - contact - ITT Cannon Electric
Micro-Pin - sockets - Techron
Micropix - cathode ray tubes - Litton Inds.
Micro-Plug - phone plugs - Switchcraft
Micro-Point - set screw needle - Duotone
Microporous - filters, fluid - Circle Seal
Micropot - precision potentiometers - Amphenol Controls Div.
MicroProbe - elec. test instr. - Circon
Micropunch - printed circuit layout tool - Moran Instr.
Micro-Rac - connectors - Amphenol Ind'l. Div.
Microreed - microminiature reed relay - Solid State Elctrns.
Micro-Ribbon - connectors - Amphenol Ind'l. Div.
Micro-Riter - temperature recorders - Conklin Instr.
Micro-Scan - relays - James Elctrns.
Micro School - reading equipment - Bowmar Instr.
Microsen - process controls - Robertshaw Controls
Microsense - non-contact gaging - Ade
Micro Sentry - relay - Magnetics
Micro Sentry - voltage relay - Magnetics
Microsocket - contact - ITT Cannon Electric
Microsoltex - soldering equipment - Atlantic Instrs.
Microsource - power supply - Elasco-Eastern
Micro-Space - magnetic disc recording heads & discs - Data Disc
Micro-Space - magnetic disc recording heads & discs - Data Disc
Microspec - infrared spectrophotometer - Beckman Instrs., (AISSD)
Microspot - cathode ray tubes - Ferranti Elec.
Microstar - microscope - American Optical
Microsurface - describes finish on surface of wafers - Ventron
Micro-Synclamps - sub-min. synchro clamps - Timber-Top
Micro-T - miniature package for transistors - Motorola Semiconductor Prods.
Microtech - flexible waveguides - Waveline
Micro Tek - gas chromatographs - Tracor
Microtel - microwave radio - GTE Lenkurt
Microtemp - thermal fuse - Micro Devices
Microtesters - testers - Simpson Elec.
Microthin - spaghetti tubing - Shamban, W.S.
Microtime - circuit protector - Micro Devices
MicroTool - small hand tools - Circon
Micro-Topographer - surface measurement indicator - Gould
Micro-Trak - tone arm - Gray Resch. & Dev.
Microtran - electronic transformers - Microtran
Microtrode - microelectrode - Transidyne-General
Microtron - cooking tubes - Litton Inds.
Micro Versa LOGIC - logic modules - Varian Data Machines
Microyre - miniature wire & cable - Tensolite
Microzone - electrophoreses apparatus - Beckman Instrs., (AISSD)
Micro-400 - computer - Microdata
Micro-800 - Computer - Microdata
MIDA - miniature integral diode assemblies - Motorola Semiconductor Prods.
Midcoder 110 - data transmission system - Nat'l. Midco Inds.
Midgi-Coder - bcd to numeric decoder/driver - Pinlites
Midgi-Counter - decode counter, encoder - Pinlites
Midgi-Dial - dial assy. - Theta Instr.
Midgi-Lite - digital readout - Pinlites
Midi-Trim - potentiometer - Tanger Elctrns.
Midnight - carbon paper - Carter's Ink
Mi-Kro Grip - cable clamp - MI-KRO Connector Div.
Mikrovan - wax - Humble Oil & Refining
MIL-Clamp - coax connector with clamp construction unique to amphenol - Amphenol RF Div.
MIL-Crimp - coax connector with crimp construction unique to amphenol - Amphenol RF Div.
Mil Data Sheet File - mil-fed specs and "slash sheets" - Johnson Research
Mili-Ductor - non shielded inductor - Nytronics
Milipot - potentiometer - Voak Engrg.
Militan - *mil spec type* solid tantalum capacitors - Components
Mil-Kote - paint & coatings - Zophar Mills
Miller - welders - Miller Elec. Mfg.
Millermatic - welding equip. - Miller Elec. Mfg.
Milliken - high-speed cameras - Teledyne Camera Sys.
Millimac - miniature magnetic comps. - Hughes Aircraft
Millisec - relay - Stevens-Arnold
MilliTorr - ionization gauge - Varian Assocs.
Millivac - elctrn. measuring & testing instr. - Millivac Instrs.
Mil-Loc - mil-std stressed panel fastener - Deutsch Fastener
Milmaster - electronic micrometers - Electron-Machine
Milros - mildly activated rosin flux - Alpha Metals
Mil Standard Parts Catalog - an, naf, and & ms drawings - Johnson Research
Milwaukee Relays - relays - Deltrol Controls
Milwaukee Wrot - washers & stampings - Wrought Washer Mfg.
Mina - ball bearings - MPB
Mina Gear - gear-motors - General Elec.
Minapar - plastic bearing retainers - MPB
Minapure - lubricant - MPB
Mineac - miniature electronic auto collimator - Barnes Engrg.
Min-Econ - solid-state small amplifiers - C-COR Elctrns.
Minelco - potentiometers, switches & indicators - Miniature Elctrn. Comps.
Mineon - indicator light - Drake Mfg.
Mineralight - lab. short wave ultraviolet lamps - Black Light Corp. Amer.
Mineralight - short wave ultraviolet lamps - Ultra-Violet Prods.
Minertia Motor - servo motor minimum inertia - Yaskawa Elec. America
Mini-Aud - audio power amplifier - Dynair Elctrns.
Mini Bee - audio-video recording motor - Hurst Mfg.
Miniboxer - miniature axial fan - IMC Magnetics
Minibridge - silicon rectifier - Elctrn. Devices
Minibuoy - marine distress marker - Soderberg Mfg.
Minibutton - switch, pushbutton - Digitran
Minicam - camera - CBS Laboratories
Mini-Cator - indicator lights - Ind'l. Devices
Mini-CCTV - closed circuit tv system - GBC Closed Circuit TV
Minicom - monitor receiver - Unimetrics
Mini-Con - connectors - Switchcraft
Minicube - subminiature blower - Sanders Assocs.
Minidac - digital/analog converter - Analog Devices
Minidek - 6" diameter reel tape - Digi-Data
Mini-Dial - dial assy. - Theta Instr.
Mini-Diget - complete line of packaged elctrn. readouts - Instrument Displays
Minidisc Package - impatt diodes - Hughes Aircraft
Mini-Fade - 2-input video fader - Dynair Elctrns.
MINIform - 303 series subminiature switch - Amphenol RF Div.
Minifus - small fuses - Electrey, S.A.
Mini-gator - clips - Mueller Elec.
Mini-Imp - pumping system - T-M Vacuum Prods.
Mini-Jack - telephone jacks - Carter Precision Elec.
Mini-Joint - miniature universal joints & couplings - Falcon Div.
Mini-Joints - joints & couplings - General Thermodynamics
Minikool - axial blower/fan - HICO (Horizons Int'l.)
Minilamp - minature indicator lights - Int'l. Prods.
MiniLever - switch, lever - Digitran
Mini-Line - miniature staking press - Magnetec
Mini-Lite - indicator - TEC
Minilith - monolithic crystal filter - Reeves-Hoffman Div.
Minilok - terminal block - Burndy
Minimac - eddy current inspection equip. - Magnetic Analysis
Mini-Mass - memory system - Standard Memories
Mini-Mate - cylindrical hi-density connector - Matrix Science
Mini-Matrix - programming board - (NES) Nationwide Elctrn. Sys.
Mini-Mike - subminiature slide snap switch - Chicago Switch
Mini-Mite - switches - McGill Mfg.
Mini Mite - portable potentiometer - Thermo Elec.
Mini-Mix - mixers, adapters, audio accessories - Switchcraft
Mini-Mod - audio-video modulator - Dynair Elctrns.
Mini-Monitor - Miniature rf wattmeters - Bird Elctrn.
Mini-Noise - coaxial cable - Microdot
Mini-Pac - discrete annunciator - Symbolic Displays
Mini-Page - paging system - Sparks Communications
Minipak - transceiver - Radio Specialty Mfg.
Mini-Panel - telephone jack panels - Carter Precision Elec.
Mini-Plug - telephone plugs - Carter Precision Elec.
Mini-Prox - proximity switch - Electro Prods. Labs.
Mini Pump - pump - Milton Roy
Mini-Reader - portable rh-temp indicator - Hygrodynamics
Minireed - miniature reed relay - Solid State Elctrns.
Mini-Rote - rotary computer - Airflyte Elctrns.
Minisel - selenium rectifier - Elctrn. Devices
Mini-Sentry - intrusion detection sys. - Laser Sys.
Minisert - miniature L.C. socket - Berg Elctrns.
Mini-Shield - shields - Staver
Mini-Slide - pilot lights & sockets - Ind'l. Devices
Mini Slide Snap - subminiature slide snap switch - Chicago Switch
Minisource - power supply - Elasco-Eastern
Mini-Speaker - weatherproof speaker system - Minneapolis Speaker
Mini Spec - military spec & stds book - Quality Documents
Minisplice - small size splice/connector machine - Connectrol
Mini-Springs - springs - Staver
Ministac - high voltage low current rectifier - Semtech
Ministic - high voltage low current rectifier assembly - Semtech
Mini-Strip - strip type connector - Matrix Science
Miniswitch - switch, thumbwheel - Digitran
Mini-Sync - tv sync generator - Dynair Elctrns.
Mini-Synclamps - min. synchro clamps - Timber-Top
Minitactor - solid state relay - EDC Data Comps.
Minitan - microminiature solid tantalum capacitors - Components
Minitape - battery operated tape recorder - Stancil-Hoffman
Minit-Cure - epoxy adhesive - Allaco Prods.
Minit-Cure - epoxy adhesive - Packaged Resins
Mini-Test - continuity tests - Ind'l. Devices
Mini-Thin - 300 volt teflon wire - Thermax Wire
Minitron - digital readout - Luminetics
Minityper - digital printers - Shepard Div.
Minivac - vacuum sys - Vacuum Inds.
Mini-Vap - vapor cleaner - Headway Research
Mini-Vit - variable impedance transducer - Kaman Nuclear
Mini-Volt - voltage testers - Ind'l. Devices
Minivox - 2-way personal portable - Unimetrics
Miniwall - telephone sets - Stromberg Carlson
Mini-Wasp - miniature wrapost aluminum systems panels - Malco Mfg.
Mini-Wrap - modular plate assembly - Amphenol Ind'l. Div.
Mini-6 - video switcher - Dynair Elctrns.
Minnie - connector - Amphenol Connector Div.
Minos - gas monitor - Beckman Instrs., Advanced Tech.
Minrac 17 - connectors - Amphenol Ind'l. Div.
Minsil - silicon rectifier - Elctrn. Devices
Mirrodip AAI - bright dip - Colonial Alloys
Mirrolux - polishing compound for silicon - Materials Development
Mirropane - transparent mirror - Liberty Mirror Div.
Misco Red Line - complete speaker line - Minneapolis Speaker
Missilite - rectangular indicator lights - Marco-Oak
Miss Tester - relay - Hi-G
MistoR - magnetoresistor - American Aerospace Controls
Mitey-Mite - connectors - Amphenol Ind'l. Div.
Mi-T-Mag - ceramic magnets - National Moldite
Mix-Amp - mixers, adapters, audio accessories - Switchcraft
Mixer-Master - electronic control system - Veeder-Root
Mix-Kit - package device for 2-part compounds - Hardman
M-Jax - phone jacks - Switchcraft
MKS Baratron - pressure-vacuum meter - MKS Instrs.
M-Line - minature microwave components - Sage Labs.
M-Line Accessories - strain gage accessories - Micro-Meas. Div.
MLK Switch - lever switches - Switchcraft
ML6 - high-friction coating - Meridian Laboratory
Mobilcal - hf manpack radio - Racal Communications
Mobilfone - radio comm. - Mobil Elctrns.
mobilite - d.c. fluorescent lighting unit - Midwest Audio
Mobilmatic - automatic equip. - Mobil Elctrns.
Mobilpage - amplifiers for mobile equipment - Midwest Audio
Mobiltel - mobile telephone equipment - GTE Lenkurt
Mobiltemp - temperature sensor - Midwest Audio
Mobiltone - tone equip. - Mobil Elctrns.
Mobius II - tape handler - Robins Inds.
Mod Cell - display construction mat'l. - Burtek
Model 400 - screw driver - Shakeproof Div.
Model 5100 - draft model - Universal Drafting Mach.
Model 5200 - draft & digitize model - Universal Drafting Mach.
Modem 1100 - high speed data sets - Int'l. Comm.
Modem 2200 - high speed data sets - Int'l. Comm.
Modem 3300 - high speed data sets - Int'l. Comm.
Modem 4400 - high speed data sets - Int'l. Comm.
Modem 4433 - high speed data sets - Int'l. Comm.
Modem 5500 - high speed data sets - Int'l. Comm.
Modernphone - intercom - Roche, Paul C.
Modifilm - capacitor - Industrial Condenser
Modiflex - capacitor - Industrial Condenser
MODline - amplifiers, narrow-band - Jerrold Elctrns.
Modline - non-contact temperature measurement - Ircon
Mod Meter - panel meter - API Instrs.
Mod-U-Dim - dimming system - Decor Elctrns.
Modulab - clean rooms - Bendix
Modulair - cabinet panel - Rotron
Modular Feed-Thru Block - bussing powered distribution - Matrix Science
Modular Programming Block - test & programming sys. - Matrix Science
Modular Terminal Block - bussing &/or distribution of multiple conditions - Matrix Science
Module-Matic - tape controlled plating sys. - Sel-Rex
Module-X - modular plating equip. - Sel-Rex
Moduline - rotary switches - Oak Mfg.
Moduline - clean room benches - Matrix Engineering
Modulok - terminal block - Burndy
Mod-u-Lok - floor plates - Bossert Mfg.
Modu-Mount Cabinetry Series 50 - 11 gage construction relay racks - Honeywell
Modu-Mount Cabinetry Series 70 - rfi cabinetry - Honeywell
Modu-Mount Cabinetry Styleline 4000 Series - 14 gage construction relay racks - Honeywell
Moduprint - printers - Practical Automation
Modutrim - ceramic variable capacitors - JFD Elctrns./Sub. Riker-Maxson
Moist-o-Solve - blockout xx swab - Podgor, Joseph
Moistrex - moisture measuring equipment - Rank Precision Inds.
Moisture Monitor - moisture meters - Strandberg Engrg. Labs.
Moisturpump - dehumidifiers - Electro Impulse
Mold-Ease Conc. Pcr - mold lubricant - Merix Chem.
Molded Heat - molded to shape electrical heater - Thermal Sys.
Molded-On - cable end molding - Barker Prods.
Moldite - ferrite materials - National Moldite
Moleculoy - linear polyamides - Belding Chem. Inds.
Molgard - mold release agent - Ram Chems.
Molykote - lubricants - Dow Corning
Molyspray - molybdenum metallizing wire - Philips Elmet
Monarch - converters - Carter Motor
Monastrip EP - epoxy stripper - Mona Inds.
Mondial - magnetic products - Infinetics
Mondur - isocyanates - Mobay Chem.
Monel (00250) - nickel-copper alloys - Huntington Alloy Products Div.
Monilogic - integrated circuit logic cards - Monitor Sys.
Monital - cctv lenses - Rank Precision Inds.
Monital - motion picture cine lenses - Rank Precision Inds.
Monitoradio - vhf receivers sys - Regency Elctrns.
Monitor II - semiconductor test set - IPT
Monitorscope - medical oscilloscope - Essential Elctrns.
Monkey Grip - vinyl coated gloves - Edmont-Wilson
Mono - integrated circuits - Precision Monolithics
Monoball - bearings & rod end bearings - Southwest Prods.
Monobeam - infrared analyzers - Beckman Instrs., (AISSD)
Mono-Bit - digital readout - Symbolic Displays
Monobloc - capacitor - Erie Technological Prods. (EEM)
Monobond - epoxy adhesive - Allaco Prods.
Monobond - epoxy adhesive - Packaged Resins
Monocast MC - castable nylon stock shapes - Polymer
Monoceram - monolythe type ceramic capacitor - San Fernando Elec. Mfg.
Monocon - variable spot size cathode ray tube - Rank Precision Inds.
Monogas - gas generator - Sunbeam Equip.
Mono Graf - shell molds - Misco Div.
Mono-Lithic Keyboards - one piece assembly of many switches - Wild Rover
Monolythic - multiple layer electronic device - Sprague Elec.
Mono-Mite - miniature digital readout - Symbolic Displays
Monomodule - integrated circuits - Precision Monolithics
Monopak - meter & sensor - AMF Electical Prods.
Monopass - optical interference filters - Optics Technology
Monoplex - microphone - Shure Bros.
Mono-Pole - supporting mast structure - Telrex Labs.
Monopoxy - single-component epoxy resin adhesive - Hardman
Mono-Shell - shell molds - Misco Div.
Monothin - thin silicon wafers - Monsanto Elctrn. Mat'ls.
Mono-Tone - continuous tone squelch - Meson Elctrns.
Monoxor - carbon monoxide indicator - AMBAC Inds.
Mon-X - single crystal silicon - Monsanto Elctrn. Mat'ls.
Monzini - casting compound - Adhesive Prods.
Moody Kit - tool sets - Moody Machine Prods.
Moricon - cds light receiver and illuminator - Moririca Elctrns.,
MOS-8S - memory sys., integrated circuit - Cambridge Memories
Motofeed - mill feed control sys. - Electro-Craft
Motogard - protection system - Power Control
MotoHand - elec. manipulator by linear induction motors - Yaskawa Elec. America
Motomatic - motor-generators & motor speed controls - Electro-Craft
Motomatic Lab. - educational teaching device - Electro-Craft
Motorite - diesel compression tester - AMBAC Inds.
Motortron - fuse receptacle - Bussmann Mfg.
Mototrol - pressure operated control - Autocon Inds.
Move-View - bench magnifier - Moffatt Prods.
Moviematic and Duolite - projectors - Kalart Victor
MPF - precision waveguide flange - Maury Microwave
MP-System 1000 - modular instrumentation system - McKee-Pedersen Instrs.
M-Pyrol - solvent for resins & coatings - GAF
MRC - ball and roller bearings - Marlin-Rockwell
MRTL - resistor transistor logic ic's - Motorola Semiconductor Prods.
MSP - miniature surge protector - Joslyn Elctrn. Sys.
MSW - igniter sets - Triple-A Specialty

MT-Jax - phone jacks - Switchcraft
MTLC - miniature & subminiature tuners - JFD Elctrns./Sub. Riker-Maxson
MTM - magnetic tape memory - Raymond Engrg.
MTNS - metal thick nitride silicon - General Instr.
MTOS - metal thick oxide silicon - General Instr.
MTR-1200 - tape recorder - Leach
MTR-1400 - tape recorder - Leach
MTR-2000 - tape recorder - Leach
MTR-3200 - tape recorder - Leach
MTR-362 - tape recorder - Leach
MTR-5204 - cartridge recorder - Leach
MTR-7100 - tape recorder/reproducer - Leach
MTR-8600 - tape recorder - Leach
MTTL - transistor transistor logic ic's - Motorola Semiconductor Prods.
MTTL I - transistor transistor logic ic's - Motorola Semiconductor Prods.
MTTL II - transistor transistor logic ic's - Motorola Semiconductor Prods.
MTTL III - transistor transistor logic ic's - Motorola Semiconductor Prods.
Mublak - blackening compound - Muirhead
Mu-Caps - capacitors, fixed, ceramic - Republic Elctrns.
Mucon - capacitors, fixed, ceramic - Republic Elctrns.
Mufax, Courier, Sendox, Mercury IV - facsimile sys - Muirhead
Muffin - fan - Rotron
Muldipol - multiple dipole collinear arrays - TACO Div.
Multi-Cap - ceramic capacitors - American Lava
Multi-Cell - silicon high-current rectifier process - Motorola Semiconductor Prods.
Multi-Cell II - silicon high-current rectifier process - Motorola Semiconductor Prods.
Multi-Circuit Etch - etchants for production of printed circuits - Hunt, Philip A. Chemical
Multi-CJ - multi calibration cold junction reference source - Omega Engrg.
Multicorder - chart recorders - Simpson Elec.
Multi-Crimp - spade, ring terminals, and quick-connect terminals. - Malco Mfg.
Multidex - rotary switches - Oak Mfg.
Multidial - counting dials - Spectrol Elctrns.
Multiductor - tripple frequency convertor - Ajax Magnethermic
Multifilm - capacitor - Industrial Condenser
Multiflash - flash equipment - EG&G
Multiflex - circuitry - Flexible Circuits
Multiflex - reset timer/multiple circuit - Eagle-Signal Div.
Multiguard - induction motor - Lincoln Elec.
Multi-Lamp - bench lighting - Moffatt Prods.
Multi-Lite - push button switches - Switchcraft
Multi-Meg - high resistance resistor - Caddock Elctrns.
Multimet - high-temp alloy - Cabot
Multi Mite - portable potentiometer - Thermo Elec.
Multimode - microwave horns/feedhorns - TACO Div.
Multi-Mode Tonotron - direct view storage tube - Hughes Aircraft
Multi-Pac - process for multi-layering of back panels - ELFAB Crop.
Multi-Pac - power supply - Velonex
Multipak - powder compacting presses - Pentronix, Div.
Multipak - composite coaxial cable - Andrew
Multiple Microflash - flash equipment - EG&G
Multi-Port - filters - AMBAC Inds.
Multipower - modular power supply - Astro-Space Labs.
Multipulse - cam timer - Eagle-Signal Div.
Multireed - relays - Thermosen
Multi-Slide - switches - Switchcraft
Multi-Spring Master Coiler - hand model - Perkins Machine & Gear
Multi-Switch - switches - Switchcraft
Multisyn - encoder - Del Elctrns.
Multi-Tap - transformer - Sola Elec. Div.
Multi-Tech Engineering - lighted panel components - T.J. Elctrns.
Multitest - eddy current instruments - Ann Arbor Div.
Multitest - ndt - eddy current equipment - Automation Inds.
Multitron - gamma radiography machines - Automation Inds.
Multi-Vac - vacuum furnace - Lindberg Hevi-Duty
MultiVersal - ultrasonic power supplies - Advanced Patent Technology
Multi-Volt - high voltage electrical testers - Multi-Amp
Multizone - zone melting apparatus - Materials Resch.
Multra - stabilizer controls - Muirhead
Multrathane - urethane elastomer casting resin - Mobay Chem.
Multron - polyester resins - Mobay Chem.
Music Mini-Speaker - weatherproof speaker system - Minneapolis Speaker
Mu-Stat - miniaturized thermal switch - Princo Instrs.
Muttalarm - alarm - Autocon Inds.
mW MRTL - resistor transistor logic ic's - Motorola Semiconductor Prods.
Mykroy - glass bonded mica - Molecular Dielectrics
Mylar - polyester film - E.I. DuPont DeNemours
Mylar - film, polyester - E.I. DuPont DeNemours
Mylomn - evaporated metal film resistors - EMC Technology
Mystery Mark - ink - Black Light Prods.
Mystik - electrical tape - Port Plastics
MystR - resistance material - Waters Mfg.
M-1 MicroMux - carrier sys. - Elctrn. Comm.
M-35 - microfilm lamps - Quartz Radiation

N

N - sodium silicate - Philadelphia Quartz
N-A - control cables - Plastic Wire & Cable
Nabond - fused tinned wire - Nat'l. Wire & Cable
Nabond - fused tinned wire - Dynatronic Cable Engrg.
Naked-Mini - computers - Computer Automation
Nalco - carbon filament incandescent lamps - North American Elec. Lamp
NAMCO - control switches & soleniods - National Acme
Namograph - marking machines - Kingsley Mach.
Nanistor - high speed resistors - General Resistance
Nano - connector - ITT Cannon Electric
Nanoclock - divider-clock - Timing Sys.
Nanocom - telemetry commutator - General Devices
Nanomemory - memory sys - Elctrn. Memories
Nanos - fan - Rotron
Nanostak - memory stacks - Elctrn. Memories
Nanotran - isolation transformer - Stevens-Arnold
Narcoil - diffusion pump fluid - Norton
Narcoil - diffusion pump fluid - Vacuum Equip. Div.
Narescoil - pump oil - Norton
Narescoil - pump oil - Vacuum Equip. Div.
Narliner - strippable film - Norton
Narliner - strippable film - Vacuum Equip. Div.
Narrow-Caps - capacitors, fixed, ceramic - Republic Elctrns.
Nashoba - wire marking inks - Geartronics
National - all prods. in the rest of the world - Matsushita Comm. Ind'l. Co.,
National and Ucar - carbon & graphite prods. - Union Carbide
Natite - industrial ceramic materials - Nat'l. Ceramic
NATVAR - flexible electrical insulation - Natvar
Navtrak - navigation sys - Edo Western
NA-X - extra flexible control cable - Plastic Wire & Cable
Neg'ator - constant force spring - Hunter Spring
Nelco - lacquers & coating system - Chemical Prods.
Nelson Ross - plug-in spectrum analyzers - Polarad Elctrn. Instrs.
Nelweld - equip. - Nelson Stud Welding
Nems-Clarke/Dei - telemetry receivers - Defense Elctrns.
Neox - neoprene coated gloves - Edmont-Wilson
NePKon - indicator light - Penn Keystone
Neploc - industrial - Pyle-National Div., Harvey Hubbell
Neptune Series - elec. connectors - Pyle-National
Neptune Series - waterproof conn. - Pyle-National Div., Harvey Hubbell
Netic - shielding material - Perfection Mica
Neu-Tec-Tronic - solder alloy - Eutectic
Neutype, Sealtite, Firetite - film storage cabinets - Neumade Prods.
Neuvator - film cleaning machine - Neumade Prods.
Nevermold - mold-resistant - Mosinee Paper
New Britain - plastics reciprocation screw injection molding machs. - Plastics Mach. Div.
Newdamp - balancing fluid - Bacon Inds.
New Easy - cutting machine - Porter, H.K.
Newport - auto antennas - New-Tronics
Neydium - electrical contact alloys - Ney, J.M.
Neyetch - slip rings & commutators - Ney, J.M.
Neyoro - electrical contact alloys - Ney, J.M.
NF-Lite Switch - pushbutton switches - Switchcraft
NF Switch - pushbutton switches - Switchcraft
Nial - thermocouple alloy - Driver, Wilbur B.
Ni-Bra-Kote - brazing medium - Cambridge Plating
Nickel-Glo - additive for bright nickel plating - LEA Mfg.
Nickelply - steel wire - Nat'l-Standard
Nicoro - brazing alloys - Western Gold & Platinum
Nicoro 80 - brazing alloys - Western Gold & Platinum
Nicusil 3 - brazing alloys - Western Gold & Platinum
Nikkor - lenses - Photo Tech. Prods.
Nikon - cameras - Photo Tech. Prods.
nimo - 10 gun crt display, discrete, four and six decade - Ind'l Elctrn. Engrs.
Nimpac - power supply - Velonex
90 K Series Hybrids - plug-in logic modules - Struthers-Dunn
920 Series - tabular display sys. - Sanders Data Sys.
980 Series - projection display sys. - Sanders Data Sys.
Nioro - brazing alloys - Western Gold & Platinum
Niox - note catalogues - Haas Precision Industries
Niphos - ni alloy coating - N.Y. Testing Labs.
Ni-Rod (00300) - welding electrodes - Huntington Alloy Products Div.
Niromet - controlled expansion alloy - Driver, Wilbur B.
Niron - controlled expansion alloy - Driver, Wilbur B.
NiSn - wire; nickel-tin plated - Hudson Wire
NI SPAN C Alloy 902 - temperature compensated material - Engelhard Minerals & Chemicals
NI Span C Alloy 902 - temperature compensated material - Engelhard Minerals & Chem.
Nitec - mesh alloys - Eutectic
NiTectic - electrodes - Eutectic
Nite Hawk - flashlights - Ray-O-Vac
Nitrox - vapor phase oxidation system - Applied Materials Tech.
Nivaflex - note catalogues - Haas Precision Industries
Nivarox - note catalogues - Haas Precision Industries
Nixie - numerical indicator tube - Burroughs
NLS - mechanical centrifugal clutches - Formsprag
NMD - globe, angle, & check valves - Lunkenheimer
Noala - automatic noise level adjuster - Altec
No Arc - hi voltage insulator - Chemtronics
Nobleloy - film resistor - Continental-Wirt Elctrns.
Noble - Met - mixed-metal evaporated film - American Comps.
Noblewest - marking machines & stamping equip - Noble & Westbrook
Noblette - resistor film - Continental-Wirt Elctrns.
Nobrush - permanent magnet generators - Gerator
No-Chip - taps - Bendix
Noise damp - noise control panels - Barry Controls
No-Klik - quiet switches - Circle "F" Industries
Nokorode - soldering flux - Dunton, M.W.
Nolte - flow measurement products - Kingmann-White
No-Mar - special set screw - PIC Design
No-Nik - wire stripper - Clauss Cutlery
No Noise - volume control & contact restorer - Elctrn. Chemical
Nontact - non-contact temperature sensor - Trans-Met Engrg.
Non-Tamp - type s plug fuses - Eagle Elec. Mfg.
Nopcostat - anti-static agents - Nopco Chem. Div.
Nopcowax - releasing agents - Nopco Chem. Div.
Norac - non-rotating armored cable - Boston Insulated Wire & Cable
Norelco - electronic educational kits - Smith, Herman H.
Norimat - projection units - Heitz, Karl
Normatic - welder controllers - Square D
Normatype - drytransfer lettering - Keuffel & Esser
Norpak - transistorized logic components & systems - Square D
Norplex - laminated plastic sheets - Norplex Div. UOP
Norsat - thermostats - Norwalk Thermostat
Norseman - hand tools - Erikson Specialized Tool
Northern Engineering - distribution transformers Ind'l. control transformers - Webster Elec.
North Seeker - gyro/repeater sys. - Humphrey
Noryl - thermoplastic resins, thermoplastic sheet - General Elec.
Noryl Resins - modified phenylene oxides - General Elec.
No-Slip - positive drive belt - PIC Design
Nova - speakers - Allied Elctrns.
Nova-Cell - batteries - Allied Elctrns.
Novaerter - frequency changers/inverters - Nova Electric Mfg.
Novaglas - nomex-glass fabric - Natvar
Novatron - high energy flash tubes - Xenon
Novimide - ultra high temperature resins - Isochem Resins
Nox-Rust - rust preventives - Daubert Chem.
No. 826 - etchants for production of printed circuits - Hunt, Philip A. Chemical
NRC - vacuum equipment - Norton
NRC - tantalium - Norton
NRG-Pak - dc to ac inverter ballasts - Luminator Div.
N Series - glass & quartz piston trimmers - JFD Elctrns./Sub. Riker-Maxson
N-S Rocket Wire - tensile wire - Nat'l-Standard
Nu Blac - ceramic products - Star Porcelain
Nucarb - solid carburizers - Houghton, E.F.
Nu-Clear - liquid scintillation vials - Nuclear Equip. Chem.
Nuclear and Nublack - varnishes - Sterling
Nuclear Triode - position sensitive detector - Nuclear Diodes
Nucor - power components - Nuclear Corp. Amer.
Nudeea - anti-static cleaner - Miller, Harry
Nugget - blower - Rotron
Nu Glu - cement - Carter's Ink
Nulok - coax connector - Cinch-Nu Line
Numerical Indexer - numerical control - Summit Engrg.
Numericon-A - linear/rotate actuator - Smith, Robert Elec.
Numericon-A - linear/rotate actuator - Smith, Robert Elec.
Nursecom - hospital comm. sys. - Executone
Nursetalk - nursing home comm. sys. - Executone
Nu-Trim - potentiometer - Tanger Elctrns.
Nutsert - insert fasteners - Avdel
Nyebar - barrier film - Nye, William F.
Nyetact - electrical contact lubricant - Nye, William F.
Nylaflow - nylon reinforced hose - Polymer
Nylaflow - nylon pressure tubing - Polymer
Nylakrimp - nylon insulated terminal - ETC
Nylasint - sintered nylon parts - Polymer
Nylatint - nylon dye - Polymer
Nylatron - nylon stock shapes - Polymer
Nylatron - nylon molding compounds - Polymer
Nylaweld - nylon to nylon adhesive - Polymer
Nylobond - connectors - Amp
Nyloclip - nylon cable hangers - Burndy
Nylok - self-locking fastener - Nylok Co. Div.
Nylon-Zip - slide fasteners - Waldes Kohinoor
Nylotube - thinwall tubing and insulation - Nyltite Corp. America
Nylox - adhesive composition for nylon, etc. - Hardman
Nyloy - rod ends with ball bearings - MPB
Nypoly - magnet wire; polyurethane-nylon - Hudson Wire
Nysol - polyurethane insulated magnet wire - REA Magnet Wire
Nystagmotrac - optical stimulator - Beckman Instrs., (AISSD)
NYT-Cap - ceramic capacitor high stability - Nytronics
NYT-Chip - ceramic capacitor chip - Nytronics
Nytran - transformer microminiature - Nytronics
Nytran - miniature transformer - Nytronics
N-4 - zirconium copper alloy - Nippert
N-4004C - tape recorder - Leach

O

Oakite - cleaning compound - Oakite Prods.
Oakite Drycid - powdered acid compound - Oakite Prods.
Oakometer - solution testing instrument - Oakite Prods.
Observer - cctv cameras - Blonder-Tongue Labs.
O Cord - type sto-sjto cord - Plastic Wire & Cable
Octagon - cleaners & solvents - Octagon Process
Octaplate - electrolessplating chemicals - Octagon Process
Octastrip - stripping compounds - Octagon Process
Oct-o-let - multiple outlets - Fedtro
Offscat - offset parabolic reflectors - RF Systems
Ohio - carbon brushes - Ohio Carbon
Ohiohm - carbon composition resistors - Ohio Carbon
Ohmitran - transformers - Ohmite Mfg.
Ohmitrim - trimmer - Ohmite Mfg.
Ohmitrol - power controls - Ohmite Mfg.
Ohmpath - resistive coatings - Fansteel
Ohmspun Loads - resistance load - States
Oildag - graphite in petroleum oil - Acheson Colloids
Oil Foil - felt oil seals - GAF
Oilon Pv 80 - acetal combined with lubricant - Cadilac Plastics & Chems.
Oilostatic - oil pressure pipe type cable transmission systems - Okonite
Okay - leather belting - Houghton, E.F.
Okemco - heavy duty tank cleaner - Oakite Prods.
Okoclad - aluminum sheathed wiring systems - Okonite
Okocord - portable cord and flexible cable - Okonite
Okoflex - instrument control tubing - Okonite
Okoguard - high-voltage cable - Okonite
Okolatex - latex insulation - Okonite
Okolene - (polyethylene) insulated wire - Okonite
Okometal - fatigue-resistant alloyed lead sheaths - Okonite
Okonite - wire, cable, tape, rubber & cement splice roller - Okonite
Okoprene - cable & wire protective coverings - Okonite
Okoseal - chemical resistant cable and wire - Okonite
Okosheath - covering for lead sheathed cable - Okonite
Okotherm - high temperature cable - Okonite
Omag, Multiscope - magnifiers, microscopes - Heitz, Karl
Omega - diffusion furnace - Lindberg Hevi-Duty
Omega - data reduction sys. - Beckman Instrs., (AISSD)
Omega - time recorder - Heitz, Karl
Omega - replacement styli - Ercona
Omega - miniature connector - Cinch-Nu Line
Omegaclad - insulated wire - Omega Engrg.
Omegalok - compression fitting - Omega Engrg.

Omegatite - thermocouple insulators - Omega Engrg.
Ommi-Coat - nuclear gauges - Nuclear Resch.
Omniband - multi-band radios - Unimetrics
Omni-Cell - emi shielding vent panel - Metex
Omniclosure - chassis kits, card cages, portable cabinets - Techmar
Omnicorder - miniature recorder - Edison, Thomas A. Instr. Div.
Omnidyne - microphone - Shure Bros.
Omniflo - turbine flow transducer - Flow Technology
Omni-G - omni-directional shock indicators - IMPACT-O-GRAPH Div.
Omni-Glow - pilot lights - Ind'l. Devices
Omnigraphic - recorders - Houston Instr.
Omniguard - monitor - Edison, Thomas A. Instr. Div.
Omni-II - deposit control master - Sloan Technology
Omnilogic - ic fast logic system - Lecroy Resch. Sys.
Omnimite (R) - transducers - Bendix
Omnipoint - monitoring & control system - Motorola Instr. & Control
Omni Reader - 2 in 1 light distributor and mark sensor for e.d.p. - Electro Fiberoptics
Omni Sensor - reflective sensor for marks, holes, codes - Electro Fiberoptics
OmniTester - automatic circuit test set - Telesciences
Omnivac - vacuum cleaning equip - Lear Siegler
Omny-Bus - power distribution bus bar - Methode Elctrns.
Omny-Pac - basic design system - Methode Elctrns.
100 Plus - screwdrivers - Stanley Tools
185 - bronze surfacing alloys - Eutectic
On The Ball - aerospace chemical - Merix Chem.
O-Pac - power packs - Opad Elec.
Opco Inks - non-etching marking inks - Organic Prods.
Opco Markers - felt tip markers - Organic Prods.
Operational Filter - multifunction variable filter - Rockland Sys.
'O-pf' - transistors - Motorola Semiconductor Prods.
OPK OPIC - tape preparation unit - Excellon Inds.
Optach - shaft encoder - H H Controls
Optecon, Photosyn, Supercon - optical incremental encoders - Data Technology
Opticator - readout devices - Bowmar Instr.
Opticon C-12 - catalyst - Opticon Chem.
Opticon SFA-23 - optical & GP cement - Opticon Chem.
Opticon UV-57 - optical cement - Opticon Chem.
Optima - electronic enclosures - Optima Enclosures
Optima Enclosures - electronic cabinets & enclosures - Scientific-Atlanta
Opti-Scope - flexible fiber optic borescope - Keystone Micro Scan.
Optisyn - rotary optical encoder - Dynamics Resch.
Opto-Hybrids - hybrid microcircuit subsystem combining photovoltaic sensor, current amplifier, level detector and dtl/ttl output amplifier - Centralab Semiconductor
Optoliner - tv test equipment - Photo Resch.
Optosil - fused quartz - Amersil
Orange Drop - epoxy coated capacitor - Sprague Elec.
Orb-Ion - vacuum pumps - Vacuum Equip. Div.
Orb-Ion - vacuum pumps - Norton
Orbit - cameras - Burke & James
Orcon - pushbutton switches - Switchcraft
Original Bright Gold - cyanide gold plating process - Sel-Rex
Orosene 999 Gold - 24kt acid bright gold - Technic
Orotemp 24 Gold - 24kt neutral gold - Technic
Orthomat Mark II - n/c drafting machines - Universal Drafting Mach.
Orthomode Mixers - microwave rf mixers - Varian
Orthonal - alloy - Magnetics
Orthonull - bridges - General Radio
Orthosene - cleaning solvents - Moore John B.
Orthosil - laminations & cores - Thomas & Skinner
Orthospan Mixers - microwave mixers - Varian
Orthostar - mixer/preamplifiers - Aertech Inds.
Orthotee - hybrid mixers - Microwave Assocs.
Osciducer - pressure-to-frequency converter - Solid State Elctrns.
Oscilloscribe - oscilloscope camera - Shotec
OSM - miniature low vswr rf coaxial connectors - OMNI Spectra
OSSM - sub-miniature low vswr rf coaxial connectors - OMNI Spectra
OTC - tools & hydraulic equip. - Owatonna Tool
Overtec - wearfacing alloys - Eutectic
Oxycon - lead oxide vidicon - General Electrodynamics
Oxy-Hydorogen - welder - Henes Mfg.
Oxylene - cleaning solvents - Moore John B.
Oyltite-Stik - sealant and pipe thread compounds - Lake Chemical
Ozonator - ozone generators - Bycoski, Casmir T.
O-30 - cemented oxide mat'l. and prods. - General Elec.

P

Pacecom - computer cables - Pace Wire & Cable
Pacemaker - heat treat furnace - Lindberg Hevi-Duty
Pacemaker - ac motors - Allis, Louis
Pace Panel Meters - panel meters - A & D Electrical Instrs.
Pacer - ac motors - Allis, Louis
Pacer - film capacitor - Sprague Elec.
Pacer/Pacemaker - ac electric motors - Allis Louis
Pacers - temperature compensated reference diodes -
PacesetterII - catv amplifiers - Ameco
Pacfax - compression modem - International Scanatron Sys.
Packaid - vinyl coating - Seal-Peel
Packmaster - transceiver - Radio Specialty Mfg.
Pactec - security system component - Pacific Technology
Page Alarm - mobile decoder - Reach Elctrns.
Page/All - comm sys - Action Systems
Pagemaster - paging sys - Bogen Div.
Paintstik - paintstik markers - Markal
Pak-Rak - storage rack - test rack or shipping container - Calabro Unitrack
Palco - brazing alloys - Western Gold & Platinum
Paliney - electrical contact alloys - Ney, J.M.
Pallabar - neutral brilliant palladium - Technic
Palladex II - palladium plating process - Sel-Rex
Palomar - accelerometer - Sundstrand Data Control
Paloro - brazing alloys - Western Gold & Platinum
Pamco - amplifies & intercom systems - Paraplegics Mfg.
Panagard - temp. monitor - Scam Instr.
Panalarm - annunciator - Scam Instr.
Panaplex - readout, gas discharge, 9-segment - Burroughs
Panasonic - all prods. in U.S.A. and Can. - Matsushita Comm. Ind'l. Co.,
Pan-A-Trol - control panels - General Elec.
Panavox - speaker system - Wilder Engrg. Prods.
Pancake - overfloor wiring systems - Wiremold
Panduct - plastic wiring duct (p.v.c.) - Panduit
Panelist - panel meter - API Instrs.
Panel Lock - prefabricated house - Lockheed Aircraft Svc.
Panelmate - indicators - Westmoreland Plastics
Panel Mite - standard size thumbwheel switch - Tech Labs.
Paneloc - quick-operating fasteners - Paneloc
Panelspotter - series resistance spot welder - Lenco
Panhandle - carrier equipment - GTE Lenkurt
Pan-L-Clad - plastic-metal laminated panels - Photo Chemical Prods. Cal.
Pan-L-Screw - panel fastener - Aerospace Knob
Pan-L-Screw - screw - Stake Fastener
Pan-Omni - thin film control center - Sloan Technology
Panther - rubber, friction and plastic tapes - Okonite
Panther - grinding wheel - Avco Bay State Abrasives Div.
Pan-Ty - nylon cable ties & clamps - Panduit
Paper Riter - felt tip pen - Markal
Paper Riter - felt tip marker - Lake Chemical
Parabeam - catv receiving antennas - TACO Div.
Parachron - synchronous motor - Paragon Elec.
Paraflector - parabola - Scala Radio
Paraformed - paper tubing - Paramount Inds.
Paraformer - voltage regulators - AMBAC Inds.
Paraformer - ac filter regulator - Wanlass Div.
Paragon - loudspeaker - Lansing, James B. Sound
Parak - ac line conditioner & arrestor - Wanlass Div.
Paralog Plus - antennas, log-periodic - Jerrold Elctrns.
Paraslot - slotted cyl. - Scala Radio
Paraswitcher - inverters-dc to ac dc to dc - Wanlass Div.
Paraswitchers - power supplies - AMBAC Inds.
Paratex - packaging; cushioning; air cleaners & filters - Blocksom
PARAX - voltage regulators - AMBAC Inds.
Parts-Bins - parts-bins, corrugated paper - Equipment Co. of America
Parvan - wax - Humble Oil & Refining
Patch-Ohm - resistor block - Cambridge Thermionic
Patinate - lead plating process - Conversion Chem.
Patrician - deluxe spkr. sys. - Electro-Voice
P&B - precision snap-action switches - Potter & Brumfield
P&B - relays - Potter & Brumfield
PBF - plastic bottle feeder - Aidlin Automation
PCBs - printed circuit board resistors - Milwaukee Resistor
PCB Tainers - pcb retainers - Birtcher
PDP - computers - Digital Equip.
PDQ - quick connect terminals - ETC
P D V M - voltmeter - Dytro
PD-100 - photomask duplicator - IPT
PEAC - photo-electronic auto collimator - Barnes Engrg.
Peaklite - indicator light - Penn Keystone
Peak-N-Notch - active band pass/stop filter - Radiation Devices
Peak Picker - amplifier - Ircon
Pearlite - solid carburizer - Houghton, E.F.
Peat - air tester - Bossert Mfg.
PECO - transformers - Power Elctrns.
Pedaline - foot switches - Line Elec. Div.
Pee Cee Ductor - shielded radial leaded inductor - Nytronics
Peeco - flow actuated electrical switches - Power Engrg. & Equip.
Peeco - bowl feeders - Automation Devices
Pee Dee Ductor - non-shielded inductor microminiature - Nytronics
Peer - hand tools & magnifiers - Hammel, Riglander
Peerless - fans and motors - Porter, H.K.
Pee-Wee - clips - Mueller Elec.
Pee Wee Closure - splicing/encapsulating kit - Communications Tech.
Pee Wee Inductor - shielded inductor microminiature - Nytronics
Pegi - insulating cable cleats - Adalet Mfg.
PeKan - decorative nut - Penn Keystone
Pelaspan Pac - protective packaging foam - Dow Chemical
Pem - self-clinching fasteners - Penn Engrg. & Mfg.
Pem Hex - self-clinching, self-locking fasteners - Penn Engrg. & Mfg.
Pem Sert - self-clinching flush fasteners - Penn Engrg. & Mfg.
Pem Serter - automated press - Penn Engrg. & Mfg.
Penetrant - multi-purpose cleaner - Oakite Prods.
Penfile - burnisher cleaner - Jonard Inds.
Penn-Crimp - fabricated terminals - Teledyne Penn-Union Elec.
Penn-L-Tap - compression tap connector - Teledyne Penn-Union Elec.
Penn-Lug - cast terminal lug - Teledyne Penn-Union Elec.
Penn-Sleeve - aluminum compression sleeves - Teledyne Penn-Union Elec.
Penn-Stem - compression connectors - Teledyne Penn-Union Elec.
Penn-Tap - aluminum parallel groove connectors - Teledyne Penn-Union Elec.
Penn-Wrap - connection insulator - Teledyne Penn-Union Elec.
Penn-Wrapper - connection insulator - Teledyne Penn-Union Elec.
Pen-Ray - spectral light sources - Ultra-Violet Prods.
Pen-Ray - pencil quartz lamps - Black Light Corp. Amer.
Pensco - industrial diamond prods. - Penn Sci. Prods.
Pentax - (photographic equipment) - Honeywell
Perco - coils - Linell Engrg.
Perf-O-Grip - vibration absorbing felt pads - GAF
Peri-Flo - peristaltic pump - Hardman
Periguard - outdoor intrusion detection sys. - Westinghouse Elec.
Perlitex - heat treating salts - Houghton, E.F.
Perliton - heat treating salt - Houghton, E.F.
Permablend - scintillator - AMBAC Inds.
Perma-Blend - chemical - Packard Instrument
Perma Brush - rotating switch - General Devices
Permacad - (battery) - Honeywell
Perm-A-Caps - capacitors - Chicago Condenser
Permafluor - scintillator - AMBAC Inds.
Perma-Fluor - chemical - Packard Instrument
Perma Flush - flush printed circuitry - Ansley Div. ACI
Permafoam - shielded foam transmission line - Columbia Eletrn. Cables
PermaKouple - shielded thermocouple - Thermotronic Devices
Permalex - electrical apparatus - General Elec.
Permaline - cable jacketing material - Columbia Eletrn. Cables
Permaluster - processed wire and strip - Permaluster
Perma Power - electronic svc. accessories - Chamberlain Mfg.
Perma-Resin - resin coating systems - Photo Chemical Prods. Cal.
Permasol - coolant fluid - Houghton, E.F.
Perma-torq - coil forms - Cambridge Thermionic
Permelite - melamine molding material - Fiberite
Permopad - permanent p.c. component spacers - Bivar
Perpetuum-Ebner - turntables - Ortofon Div.
Per-T - recorder, peripherial transport - Borg-Warner Controls
Per-Trolene - cleaning solvents - Moore John B.
Petrosorb - filter housing - Pall Trinity Micro
P-F - plastic fabricated dust bellows - Gagne Assocs.
PF Etchants - etchants for production of printed circuits - Hunt, Philip A. Chemical
Phantom Load - artificial load - States
Phantom Positioner - audio pan-pot - Ultra Audio Prods.
Phantom Power - simplex power supply - Gotham Audio
PHASAC - converters-phase - AMBAC Inds.
Phasac - single to 3-phase converter - Wanlass Div.
Phase/Amp - scr proportional power controllers (ac, dc and zero-crossover) - Halmar Elctrns.
Phasometer - phase sequence indicator - Walters, W.A.
Phazor - phase meters - Ind'l. Test Equip.
Phenolic - plastic laminate - Hermes Plastics
Phenolite - laminated plastics - NVF
Phenoweld - phenolic adhesives for nylon, etc. - Hardman
Phillex - trichlorethylene - Phillips Mfg.
Phillsolv - perchlorethylene - Phillips Mfg.
Phoenician - catv amplifiers - Kaiser CATV
Phoenician XR - catv amplifiers - Kaiser CATV
Pho/Gamma - gamma ray scintillation camera - Nuclear-Chicago
Phonemaster - inductive pickup for hearing aids - Radioear
Phosblack - steel phosphating and blackening process - Mac Dermid
Phosphotex - phosphating processes - Mac Dermid
Phosroc - high temperature wire - Cerro Wire & Cable
Photobell - (photoelectric devices) - Photobell
Photocom - modulator - James Elctrns.
Photo Corder - photo digital recorders - KDI Adtrol
Photofab - small parts - Magnetics
Photofact - tech. service data - Sams, Howard W.
Photofluorometer - photoelectric fluorometer - Coleman Instrs.
Photoforming - chemical milling - Hamilton Watch
Photo-Lux - back illuminated panels - Photo Chemical Prods. Cal.
Photo Mark - proto type instr. panels - Centerline Specialties
Photomod - photocell - lamp module - Clairex Elctrns.
Photon - counting - SSR Instrs.
Photo-Optic - photoelectric controls - Dolan-Jenner Inds.
Photopen - digital cursor positioner - Microwave Div
Photorepeater - automatic sys-electro-mechanical-optical - Mann, David W.
Photostress - photoelastic measurement equipment - Automation Inds.
Photo-Wrinlay - photo-contact markings - Photo Chemical Prods. Cal.
Physio/Sentinel - physiological monitor - Mennen-Greatbatch Elctrns.
Picabond - communications splice - Amp
Pic Boost - tube brighteners - C.B.C. Inds.
Pic Cable Closure - splice closure - Communications Tech.
Piccodiene Resins - dicyclopentadiene resins - Pennsylvania Ind'l. Chem.
Piccolastic Resins - low molecular wt. polystyrenes - Pennsylvania Ind'l. Chem.
Piccolyte Alpha Resins - alpha pinene terpene resins - Pennsylvania Ind'l. Chem.
Piccopale Resins - petroleum hydrocarbon resins - Pennsylvania Ind'l. Chem.
Piccotex Resins - alphamethyl styrene copolymers - Pennsylvania Ind'l. Chem.
Picco 6000 series Resins - aromatic petroleum resins - Pennsylvania Ind'l. Chem.
Pick-A-Back - turbine flow transducer - Flow Technology
Pick-A-Strip - outlet box - Waber Elctrns.
Pico-A - micro-miniature transformer - Pico Elctrns
Pico-B - micro-miniature transformer - Pico Elctrns
Pico-C - micro-miniature transformer - Pico Elctrns
Picoclareed - switching assemblies - Clare, C.P.
Pico-D - micro-miniature transformer - Pico Elctrns
PICOMM - coordinate measuring machine - Potter Instr.
Pico-Pac - power supply - Velonex
Picoreed - switching assemblies - Clare, C.P.
Picotrim - capacitors - Voltronics
Pidg - terminals and splices - Amp
Piezite - ceramic crystal - Endevco
Piggy - wire connectors - Thomas & Betts
Piggy-Back - switches - Switchcraft
Pig-Tailor - production aid machine - Bruno-New York Inds.
Pik-Keeper - keeps pick always handy - Duotone
Pill - drop in pill termination, attenuators, resistors & capacitors - EMC Technology
Pilot B - scintillator - Pilot Chemicals
Pilot F - scintillator - Pilot Chemicals
Pilot M - scintillator - Pilot Chemicals
Pilot Y - scintillator - Pilot Chemicals
Pin Saver - pin straightener, connector - Air-O-Tronics Prods.
Pinserter - pin feeder & inserter - Aidlin Automation
Pintrex - pin feeding machinery - C.E.M.
Pipetite Paste & Stik - sealants & pipe thread compound - Lake Chemical
Pipix - fiber optic crt's - Litton Inds.
Pitran - pressure sensitive transistors - Stow Labs.
Pittman - d-c motors - Pittman
Pixie - position indicator tube - Burroughs
Pixie - force transducer - Endevco
Pixiepot - multi-turn potentiometer - Duncan Elctrns.
Placovar - alloy - Hamilton Watch
Pladd - plated additive printed circuitry - Mac Dermid
Planar Bonding - ribbon cable mfg. - Berk Tek

Planetgear - counters - Haydon Switch & Instr.
Planetor - wood boring bits - Price & Rutzebeck
Plant-Central - production inventory control - Weltronic
Plaqohm - placque type power resistors - Ward Leonard
Plaslilokt - bobbin flange process - Precision Paper Tube
Plasma Chromatograph - instrument chemical analysis - Franklin Gno
Plasmalloy - thermal spray powders & matls. - Plasmadyne
Plasma-Power - d.c. to d.c. converter - Crestronics
Plasmatron - plasma spray systems & accessories - Plasmadyne
Plaspreg - plaster impregnant - Furane Plastics
Plast-A-Flex - type nmc - Plastic Wire & Cable
Plasti-Bond - terminals - Amp
Plastibox - small parts bins - Lewis G. B.
Plasticon Capacitors - capacitor, metal case - Condenser Prods.
Plastiform brand - permanent magnet - 3M
Plasti-Grip - terminals and splices - Amp
Plasti-Grommets - blind snap-in retained nuts - Fastex Div.
Plastilease - mold release agent - Ram Chems.
Plastilokt - method of affixing bobbin & langes - Resinite Corp. Div.
Plasti-Metal - laminated metal foil - Anchor Plastics
Plastinite - one piece nylon strain relief grommets - Fastex Div.
Plasti-Plugs - non-corrosive plastic hole plugs - Fastex Div.
Plasti-Ring Shaft Retainers - "O" rings - Fastex Div.
Plasti-Rivets - one piece, self expanding, blind plastic rivets - Fastex Div.
Plasti-Supports - plastic non-corrosive shelf supports - Fastex Div.
Plasti-Tags - color-coded tag markers - Seton Name Plate
Plasturbo - blower wheels - Mamco
Platanex III - platinum plating process - Sel-Rex
Platanium Anodes - platinum plated titanium anodes - Sel-Rex
Plategage - plating thickness gage - Empire Sci., Ind'l. Elctrn. Gage
Platular - heat exch. surfaces - Janitrol Aero Div.
Plause - liquid hand cleaner - Oakite Prods.
Plazma-Beam - refining equip. - Materials Resch.
Plexiglas - acrylic sheet - Port Plastics
Plike - wire stripping plier - Hunter Tools
Plioform - surface conforming alum. foil - Graphtex
Plotamatic - x/y recorder - Bolt Beranek & Newman
Plot-O-Mag - film cartridge for dp-203 digital plotter - Geo Space
Plug-In Analyzers - spectrum analyzers - Nelson Ross Elctrns.
Plug-in Panel Lite - bi-pin indicator light - GTE Sylvania
Plugmold - multioutlet systems - Wiremold
Plug-N-Probe - probe, test - Air-O-Tronics Prods.
Plug-O-Matic - battery chargers - Fedtro
Plug Stat - temp sw - Control Prods.
Plumbicon - tv camera pickup tube - Amperex Elctrn.
Plus-C - glass & quart piston trimmer - JFD Elctrns./Sub. Riker-Maxson
Plusistor - positive temperature coefficient thermistors - Victory Engrg.
Plus/Modules - etched circuitry in modular form - Ansley Div.•ACI
Plus Seal - fluorocarbon seal - Shamban, W.S.
Plycon - harness systems - Methode Elctrns.
Plymozone - ozone resistant tape - Plymouth Rubber
Plymprene - neoprene splicing compound - Plymouth Rubber
Plyo-Duct - wiring - Methode Elctrns.
PMA Switches - permanent magnet actuated - RDI
PMB - magnetic brake - General-Electro Mechanical
PMC - magnetic clutch - General-Electro Mechanical
PMI - peripheral mode isolators - Western Microwave Labs.
PML - condenser, microphones & headsets - Ercona
Pneu-Therm - pneumatic-temp tranducers - Dynamic Controls
PNR - control cable - Cerro
PNR - control cable - Cerro Wire & Cable
PNRX-90 - control cable - Cerro Wire & Cable
Pocketalk - pocket paging sys. - Executone
Pocket Magnetometers - Annis, R.B.
Pocket-Probepyrometer - heat measuring device - Elctrn. Dev. Labs.
Pogo - miniature lamp - Western Indicator
Pogo Contact - connectors (contacts-spring loaded) - Pylon
Pogo Lamp - t-1 lamps - Aerospace Knob
Poke-Home - crimp contacts - Amphenol Connector Div.
Poke-Home - contacts - Amphenol Ind'l. Div.
Poketpage - am pager - Unimetrics
Pola-H - emi shielding strip - Metex
Polarflex - prot. coating - Western Coating
Polaring - emi shielding gasket - Metex
Polarizing Screwlocks - connector locking device - Continental Connector
Polar Path - gyro magnetic compass sys. - Bendix Aerospace-Elctrns.
Pola-Sheet - emi shielding gasket - Metex
Pola-Stick - emi shielding gasket - Metex
Pola-Strip - emi shielding strip - Metex
Pol-Lar - formed capacitor covers - Precision Paper Tube
Pol-Lar - formed capacitor covers - Resinite Corp. Div.
Poly-C - capacitor - General Elec.
Polychromatrans - pct series audio transformers - Stancor
Polyclean - cleaner - Communications Tech.
Polycycle - motor-generators - General Elec.
Poly-D - disposable ind'l gloves - Edmont-Wilson
Poly-Dap - diallyl phthalate molding compounds - U.S. Polymeric,
Polydip - compound - Communications Tech.
Polydyne - speed drives - General Elec.
Poly Environ Cable Assemblies - coaxial cable, mineral insulated suitable for 1900 F temp. nuclear environment, etc. - Elctrn. Resources Div.
Polyflex - multiple interval reset timer - Eagle-Signal Div.
Poly-Glide - mold board cover - Shamban, W.S.
Polyguide - clad laminates - Burlington Opers. Div.
Polyken - pressure sensitive tape - Kendall
Polykon - step & repeat projection sys - HLC Mfg.
PolyLewton - handling sys. - Lewis G. B.
Poly-Lok - polyethylene compound - Superior Continental
Polymer Sys. - epoxy molding compounds - Adams & Assoc.
Polymet - ag silver/plastic "alloy" - Polymer
Polynoid - linear induction motor - Skinner Polynoid Div.
Poly-Pedance - audio transformers - Stancor
Polypenco - polycarbonate stock shapes - Polymer
Polypenco - tfe-flourocarbon stock shapes - Polymer
Polypenco - acetal shapes and parts - Polymer
Polypenco - acrylic cast rod parts - Polymer
Polypenco - cross-linked polystyrene parts - Polymer
Polypenco - nylon stock shapes - Polymer
Poly-Planar - plastic wafer-thin loudspeakers - Magitran
Polyplanar - flat plastic speaker - Electronic Resch. Assocs.
Poly-Planar - plastic wafer-thin loudspeakers - Era Acoustics
Poly Planar - wafer thin loudspeakers - Era Acoustics
Poly-Plates - nameplates - Brady, W.H.
Polypore - porrous plastic materials - Polymer
Poly-Preg - preimpregnated products - U.S. Polymeric,
Polypulse - cam timer - Eagle-Signal Div.
Poly Q - liquid scintillation sample vials - Beckman Instrs., (AISSD)
Polyseal - motors, insolation, coils, windings - General Elec.
Polyset - epoxy transfer molding compound - Morton Chemical
Polyskop - sweep test sys. - Rohde & Schwarz Sls.
Poly-Sonic - outdoor speakers - Magitran
Poly-Sonic - outdoor speakers - Era Acoustics
Poly-Sonic - outdoor poly-planar speakers - Era Acoustics
Polytard - polyester - Elctrn. Components
Polytel - insulated tubes - British Insulated Callender's Cables,
Polytemp - coated glass cloth - Natvar
Polyteraglas - polyester-coated dacron-glass fabric - Natvar
Poly-TreatCheck Ink - product for checking treatment of polyethylene film. - Independent Ink
Polytwist - flex-lead assembly - Poly-Scientific
Polyvolt - lighting controls - General Elec.
Polyweld - weldable tubelet p.c. - Advanced Circuitry Div.
PonyPrinter - computer keyboard - Di/An Controls
Pop Rivets - blind fasteners - USM
Poral - air cleaners - Carbone
Porcelain Mould Aid - lubricant - Houghton, E.F.
Porcupine - emi shielding gasket - Metex
Porcupine Metalastic - emi shielding gasket - Metex
Porphil - machined tungsten parts - Philips Metalonics
Porta/Flex - vapor degreaser, portable - Gagne Assocs.
Portametric - portable measuring instrument - Electro Sci. Inds.
Portanim - portable nim power supply - Berkeley Nucleonics
Porta-Pack - wire markers - Brady, W.H.
Port-A-Tak - portable tachometer - Strandberg Engrg. Labs.
Porta-Trace - portable light boxes - Gagne Assocs.
Port-O-Reel - cable reel - Ind'l. Elec. Reels
Port Pilot - direction finder - Bludworth Marine Div.
Pos-Aline - insulator - ITT Cannon Electric
Posi-Crimp - terminals & connectors - Teledyne Positive Connector
Positemp - thermistors, sensors - Pennsylvania Elctrns. Technology
Positrol - oil injection sys - Electrovert
Pos-O-Grip - overrunning clutch - Zero-Max
Postlite - indicator light - Drake Mfg.
Pot Hook - panel mounts - Waters Mfg.
Pour-Lay - corrosion proof cement - Sauereisen Cements
Powerbus - laminated bus bars - Flexible Circuits
Power Commander - battery charger - RIL Elctrns.
Powerdial - scr power control - Lutron Elctrns.
Power-Dyne - torque wrench - Raymond Engrg.
Powereel - cable reel - Ind'l. Elec. Reels
Powerformer - dry type transformers - Jefferson Elec.
Powerformer - dri-type transformers - Jefferson Elec.
Powergrip - belts - Uniroyal
Powerhouse - ultraviolet lamp - Black Light Prods.
Powerhouse - speakers, battery chargers, tapes & megaphones, noise filters - Fedtro
Powerline - outlet box - Waber Elctrns.
Power-Line - p.a. amplifier - University Sound
Powerline - power line filters - Filtron
Powerlytic - electrolytic capacitor - Sprague Elec.
Power Mark - circuit breakers - General Elec.
Power Master - amplifier - Shure Bros.
Power-mod - power supplies - Powertec
Power-O-Matic 60 - saturable reactor control - Blue M Engrg.
Power-O-Matic 70 - proportioning control - Blue M Engrg.
Power-Pac - transistors - Motorola Semiconductor Prods.
Power-Plug - phone plugs - Switchcraft
Power Point - plug in cart. - Electro-Voice
Powerstat - variable transformers - Superior Elec.
Power-Style - switchboards - Square D
Powertemp - temperature control systems - Robicon
Powertran - power supply module - Ferrotran Elctrn.
Powertron - a.c. power supplies - Ind'l. Test Equip.
Power/Vac - circuit interrupters - General Elec.
Pow-R-Bridge - semiconductor power assemblies - Westinghouse Elec.
Pow-R-Carriage - multiple cable & hose carrier system - Aero-Motive Mfg.
Pow-R-Matic - cable reels - Aero-Motive Mfg.
Pow-R-Mite - electric cable reels - Aero-Motive Mfg.
Pow-R Pac - converter, rectifier - Price & Rutzebeck
Powr Pak - generators, generator sets - Winpower Mfg
Powr-Rib - resistors - Ohmite Mfg.
Pow-R-Safe - tool testers, electrical - Multi-Amp
Poxy-Gard - epoxy compounds - Sterling
PPC #1 Liquid Conc - cleaner - London Chemical
Precifix A - 7mm connectors - Americon
Precifix AA - 7mm connectors - Americon
Precise-ohm - precision resistors - Precision
Precision - mechanical counter - Dittmore-Freimuth
Precision Pad Connectors - printed circuit draffing aids - Brady, W.H.
Predfet - temperature stable fet - Film Microelectronics
Prefcoat - measurement system - Ohmart
Prefiltron - iron-copper powders - Pfizer-Minerals
Preis-Panto - engraving machines - Preis, H.P. Engraving Mach.
Premax - antennas and accessories - Premax Prods. Div.
Pre-Met - plating solution filter - Sel-Rex
Prentice P-1000 - dataset station - Prentice Elctrns.
Prepkromatic - preparative gas chromatograph - Nester/Faust Mfg.
Prep/Lap - welding machines - Taylor-Winfield
PRES-a-ply - pressure sensitive labels, etc. - Dennison Mfg.
Pres-Bond - gasketing tapes - Press-On Prods.
Presidio - hi fi speaker sys. - University Sound
Pres-Loc - pres to open or close - Deutsch Fastener
Presserts - captive nuts & studs - Precision Metal Prods.
Pressex - epoxy preform powder - Mansol Ceramics
Press-Fit - teflon insulated terminals - Sealectro
Presslite - iluminated pushbutton switches - Marco-Oak
Press-On - compression tap - Teledyne Penn-Union Elec.
Press-to-Test - indicator light - Drake Mfg.
Pressure-Lock - receptacle terminals - General Elec.
Pressweld - work benches tables - Pressteel
Presteel - metal stampings - Worcester Pressed Steel
Prestest - self testing indicating lights - Cutler-Hammer
Prestrace - recording chart paper - Gubelman Chart Div.
Primax - soldering guns - Roche, Paul C.
Prime' - Centralab semiconductor high reliability program -
Primewire - premium alum. welding wire - ARC Prods. Div.
Primus - video & audio tape - Wabash Tape
Princeton - cameras - Burke & James
Print-Punch - price-marking & attaching mach. - Dennison Mfg.
Print Stix - pressure sensitive stock - Topflight
Prismatic - wire color coding inks - Formulabs Ind'l. Inks
Pritchard - photometers - Photo Resch.
Probotrol - liquid contact probe - Autocon Inds.
Prodag - graphite in water - Acheson Colloids
Professional - transistor & diode test equipment - Components
Program Trace - computer software debugging aid - Cybermatics
Project M - hi fi speaker sys. - University Sound
Projectovision - large screen projection monitor - GBC Closed Circuit TV
Proline - voice & music transmission system - Kahn Resch. Labs.
Pro Line - all roberts products - Roberts Div.
Prolog - automatic programming sys - Continental Elctrns. Mfg.
Proloid - radar-augmentation device - Teledyne Micronetics
Prom - programmable read-only memory - Harris Semiconductor
Prong-Lock - rings, retaining - Waldes Kohinoor
Propellon Instant Freeze - coolant liquid freon - Heeger
Propimax - fan - Rotron
Proportionall - heat input control - Hotpack
Protect/Alert - security alarm system - Executone
Protectear - ear defender - Sharpe Audio Div.
Protectocoats - solderability protection - Alpha Metals
Protect-o-Matic - alarms & warning devices - Fedtro
Protectox - precision metal electrolytic - Technic
Protistor - fuses - Carbone
Prototypes by Kotokast - experimental molded parts - Minnesota Rubber
Proxiswitch - (capacitance proximity devices) - Photobell
Proxi-Tron - detector - Automation Devices
Prox-O-Lite - (strobonar lighting equipment) - Honeywell
Proxswitch - proximity switch - Denison, R.B.
P & S - wiring devices - Pass & Seymour
PSB - indicator light - Drake Mfg.
PSC Durock - ceramic insulation - Physical Sciences
PSS - pss filter medium - Pall
PSS - porous stainless steel - Pall Trinity Micro
PTC - instruments - Pacific Transducer
P.T.I - electronic thermometers - Marshall Instrs.
Pulscript - printing demandmeters - General Elec.
Pulse-Dot - soldering equip. - Circon
Pulsignal - A.R.F. Products
Pulsistor - power thermistors - Victory Engrg.
Pulsolite - modulated light relay - Electronic Control
Pultec - filters and amplifiers - Pulse Techniques
Pumpsicle - circulating cooler - Jersey Tech. Conslts.
Punch Line - motors - Jones Motrola
Purebon - carbon-graphite - Pure Carbon
Purecel - air filter - Cambridge Filter
Purse-Lock T.M. - plastic wire ties - Fastex Div.
Push-Lite Switch - pushbutton switches - Switchcraft
Push-Penny - plugs - Thomas & Betts
Push Post - terminal - Grayhill
Push-Push - lever switches - Switchcraft
Putt-Pump - crimping tool - ETC
PV - terminal - Berg Elctrns.
PVB - potentiometric voltmeter bridge - Electro Sci. Inds.
PVC Wiring Duct - wire/cable harness - Electrovert
PVZ - capacitors - General Elec.
Pycopack - metallic sheathed thermocouple wire - Pyco
Pygmy - connector - Bendix
Pyle-Star-Line - elec. conn. environmental - Pyle-National Div., Harvey Hubbell
Pylite - lighting - Pyle-National
Pyragram - technical manuals - Hughes Aircraft
Pyram - glass-ceramic labtop - Corning Glass Works, Lab. Prods. Dept.
Pyram - glass-ceramic panels - Corning Glass Works
Pyramid Pads - opaque stamp pads - Independent Ink
Pyranol - capacitor and dielectric material - General Elec.
Pyranol Transformer - electric transformer - General Elec.
Pyre-M L - varnishes - E.I. DuPont DeNemours
Pyrex - borosilicate glasses - Corning Glass Works
Pyro - pyrometers - Pyrometer Instr.
Pyroceram - glass-ceramics - Corning Glass Works, Lab. Prods. Dept.
Pyroceram - glass-ceramics - Corning Glass Works
Pyrocon - surface temp pyrometer - Alnor Instr.
Pyrofuze - wire, ribbon, braid, foil, granules, discs, tubing - Cohn, Sigmund
Pyroid - pyrolitie graphite - Pfizer-Minerals
Pyromark - refractory coatings - Tempil Div.
Pyromatic - temp control (non-indicating) - Alnor Instr.
PyroMeg - hi megohm resistors - Pyrofilm
Pyromica - high temperature mica - Acim Paper
Pyro-Scanner - temperature monitor - Alnor Instr.
PyroSeal - carbon film resistors - Pyrofilm
Pyrotac - hi-temp alarm - Alnor Instr.
Pyro-Tech 101 and 300 - producing pyrolytic graphite silicon carbide - Ultra Carbon
Pyrotel - infrared pyrometers - Milletron
Pyrotemp - photo electric temperature controller - Electronic Control
Pyrotroller - electronic temp control - Alnor Instr.
Pyrotron - thermometer, thermocouple, smoke recorder - Bailey Meter
PZT - piezoelectric ceramic mat'ls. - Vernitron Piezoelectric Div.
P-5114B - tape recorder/reproducer - Leach

Q

QC - mic connector - Electro-Voice
Q Fasteners T.M. - positive locking quick operating closure - Fastex Div.
Q-G Connector - connectors - Switchcraft
QHT - transformers - General Elec.
Q-Master - dimming system - Century Strand
Q-PEX - alkaline etchant - Conversion Chem.
QPL Master Directory - product directory - Johnson Research
QR - rotary fastener - Tridair Inds.
QR - all products - Quartz Radiation
QRK - turntables - CCA Elctrns.
QSR - electronic capacitors - General Elec.
Q-Tron - solid state optical relay - Quantrol Elctrns.
QT-Synclamps - 1/4 turn synchro clamps - Timber-Top
Quad-drill - four spindle drill - Excellon Inds.
Quad-O-Dyn - hydraulic seal - Minnesota Rubber
Quad-O-Stat - hydraulic seal - Minnesota Rubber
Quadramatic - nc, four spindle drill - Excellon Inds.
Quadraphaser - transformer - States
Quadrastat - controls - Adams Rite Mfg.
Quad-X - hydraulic seal - Minnesota Rubber
Quantichem - analyzer - Milton Roy
Quantum-cx - computer tape - Memorex
QuartzQ - coil dope - Millen, James Mfg.
Quenchweld - welding process - Eutectic
Quenshare - capacitor resistor rc network - Paktron Div.
Qui-Change - Quik-Change - Ind'l. Devices
Quick-Clip - plastic cable holder w/self stick back - Transcon Mfg.
Quick Collect - liquid anesthetic kit - Beckman Instrs., Advanced Tech.
Quick Connect - thermal relay - G-V Controls
Quick-Connect - terminals - Ark-Les Switch
Quick-Fit - watch parts - Hammel, Riglander
Quicklight - solid carburizer - Houghton, E.F.
Quick-Lok - power receptacles - Eagle Elec. Mfg.
Quick 'n Easy - integrated circuit breadboard - Elctrn. Enterprises
Quick-Scan - test/measuring instrs. - Taylor Instr. Process Control Div.
Quick-Set - adhesive - Hammel, Riglander
Quick-Wedge - screwholding screwdrivers - Kedman
Quiet-Trim - potentiometer - Tanger Elctrns.
Quikchips - silicon monolithic ic breadboards - Silicon Gen'l.
Quik-Felt - self-sticking felt - Brady, W.H.
Quik-Labels - pressure-sensitive labels - Brady, W.H.
Quik Loc - quick disconnect connector - Joy Mfg.
Quik Set - dry transfer letterins - Brady, W.H.
Quik-Wrap - cable ties - Holub Inds.
Quindac - supervisory control system - Quindar Elctrns.
Quindalarm - alarm monitoring system - Quindar Elctrns.
Quindette - supervisory control system - Quindar Elctrns.
Quintpoint - screw self tapping - Reliance Div.
Qwik-Tab - quick connect terminals - Accurate Elctrns.
'Qwik Tube' - carbon/resin purifier cartridge - Sethco Mfg.
Qwik-Ty - connector cable strain relief - Glenair
Q200 - metal & plastic degreaser - Barco Chem. Prods.

R

Raco - seals, mechanical, teflon jacketed, spring loaded - Circle Seal
RAD - magnetic disc memory - Xerox Data Sys.
Radac - eddy current equipment - Automation Inds.
Radax - spkr. cone design - Electro-Voice
Radector - survey meter - Victoreen Instr.
Radiflex 300 - x-ray inspection system - Torr Labs.
Radifluor 360 - x-ray inspection system - Torr Labs.
Radiodyne - receivers, towers etc. - Western Coil & Elec.
Radioear - hearing aids & accessories - Radioear
Radio Grades - laminations - Thomas & Skinner
Radiopage - wireless pager - Miles Reproducer
RADIOPHASE - airborne geophysical instrument - Barringer Research,
Radio Shack - batteries - Allied Elctrns.
Radocon - radiation dose indicator - Victoreen Instr.
Radox - radio remote control - Barrett Elctrns.
Railite - locomotive & car insulated wire & cable - Tensolite
Rain/Lite - auto safety device - Ground Data
Rally-Rap - spiral-cut polyethylene, rulan, nylon & teflon - Tco/Rally
Ramaflex - flexible heater - Rama
Ramanel - polyester enamel - Ram Chems.
Ramarod - cartridge heater - Rama
Ramaset - epoxy enamel - Ram Chems.
Ramm 1024 - mos memory system - Standard Logic
Ramm 1024 - mos memory sys - Standard Logic
Ramp-Conical - washer - Shakeproof Div.
RamRod - zener diodes - Motorola Semiconductor Prods.
Ramtec - serro controller - Ametek/Testing Equip. Sys.
Rancho - flexible cord - Teledyne Western Wire & Cable
Ranchoprene - flexible cord - Teledyne Western Wire & Cable
Random Access - intercommunications systems - Altec
Rank Cintel - studio broadcast equipment - Rank Precision Inds.
Rantrac - telemetry tracking system - Rantec Div.
Rapac - positioning control systems - Square D
Rapid - remote radio alarm sys. - Secode Elctrns.
Rapidaptor - quick change tool systems - Kingmann-White
Rapidframe - television synchronization - Tracor
Rapidograph - marking inks - Koh-I-Noor Rapidograph
Rapidprint - time recorder - Rapidprint Time Recorders
Rapid-Pump - crimping tool - ETC
Rapid-Set - pricing & coding mach. - Dennison Mfg.
Rapid-Syn - drivers & pulse sources - Computer Devices of Calif.
Rapid-Wrapit - wire wrap tool - Utica Tool
Rascore Systems - radar scoring systems - Bedford Div.
Rationmic - DVM resistance technique - Data Precision
Ratio-Scope - pyrometer - Milletron
Rauclair - flexible tubing (PVC) - Rehau Plastiks
Rau-Sik - tubing, profiles & parts (silicone) - Rehau Plastiks
Raychron - industrial timers - Raymond Controls
Raycorder - digital magnetic tape recorder - Raymond Engrg.
Rayfoam L and Rayfoam NF - dielectric materials - Raychem
Raylay - light controlled relay - Solid State Elctrns.
Raymaster - all light source equipment - Gates, Geo. W.
Raymer - tuners-amplifiers-receivers for background music & general purpose - Trutone Elctrns.
Raymike - x-ray thickness gage - General Elec.
Raynger - portable infrared thermometer - Raytek
Rayolin NF - jacket compound for cables - Raychem
Rayotube - temperature detector (radiation-type) - Leeds & Northrup
Raytector - radar alarm system - Miller Associates
Ray Weigh - scale - Ohmart
R.C.E. - etchants for production of printed circuits - Hunt, Philip A. Chemical
RCM - all systems - Merchant, Robert C.
Reabond - film insulated magnet wire - REA Magnet Wire
Reactospeed - variable speed motor control - Autocon Inds.
Reactrol - regulator - General Elec.
Readouts - compact binary to decimal conversion storage - WABCO Aerospace Dept.
Real-Al - dacron mat - Acme Chemical & Insulation
Reali-Slim - ball & roller bearings - Keene
Realistic - speakers, mikes, tape (recording), I.C. alarms, monitors, etc. - Allied Elctrns.
Reapak - magnet wire package - REA Magnet Wire
Recharjer - battery chargers - La Marche Mfg.
Recipromatic - counter - General Radio
ReCoCo - part counting sensor - Dynamic Precision Controls
Re-Coil - induction heater accessory - Miller, L.C.
Reconofax - infrared scanning systems - HRB-Singer
Record-Matic - automatic record album selector - Duotone
Redar - hose & rubber materials - Darling, R.E.
Red Cap - wire dereeling equip. - REA Magnet Wire
Reddy - lugs & taps - Thomas & Betts
Red Eye - infra-red pyrometers - Milletron
Red-Hat - controls - Automatic Switch
Red-Hat - solenoid valves - Automatic Switch
Redi-Bar - cultured quartz - Hoffman, P.R. Co. Div.
Red Line - miniature tnc series - ITT Gremar
Red Line - thermal relay - G-V Controls
Redmont - neoprene coated gloves - Edmont-Wilson
Red Top - tantalum capacitor - Sprague Elec.
Red Top - thermo-regulator - H-B Instr.
Redule - power sources - Power Designs
Reedac - switches - Grigsby-Barton
Reedlays - relay - Computer Comps.
Reevelec - heating equipment - Reeve Elctrns.
Reeves - mechanical variable-speed drives - Reliance Elec.
Ref-Cel - reference temperature system - Hy-Cal Engrg.
Reflectar - telephoto lenses - Zoomar
Reflectin-Lead - solder plating bath - Conversion Chem.
Reflective - insulation mat'ls. & parts - Fansteel
Reflectometer - swr indicator - New-Tronics
Reflectoscope - ndt - ultrasonic equipment - Automation Inds.
Refractosyn - angle detector - H H Controls
ReFreTran - oscillator - Dynamic Precision Controls
Regadyne - adjustable speed & frequency drives - Control Prods.
Regal - butterfly valves - Lunkenheimer
Regal - numbering machines - Bostitch
Regal - blower heat guns - Commercial Elec. Heating Devices & Mfg.
Regatran - laboratory power supply - Elctrn. Meas.
Regent - motors and gearmotors - Carter Motor
Registat - in-out register sys. - Executone
Registat Remote - in-out register sys. - Executone
Regulimit - adjustable safety thermostat - Hotpack
Regutron - speed controls - Electric Machinery Mfg.
Rehau - heat-shrinkable tubing (PVC) - Rehau Plastiks
Rejafix - marking machines - Popper & Sons
Rek-O-Kut - tonearms - CCA Elctrns.
Rek-Syn - synthetic rubber - Houghton, E.F.
Reliable Mailers - boxes - Corrugated Paper Prods.
Reli-Acon - connectors - Methode Elctrns.
Reliacor - activated rosin flux - Alpha Metals
Reliafoam - rosin foam fluxes - Alpha Metals
Reliaklips - fuse-reinforcing spring clip - Reliance Div.
Relialab - environmental rooms - Tenney Engrg.
Reli-Alok - test panel & ejector/lock comp. - Methode Elctrns.
Reli-Apac - wiring system - Methode Elctrns.
Reli-Aplug - plug-in header - Methode Elctrns.
Reliaros - activated rosin flux - Alpha Metals
Reliasolv - grade cleaners - Alpha Metals
Relia-tac - contacts - Amphenol Ind'l. Div.
Remark - permanent adhesive - Topflight
Rembrandt - cameras - Burke & James
Renewatron - fuses - Bussmann Mfg.
Renovex - film cleaning solution - Neumade Prods.
Reporter - monitor receiver - Unimetrics
Repronar - (slide copier) - Honeywell
Resicom - residential communications - Altec
Resinbond - adhesives - Resin Formulators
Resin-Flux - London Chemical
Resin Form - formulated resins - Resin Formulators
Resinite - phenolic kraft tubing - Precision Paper Tube
Resist-O-Stat - decade/resistor - General Resistance
Resolon - conductive plastic potentiometer - Duncan Elctrns.
Reson-Ator - resonant reed - Meson Elctrns.
Resonet - synthetic resin finish - Houghton, E.F.
Responsyn - stepping motors - USM
Retro-Flex - photo electric control systems - Electroid
Revalon - tubing - Revere Copper & Brass
Reverse-O-Matic - reverses tape motion under timed sequential control - Roberts Div.
Rever-Synclamps - reverse synchro clamps - Timber-Top
Revmaster - motor speed controls - Opad Elec.
Rev-Trol - reversing scr controls - Electrol
Revtrol - shaft rotation control (RPM) - Electronic Control
Rexo - printers, dryers, backgrounds, etc. - Burke & James
Rexolene - microwave dielectric - Brand-Rex
Rexolite - microwave dielectric - Brand-Rex
Rexolite - dielectric materials - Port Plastics
Rexotherm - metal printed circuit board - Brand-Rex
Rezosol - resin finish - Houghton, E.F.
RF-PlasmaCoil - sputtering systems - Varian Assocs.
Rhino-Hide - cable - Pacific Electricord
Rhoco - modular power supplies-solid state - Rho Engrg.
Rhodex - rhodium plating process - Sel-Rex
RHO-VO - voltage regulators - Rho Engrg.
Ribbon Dope - thread sealant - Permacel
Ribflex - ribbon wound power resistors - Ward Leonard
RIB-LOC - terminals, jacks, plugs, indicator lights - Johnson E. F.
Richardson-Allen - dc substations - American Rectifier
Riele - testing machinery - Ametek/Testing Equip. Sys.
Rigidamp - structural damping material - Barry Controls
Rigid '800' - air dielectric rigid line - Prodelin
Rigimesh - sintered woven wire cloth - Pall Trinity Micro
Rigimesh - filter medium - Pall
RIG (Rosenthal Isolatoren) - resistors & capacitors - United Mineral & Chem.
Rim - instrument module system - Princeton Applied Resch.
Rimlock - diamond blades - Avco Felker
Ring-Gun - assembly tool - Waldes Kohinoor
Ring-Jector - assembly tool - Waldes Kohinoor
Ringmaster - solderless terminal forming & crimping equip. - Connectrol
Ring-Mount - assembly tool - Waldes Kohinoor
Ring-O-Mat - assembly tool - Waldes Kohinoor
Rinsite - rinsing additive - Oakite Prods.
Ripple Round - anodes - Alpha Metals
Riv-O-Seal - self-sealing fasteners - ABSCOA Inds.
R-JAX - phone jacks - Switchcraft
R-L - reverse locking clutches - Formsprag
R.L. Stone - thermal analysis - Tracor
Road Rater - pavement strength tester - Wyle Labs.
Roadrunner - portable dimming system - Decor Elctrns.
Robot - cameras, recorders, lenses, filters, programmer/timer - Heitz, Karl
Robot - x-ray cameras, reader-projector, remote controls digital counter - Heitz, Karl
Robotec - current limit monitor - Power Designs
Robotester - test equip., automatic checkout - Entron
Robot Monitor - water quality data acquistion system - Schneider Instr.
Rocheltex - cyanide copper plating additive - Mac Dermid
Rock-A-Lite - lighted rocker switch - Leecraft Mfg.
Rockbestos - wire and cable - Cerro
Rockette - rocker operated switches - Cutler-Hammer
Rockzone - power cables - Cerro Wire & Cable
Rodan - lamps, pilot lights - Inter-Market
Rodar - controlled expansion alloy - Driver, Wilbur B.
R-Ohm - metal & carbon film resistors - Micro-Ohm
Roll-Aer - air filter - Cambridge Filter
Roll-A-Flex - laboratory furniture - Blickman, S.
Roll-A-Maze - air filter - North American Rockwell
Roll-Flo - air filter - Cambridge Filter
Rollpin - self-locking spring pins - Elastic Stop Nut Div.
Rolocon - rolling contact sliprings - Meridian Laboratory
Rolox - 2-part epoxy compounds - Hardman
Rol-Pak - rings, retaining - Waldes Kohinoor
Roltite - x-ray clips - Upson Tools
Roly-Poly - replacement round polyplanar speakers - Era Acoustics
Roly-Poly - replacement round speakers - Era Acoustics
Roly-Poly - round plastic speaker - Electronic Resch. Assocs.
Roly-Poly - round wafer-thin replacement speakers - Magitran
Rondec SFRR II - micro min. screen machine - Podgor, Joseph E.
Rosco - screwdrivers & hand tools - Rosenberg Bros.
Rosite R, GCD & TA - inorganic cold molded compounds - Rostone
Rosite 2050 - phenolic, mineral filled, cold molded - Rostone
Rosite 2150 - melamine, cold molded, arc quenching - Rostone
Rosite 3250 - glass reinforced polyester, non-tracking - Rostone
Rosite 3450 - glass reinf. polyester, corrosion resistant - Rostone
Ross Fine Line - depth recorders - Ross Labs.
Rota-Crimp - crimping tools - Amp
Rotavac - vacuum seal - Vacuum Inds.
Rotex - label makers and embossing tapes - Avery Prods. Graphics Div.
Roto-Cam - mechanical disc clutches - Formsprag
Rotocon - mercury sliprings - Meridian Laboratory
Rotocon - lo-frequency production vibrator - Ogden Technology Labs.
Rotodome - early warning radar antenna - Dalmo Victor
Rotolite - print machine - Rotolite, Teledyne
Rotomac - eddy current inspection equip. - Magnetic Analysis
Rotopulser - rotary transducer - Allis Louis
Rotopulser - rotary pulse transducer - Dynapar
Rotopulser - rotary transducer - Allis, Louis
Roto Reed - rotary reed switches - Ansley Div. ACI
Rotorseal - rotating seals - Fawick Airflex Div.
Roto-Sembly - assembly sta. - Lewis G. B.
Rotosil - fused silica - Amersil
Rotostat - controls - Adams Rite Mfg.
Roto-Tellite - lighted pushbutton switches - Master Specialties
Roto-Track - chassis slides - Barnes Engrg.
Ro-Tran - power control unit - Inland Motor Corp. of Va.
Roughometer - surface roughness measuring instrument - Marduth Prods.
Roving Rostrum - portable public address - Chamberlain Mfg.
Royal-D - connector - ITT Cannon Electric
Royalitic - electrolytic capacitor - Industrial Condenser
Royal York - phonographs - Major Elctrns.
RP E Z Kleen Air Filter - air filter - Research Prods.
RP Industrial Filter - air filter - Research Prods.
RP Multi-Velocity - air filter - Research Prods.
RPO - comparators - Photo Tech. Prods.
RSO Patch - patch compound & adhesive - Isochem Resins
RS Switch - lever switches - Switchcraft
RT/duroid - reinforced tfe materials - Rogers
RTP 7400 - real-time peripheral device - Computer Prods.
Rubbair - industrial doors - Eckel Inds.
Rubbon - fluxless solder - ARC Prods. Div.
Rubicon - bridges, potentiometers, colorimeters - Penn Airborne Prods.
Rubrglas - silicone rubber - Multi-Flex Seals
Rubrohm - silicone rubber - Multi-Flex Seals
Rubrseels - switch boots - Multi-Flex Seals
Rubylith - masking film, art masters - Ulano Prods.
Rudmose - audiometric testing equipment - Tracor
Rugged seal - panel meters - Simpson Elec.

Rulon - reinforced teflon for bearings and seals - Dixon
Rush - wire strippers - Eraser
Rush - wire stripping equipment - Wybar Elctrns.
Rust - remote control - Rust
Rust-Ban - protective coatings - Humble Oil & Refining
Rustripper - rust removing compound - Oakite Prods.
Rust Veto - rust preventives - Houghton, E.F.
RX - phenolic, dap & epoxy plastic molding compounds - Rogers
Rx Gears - high precision instrument gears - Instru-Lec
Ryertex - laminated phenolic - Ryerson, J.T. & Son

S

Saber - dc static adj. spd drives - Allis, Louis
Saber - dc static adj. spd. drives - Allis Louis
Saber-Champ - blade probe rh measuring device - Hygrodynamics
SABRE III - portable mag. tape recorder/reproducer - Sangamo Elec.
SABRE IV - lab type tape recorder/reproducer - Sangamo Elec.
Sabre Tooth - connectors - Thomas & Betts
Safe-Pak - solid-state controlling device - Gems Div.
Safe-T-Klip - test clip - Ind'l. Devices
Safe-T-Kord - test cord - Ind'l. Devices
Safe-T-Line - rubber tubing - teflon lined - Shamban, W.S.
Safe-T-Ohm - ground detector - Anderson, W.E.
SafeTpower - dry type transformers - Transrex Div.
Safe-T-Tags - valve & switch markers - Seton Name Plate
Safetymaster - refrigeration products - Mueller Brass
Safety-Valve - heat limiters - Bussmann Mfg.
Safe-Vue - smoke candles - Hill, E. Vernon
Safront - welder controllers - Square D
Saf-T-Chlor - degreaser - Colonial Alloys
Saf-T-Cut - grinding wheel - Avco Bay State Abrasives Div.
Safti-Fence - fiberglass fercing - Ryerson, J.T. & Son
Saf T Watchman - saftey alarm - Fuel Watchman Sls. & Svc.
Sa-Fuse - electrical controls - Electric Machinery Mfg.
Sali - insulating bushings - Adalet Mfg.
Sal-Met - flux for soldering any metal to any metal - Heeger
Sandac 200 - programmable communications processor - Sanders Data Sys.
Sanitaire - air purification fixtures - Atlantic Ultraviolet
Sans-a-Fuse - circuit breaker - Workman Elctrn. Prods.
Sanwa - multitesters - Sanwa Corp. America
Saphirite - blast nozzles - Diamonite Prods. Mfg.
Sara-Sonic - ultrasonic cleaners - Sara Scientific
Sara 7 - detergent - Sara Scientific
Satellite II - microfilm readers - Information Handling Svc.
Saturn - cameras - Burke & James
Saturn Pump - t.f.e. pumps - Fluorocarbon
Saturol - solvent detergent - Oakite Prods.
Saucer - fan - Rotron
Sawcat - circular saws - Black & Decker Mfg. Co., The
SBE - cb & amatuer radio equip. - Linear Sys.
Scanafax - recording paper - International Scanatron Sys.
Scanfar - radar - Hughes Aircraft
Scan-Line - minature instrumentation - Fischer & Porter
Scanomark - digital encoders - Leupold & Stevens
S.C.E. - etchants for production of printed circuits - Hunt, Philip A. Chemical
Scenadapter - oscilloscope adapter - Optical Elctrns.
Scenoscope - three dimensional oscilloscope - Optical Elctrns.
Schadow - push button switches - International Electro Exchange
Schenck - balancing machines - Micro Balancing
Schjel-Bond - adhesive tape - Schjeldahl, G.T.
Schjel-Clad - copper clad - Schjeldahl, G.T.
Schmidt - tension meters - Electromatic Equip.
Science Fair - circuitry - Waber Elctrns.
Science Fair - training aid kits - Allied Elctrns.
Scintibloc - scintillator-photomultiplier - Quartz & Silice
Scinti-Kit - scintillation probe - Nuclear Equip. Chem.
Scope-Mate - oseilloscope camera set - Integrated Controls
Scope-Mobile - oscilloscope carts - Tektronix
Scotchflex Brand - flat cable & connectors - 3M Co. Electro Prods. Div.
Scotsman - vapor degreaser - Phillips Mfg.
Screw Launcher - screw holding driver - Vaco Prods.
Scrugun - screwdriver - Black & Decker Mfg. Co., The
SDX - synchro-to-digital converter - Dynalex
Sea-Air - marine radio - Brelonix
Sealcap - glass & quart piston trimmer - JFD Elctrns./Sub. Riker-Maxson
Sealcor - aluminum rod - ARC Prods. Div.
Sealdbin, Sealdtank, Sealdrum - containers, storage - Uniroyal
Sealectroboard - program matrix boards - Sealectro
Sealectrocard - static card readers - Sealectro
Sealectroswitch - program switches - Sealectro
SealeD-Current - water-cooled plating rectifier - Sel-Rex
Sealflex - insulation - Electric Machinery Mfg.
Sealnut - seals - silicon rubber - RFL Inds.
Sealock - corrosion-resistant receptacles - General Elec.
Seal-Off - air valves & cylinders - Taylor-Winfield
Sealok - terminal block - Burndy
Seal-Pac - transformer - General Elec.
Seal-Stop - coating/plating stop off - Seal-Peel
Seal-Therm - tape - General Elec.
SealVac - fittings & connectors - Ultek Div.
Sealvar - thermal expansion alloy - Pfizer-Minerals
Seams-Rite - general purpose gloves - Edmont-Wilson
Sea Probe - diver held sonar, model dhs-2 - Straza Inds.
SeaSpace - oceanography apparatus - Exide Power Sys. Div.
Secura-Tach - plastic ties - Dennison Mfg.
Secura-Tie - plastic ties - Dennison Mfg.
Securatrol - burgler alarm systems - Joliet Control
Seel Bolts - hardware - Multi-Flex Seals
Seel Lock Washers - hardware - Multi-Flex Seals
Seel Nuts - hardware - Multi-Flex Seals
Seel Rivets - hardware - Multi-Flex Seals
Seelskrews - hardware - Multi-Flex Seals
See-Saw - image correlation tubes - ITT Electron Tube
SE Eyelets - eyelets - USM
Seico - portable pyrometers - Syscon Int'l.
Seico - surface temperature sensors - Syscon Int'l.
Seico - thermocouples - Syscon Int'l.
Seiscord - geophysical cable - Mark Prods.
Seismiphone - ground vibration, transducer - Nold, Walter
Seismitron - rockfall detection, apparatus - Nold, Walter
Selectadata - selective tape reader - Friden Div.
Selectakrimp - hand crimping tool - ETC
Select-A-Shelf - vertical handling & storage sys. - Lewis G. B.
Select-A-Spede - dc adj. spd. drives - Allis, Louis
Select-A-Spede - dc adj. spd. drives - Allis Louis
Selectest Super 50 - multimeter - Connolly
Selection - specific ion electrodes - Beckman Instrs., (AISSD)
Selecto Brush - grove selecting with brush - Duotone
Selectric - input/output typewriter - IBM
Selectrochromer - chrome plating console - Selectrons,
Selectrodizer - anodizing console - Selectrons,
Selectrol - automatic checkweigher - Exact Weight Scale
Selectrol - float operated control - Autocon Inds.
Selectrotorch - soldering & welding torch - Selectrons,
Selenibrake - electric brake - American Rectifier
Self-Extruding EX - fasteners - Shakeproof Div.
Self-Loc-k - contact retaining device - Airborn
Self-Scan - readout, gas discharge dot matrix - Burroughs
Selistor - arc suppressor - Eastern Delta
Sellectric TM - wiring devices - Leviton Mfg.
Sel-Rex - Selenium-Silicon controlled ac-dc power rectifier - Sel-Rex
Sel-Rex-Bright Rhodium - rhodium plating process - Sel-Rex
Sel-Rex Rhodium Sulfate - rhodium plating process - Sel-Rex
Sembo - dispenser cathodes - Semicon Assoc.
Semcor - zener diodes/reference elements - Components
Semicon - sensors and tranducers - Columbia Resch. Labs.
Semi-Conductor Mounting Keps - fasteners - Shakeproof Div.
Semitung - tungsten powder - Semicon Assoc.
Sempac - silicon rectifiers - Semtech
Sempac - semi conductor modules - Datapac
Sems - memory sys - Elctrn. Memories
Semstac - semi conductor systems - Datapac
Semstak - militarized core memory stacks - Elctrn. Memories
Sensable - heat flow sensors - Hy-Cal Engrg.
Sensaire - temperature transmitter - Taylor Instr. Process Control Div.
Sensall - liquid & dry level sensing sys. - National Sonics
Sensiflex - sensitive pressure switched and equip. for fluidics - Gagne Assocs.
Sensimatic - accounting machine - Burroughs
Sensimeter - millivolt indicator - Hy-Cal Engrg.
Sensiphones - headphones - Superex Elctrns.
Senso Labels - pressure-sensitive labels - Monarch Marking Sys.
Sensomatic - presses - Weldotron
Sensomatic Labeler - auto label imprinter/applicator - Monarch Marking Sys.
Sens-Pak - solid-state controlling device - Gems Div.
Sentinel - portable alarm, combutbl. gas - Bacharach Instr.
Sentinel - fan - Rotron
Sentinel - indicator-alarm - AMBAC Inds.
Sentox - portable alarm, combutbl. & oxygen - Bacharach Instr.
Sentriline - filter-couplers, rf - Bird Elctrn.
Sentronic - load cells - Thwing-Albert Instr.
Sentry - sample cond. systems for power plant blow down systems & heat exchangers - Sentry Equip.
Sentry - msi/lsi test sys. - Fairchild Sys. Technology
Sentry-Lite - lighting equip. emergency - Hobby & Brown Elctrn.
S E P T - transistor - Sprague Elec.
Sequestor - voice & data scramblers - Ground Data
Serdex - humidity indicator - Bacharach Instr.
Serdex - indicators & recorders - AMBAC Inds.
Sergeant - fan - Rotron
Series-Delay* - 2-terminal (solid-state) delay - Neill Engrg.
Series 4000 - n/c drafting machines - Universal Drafting Mach.
Series 50 - flat cable connector - Kings Elctrns.
Series 500 Signal Conditioners - signal transmitters & conditioners - Telmar
Series 900 - rf signal generators - LogiMetrics
Serva-Bench - vibration isolating work table - Barry Controls
Serva-Levl - vibration control system - Barry Controls
Servex - plastic covered casing - Servwell Prods.
Service-Messenger - dead-end antenna fitting - Preformed Line Prods.
Servipump - pump - AMBAC Inds.
Servitemp - thermistor thermometer - Bacharach Instr.
Servitemp - thermistor thermometers - AMBAC Inds.
Servivac - gauge - AMBAC Inds.
Servivar - elec. tester - Bacharach Instr.
Servivar - electrical tester - AMBAC Inds.
Servo-Pax - miniaturized servo modules - Gap Instr.
Servo Remote - tape decks & switchgear - Merchant, Robert C.
Servospeed - electronic motor control - Electro-Devices
Servwell - mechanical push pull controls - Servwell Prods.
Setchell Carlson - video monitors, uhf/vhf receivers - Audiotronics
Setmark - conduit markers - Seton Name Plate
Setoncals - foil name plates - Seton Name Plate
Seven-O - chemically inert wrapping - Mosinee Paper
70 AND 1 Eyeleting System - eyelets & feed machine - Stimpson
720 - data display system - Sanders Assocs.
720 Series - data comm. display (cluster) - Sanders Data Sys.
760 Flux - submerged arc flux - Lincoln Elec.
780 Flux - submerged arc flux - Lincoln Elec.
79P - video tape - Memorex
SF-Jax - phone jacks - Switchcraft
SFOM - lenses - Heitz, Karl
Shadograph - optical reading scale - Exact Weight Scale
Shakeproof - fasteners - Waldom Elctrns.
Sharples - centrifuges - Pennwalt
Sharpshooter - conical antenna - Trio Mfg.
Shearite - hand tools - Amp
Shield-Arc - arc welders/electrodes - Lincoln Elec.
Shield-Cell Panel - emi shielding vent panel - Metex
Shielded Jax - phone jacks - Switchcraft
Shielding Micropaint - resistive paints - Micro-Circuits
Shield-Kon - grounding sheath connectors - Thomas & Betts
Shield-Stripp - hand tool for stripping braided coax shielding - Gagne Assocs.
Shield Vu - emi shielding window - Metex
Sho-Lite - fluorscent lantern - Shotec
Sho-Pak - switches & receptacles - Eagle Elec. Mfg.
Shopcraft - portable electric powertools - Portable Elec. Tools, Div.
Shopmate - portable electric powertools - Portable Elec. Tools, Div.
Shopmate 24 - portable electric tools - Portable Elec. Tools, Div.
Sho Rate - flowmeter - Brooks Instr. Div.
Shortstop Circuit Breaker - automotive circuit breaker - Underwriters Safety Device
Showcase - push button switches - Switchcraft
Shrink-Fit - tubing - Dielectric Materials
Shrink-Tite - tubing - Dielectric Materials
Shure Squeezer - tool - Thomas & Betts
Shure-Stake - tool - Thomas & Betts
Shur-Kit - potting compounds - Shur-Lok
Shur-Tab - fasteners - Shur-Lok
Shur-Torq - fasteners - Shur-Lok
Side-Aer - air filter - Cambridge Filter
Side-Cap - air filter - Cambridge Filter
Side-Carb - air filter - Cambridge Filter
Side-Flo - air filter - Cambridge Filter
Sidelock - air filter - Cambridge Filter
Si Fe Mag - silicon steel tape - Thomas & Skinner
Sightmaster - refrigeration products - Mueller Brass
Signaflex - controllers & recorders - Bailey Meter
Signaflo - flat transmission line cables - Ansley Elctrns.
Signaguard - alarm systems - Signatron
Signal Guard - transformer - James Elctrns.
Signapoint - powdered metal termination - Ansley Elctrns.
Signature Ratio - machinery analysis sys. - Spectral Dynamics Corp. San Diego
SigNet - signal network cables - Superior Continental
Silastic - rubbers & adhesives - Dow Corning
Sil-Clad - insulation - Electric Machinery Mfg.
Silcobest - electrical insulators - Insulating Shapes
Silcoro 60 - brazing alloys - Western Gold & Platinum
Silencers - electronic display-type calculator - Monroe
Silent-Plug - phone plugs - Switchcraft
Silflex - silicone sleeving - Varflex
Silflo - brazing alloys - ARC Prods. Div.
Sil-Fos - brazing alloy - Handy & Harman
Silgar - tube - Alpha Comps.
Silicane - low cost silicone substitute - Allaco Prods.
Silicane - low cost silicone substitute - Packaged Resins
Silicohn - resistors - Sage Elctrns.
Silicon Chisso - silison products - Chisso
Siliconel - dc high current power supply - NuTek Industries
Silicontrol - scr gate drives - Vectrol
Silicotrig - scr trigger - Bergen Labs.
Silohm - resistors, varistors - Carbone
Silox - vapor phase oxidation system - Applied Materials Tech.
Silpaint - conductive coating - Fansteel
Silpowder - silver powder - Handy & Harman
Silver Beauty - chargers - Triple-A Specialty
Silvercap - capacitor - Del Elctrns.
Silvercote - beryllium copper - Little Falls Alloys
Silver Crown Sys - navigation/communication eqpt. - King Radio
Silverex - silver plating process - Sel-Rex
Silverfilm - capacitor - Industrial Condenser
Silver-Grip - special set screws - PIC Design
Silverline - synchros - Clifton Div.
Silver Micropaint - conductive paints - Micro-Circuits
Silver-Shield - silver and nickel plated copper - International Wire Prods.
Silverslick - metallic tubing - Republic Steel
Silver-Sted - silver plated copper ribbon - Steel Heddle Mfg.
Silvertapll - directional tap - Ameco
Silvrex - silver plating process - Sel-Rex
Similux - plastic products - Sillcocks-Miller
Simplex - Opto-Metric Tools
Simulprinter - low freq analyzer - Listening
Sincos - static industrial control switches - Farmer Elec. Prods.
Sineferro - transformer - North Elec.
Sine-O-Matic - vibration testing sys. - Ling Elctrns.
Singalarm - alarm - Autocon Inds.
Sintabrite - tumbling shapes - Dixon Sintaloy
Sintabur - tumbling shapes - Dixon Sintaloy
Sintahone - tumbling shapes - Dixon Sintaloy
Sintaloy - sintered parts - Dixon Sintaloy
Sirometer - tachometer, vibrating reed - Dri-Clave
Six/Ten - electron beam system - Sloan Technology
6000 - display data recorder - Sanders Assocs.
6000 Series - key-to tape device - Sanders Data Sys.
620 - stand alone display system - Sanders Assocs.
620 Series - data comm. display (stand-alone) - Sanders Data Sys.
680 - AC-DC electrode - Eutectic
Skinny Marie - outlet box - Waber Elctrns.
Skinny Milton - outlet box - Waber Elctrns.
Skinsulated - circuitry - Waber Elctrns.
Skipper - fan - Rotron
Skitrack - plastic brush ski surface - Felton, S.A. & Son
Sky-Tie - bus drop cable clamps - Adalet Mfg.
Sleeveline - teflon sleeve plug valve - Duriron
Sleev-Scru - fastener-insulated - Pylon
Slenderet - telephone sets - Stromberg Carlson
Slendyne - microphone - Shure Bros.
Slic-Tite with Teflon - 4 thread sealants: paste, stik, tape, cord - Lake Chemical
Slic-Tite with Teflon - 4 thread sealants (stik, paste, tape, packing) - Markal
Slidelite - lighted switch - Leecraft Mfg.
Slide N' Switch - selector switch - Sealectro
Slide-Trol - linear motion potentiometer - Stackpole Comps.
Slim-Caps - capacitors, fixed, ceramic - Republic Elctrns.
Slimex - slimicides - Houghton, E.F.
Slim Jim - magnetic tape head - Michigan Magnetics
Slim Jr. - miniature soldering iron - Hexacon Elec.
Slim-Line - connectors - Switchcraft
Slimline - ion-selective electrodes - Coleman Instrs.
Slimpac - high voltage silicon rectifiers - Semtech
Slim-Slide - chassis slides - Ingersoll Prods.
Slim Sr. - miniature soldering iron - Hexacon Elec.
Slim-Track - chassis slides - Barnes Engrg.
Slipknot - tapes, compounds - Plymouth Rubber
Slip Lock - one-piece terminal - U.S. Terminals
Slip-Sync - automatic synchronizer - Chadwick-Helmuth

Slo-Lag - plug and cartridge fuses - Eagle Elec. Mfg.
Slo-Syn - synchr/step motors, n/c controls, indexers, translaters - Superior Elec.
Slow-Switch* - cushioned-starting device (solid-state) - Neill Engrg.
Slyver-Clad - batteries - C & D Batteries
SL850 - attachment fasteners - Shur-Lok
SME - selective metal etch process - Motorola Semiconductor Prods.
Smitty - folding hex wrench set - Hunter Tools
SMK - all products - Showa Musen Kogyo Co.,
Smoke Watchman - electronic smoke control - Fuel Watchman Sls. & Svc.
Smoothie - wall plates - Circle "F" Industries
Smooth-On - cements - Smooth-On
Smudge-Bans - drawing protectors - Devonics
Snail - connectors - Pylon
Snap-A-Part - break apart ceramic substrates - Cermetron
Snap-E-Lock - mil circular connector - Viking Inds.
Snapit - electro-mechanical specialties - Cable Elec. Prods.
Snaplite - indicator light - Leecraft Mfg.
Snap-Lock - mil circular connector - Viking Inds.
Snap-Lock - limit switches - National Acme
Snap-Out - aluminum tower - Up-Right Scaffolds
Snap-Pak - rings, retaining - Waldes Kohinoor
Snap-Track - circuit & relay mounting track - RDI
Snaptrol - snap together potentiometer - CTS
Snap-Wrap - modular plate assembly - Amphenol Ind'l. Div.
S/N-Fatigue Life Gage - fatigue meas. device - Micro-Meas. Div.
Sniffer - detector, gas, marine & industrial - Bacharach Instr.
Sniffer - portable gas analyzer - AMBAC Inds.
Snorkel - vinyl coated flexible gloves - Edmont-Wilson
Socks - connectors - Thomas & Betts
Sod - transistors - Solitron Devices
Softex - softening compounds - Houghton, E.F.
Softweld - nickel electrode for cast iron - Lincoln Elec.
Softy - work mats - Clauss Cutlery
So-Hot - heater - Therm-O-Lab
Solar - enlargers, copy stands, voltage regulators, cameras, etc. - Burke & James
Solarbeam - infrared heater fixtures - Luminator Div.
Solatron - regulator - Sola Elec. Div.
Solcut - soluble cutting oil - Houghton, E.F.
Soldapullt - desoldering tools - Edsyn
Soldavac - desoldering tools - Edsyn
Solderette - wavesolder unit - Electrovert
Solder Flow Limiter - soldering aid - Metex
Solderforms - solder preforms - Kester Solder
Solder Master - elec. soldering irons - Hexacon Elec.
Solderpaint - solder - Kester Solder
Solder Sniffer - desoldering/soldering iron - Thermal Ind'l. Prod.
SoLiCo - general - Sorenson Lighted Controls
Solid-D - polyethylene dielectric - Superior Continental
Solid State - dry reed hybrid modules - Struthers-Dunn
Solistrand - terminals and splices - Amp
Solithane Liquid Urethane Resins - liquid polymen - Thiokol Chemical Div.
Solitrode - glass passivated rectifiers - Solitron Devices
Solofast - quick-operating fasteners - Paneloc
Solo-Phone - headphone amplifier - Shure Bros.
Solu Bridge - solution conductivity instrument - Beckman Instrs.
Solu Chek - electrical conductivity meters - Beckman Instrs.
Sol-U-Label - permanent label - Topflight
Solu Meter - liquid measuring instrs. - Beckman Instrs.
Sol-U-Salt - plating sales - Sel-Rex
Solvar - polyurethane insulated magnet wire - REA Magnet Wire
Sol-Vex - solvent resistant gloves - Edmont-Wilson
Solvit - solvent resistant gloves - Edmont-Wilson
Somco - projection lenses - Infrared Inds.
Sonac - ultrasonic controls - Delavan Mfg
Sondol - sonic echo ranger - Listening
Sonicar - automatic braking device - AMBAC Inds.
Sonite - cement - Smooth-On
Sonitron - ultrasonic equipment - Advanced Patent Technology
Sonizon - ultrasonic test eqpt. - Magnaflux
Sonodur - hardness tester - Branson Instruments
Sonodyne - microphone - Shure Bros.
Sonofax - ultrasonic systems - Automation Inds.
Sonoflux - magnetic particle inspection - Ann Arbor Div.
Sonoflux - ndt - magnetic particle equipment - Automation Inds.
Sonogen - cleaners & degreasers - Branson Instruments
Sonophase - speaker - Electro-Voice
Sonoray - flaw/thickness tester - Branson Instruments
Sonosolder - soldering equipment - Sonobond
Sonotite - piezoelectric ceramic - Linden Labs.
Sonoweld - welding equipment - Sonobond
Son-Tector - ultrasonic detector - Techsonics
Sorb-AC - non-evaporable cartridge pump - Vacuum Equip. Div.
Sound Control Center - mixers, adapters, audio accessories - Switchcraft
Sound Director - sound columns - Argos Prods.
Sound Spot - microphone - Electro-Voice
Sound-Trek - voice speaker - American Geloso Elctrns.
Sounvistor - noise diodes - Solitron Devices
Southland - batteries - General Battery
Spacistor - sub-miniature resistors - General Resistance
Spade-Lok - terminal - Amp
Sparkcaps - capacitor-spark gap combination - Radio Materials
Spartan - fan - Rotron
Spasaver - ganged leaf switch - Chicago Switch
Spauldite - high pressure laminates - Spaulding Fibre
Speaker of the House - home intercom sys. - Executone
Specialaire - dust free cabinet - Torit
Speco - electronic components - Components Specialties
Spec Stat - temp sw - Control Prods.
Spectaculite - theatrical lighting control - Ultra Audio Prods.
Spectra - spectro photometers - Photo Resch.
Spectra-Flex, Spectra-Temp, Spectra-Twist, VLC - flat ribbon cables - Spectra-Strip
Spectra-Ink - marking ink - Spectra-Strip
Spectramax - solid-state transmission sys. - Entron
SpectraScan 750 - residual gas analyzer - Granville-Phillips
Spectrazoom - multichannel analyzer - AMBAC Inds.
Spectra-12 - solid-state transmission sys. - Entron
Spectrochrom - chromatographic analyzer - Beckman Instrs., (AISSD)
Spectrocolorimeter - spectrophotometer-colorimeter - Beckman Instrs., (AISSD)
Spectroline - ultra violet equipment, etc - Black Light Eastern
Spectrosil - synthetic fused quartz - Thermal Amer. Fused Quartz
Spectro Sys. - data sys. for laboratory automation - Varian Data Machines
Spectro-Tech - intermediate purity of graphite - Ultra Carbon
Spectrum - diamond lapping compounds - Penn Sci. Prods.
Spectrum Line - complete line of medium priced equipment - Narco Avionics
Spectrum 1 - LSI/mos tester - Xintel
Speculag - silver plating bath - Conversion Chem.
Speech Director - portable lectern p.a. system - Argos Prods.
Speechmaker - digital to voice converter - Cognitronics
Speed-Air-Bonds - insulating varnishes - Sterling
Speed Clamp - fasteners - Tinnerman Div.
Speed Clinch - fasteners - Tinnerman Div.
Speed Clip - fasteners - Tinnerman Div.
Speedcomputer - camera shutter control - Desman Elctrns.
Speedex - tools - GC Elctrns.
Speedflex - stepper motor speed control - T & T Controls
Speed Grip - fasteners - Tinnerman Div.
Speedial - motor speed control - Lutron Elctrns.
Speedivac - all - Edwards High Vacuum
Speedmaster - color analyzer & densitometers - Elctrn. Sys. Engrg.
Speedmatic - automated color darkroom sys. - Elctrn. Sys. Engrg.
Speed Nut - fasteners - Tinnerman Div.
Speedomax - elctrn. indicators, recorders, controllers - Leeds & Northrup
Speedpunch - punched card equipment - Data Products
Speedrace - hf remote controlled radio - Racal Communications
Speedreader - punched card equipment - Data Products
Speed Serts - inserts & studs - Tridair Inds.
Speer Resistors - carbon composition resistors - Airco Speer Elctrns
Spher-O-Dyne - microphone - Shure Bros.
Sphincter - sockets - Pylon
Spin-A-Filter - filters - AMBAC Inds.
Spin-Pin - production aid machine - Bruno-New York Inds.
Spiradel - distributed constant delay line - Allen Avionics
Spirafil II - semi-rigid cable - Phelps Dodge Comm.
Spirakore - transformer - General Elec.
Spiral - blower - Rotron
Spiralex - stock spiral bevel gearing - Perkins Machine & Gear
Spiralweave - cable - Okonite
Spiral Wrap - cable wrapping material - Icore Electro-Plastics
Spiral Wrap - spiral cut tubing - Icore
Spirap - wire and cable binding - Amp
Spir'ator - constant force spiral spring - Hunter Spring
Spiroband - wire/cable harness - Electrovert
Spir-O-Foam - foam dielectric cable - Prodelin
Spir-O-Guide - elliptical waveguide - Prodelin
Spir-O-Line - air dielectric cable - Prodelin
Spir-O-Lok - connectors - Prodelin
Spirol Pins - spring pins - C.E.M.
Split - ball bearings - MPB
Split Sector - spectrometer tube - Veeco Instrs.
Spoolarc - spooled wire - ARC Prods. Div.
Sportsliter - lighting - Pyle-National
Sportsman - lanterns & flashlights - Ray-O-Vac
Sportsman - depth finders - Ross Labs.
Spotcheck - dye penetrant test - Magnaflux
Spot Check - magnetic tape head - Michigan Magnetics
Spot Check - surface temperature thermometers - Pacific Transducer
Spot-Lite - fluorescent tape & film - Canrad Precision Inds.
Spot-Lite - luminous paint, film, tape - Canrad Precision Inds.
Spotlite - indicating light - Line Elec. Div.
Spot-Lok - nylok spot-lok socket screws - Allen Mfg.
Spring-Flex - retractable duct - Flexaust
Spring-O-Matic - cable reel - Ind'l. Elec. Reels
Springter - sockets - Pylon
Springtite - screw & helical washer assy - Reliance Div.
Sputtometer - monitor - Materials Resch.
SQ-LINE - thick-strip transmission line technique - Kevlin Mfg.
Squadcal - hf manpack radio - Racal Communications
Square-Duct - wireways - Square D
Square-Kut - wire & ribbon cutter - Henes Mfg.
Squaristor - square resistors - General Resistance
Squirt - semi-automatic wire feeders - Lincoln Elec.
Squirtmobile - self propelled trackless & tractor - Lincoln Elec.
S-R-4 - strain gages - BLH Elctrns.
SSB Analyzers - spectrum analyzers - Nelson Ross Elctrns.
SS Super Selective - telephone intercom sys. - Fanon Elctrns.
SSU - semiconductor storage unit - Advanced Memory Systems
Stab - Coat - insulating coating - American Comps.
Stabelex - capacitor - Industrial Condenser
Stabilene - stable base film - Keuffel & Esser
Stabilflo - control valves - Foxboro
Stabil-Glow - furnaces - Blue M Engrg.
Stabiline - automatic voltage regulators - Superior Elec.
Stabilite - resistors - Stackpole Comps.
Stabilite - laser - Spectra-Physics
Stabil-Therm - ovens - Blue M Engrg.
Stable-Arc - welding cable - Lincoln Elec.
Stable-K - capacitors, fixed, ceramic - Republic Elctrns.
Stablohm - resistance wire - California Fine Wire
Sta-Cap - ceramic dielectric & capacitors - American Lava
Stacer - self-extending spiral tube - Hunter Spring
Sta-cise - diode test process - Motorola Semiconductor Prods.
Stack-Lite - lamp displays - Pinlites
Stack-n-Nest - containers - Lewis G. B.
Stacpac - high voltage high current silicon rectifier assembly - Semtech
Sta-Fast - fasteners - Shur-Lok
Stahlastic - control boxes & cable tray - Stahlin Bros.
Staintin - solder/flux paste - Eutectic
Staintrode - stainless steel electrodes - Eutectic
Stainweld - stainless steel electrode - Lincoln Elec.
Stairway-Type - tower sections - Up-Right Scaffolds
Sta-Kon - terminals, tools - Thomas & Betts
Sta-Line - bag paper - Mosinee Paper
Sta-Lok - bearing nuts and lockwashers - Shur-Lok
Stalon - solid state oscillator - Avantek
Stancote - insulated wire - Standard Wire & Cable
Standard - solder - New York Solder
Standard Arrow - direction finders - Bludworth Marine Div.
Standard Binnacle - direction finder - Bludworth Marine Div.
Standco - tachometers, frequency meters, time meters - Sticht, Herman H.
Stanflex - cable & cord - Standard Wire & Cable —
Stangard - fixed & variable capacitors - JFD Elctrns./Sub. Riker-Maxson
Stangard - temperature & heater controllers - American Standard
Stanscrew - fasteners - Standard Screw
Stantrol - temperature & heater controllers - American Standard
Sta-Put - pushback wire - Consolidated Wire & Assoc. Corps.
Sta-Put - lubricants - Houghton, E.F.
Star - sequental talking audio response sys. - Cognitronics
Star - transistors - Motorola Semiconductor Prods.
Starline - amplifiers, distribution - Jerrold Elctrns.
Sta-Straps - nylon cable ties & clamps - Panduit
Stat-I-Chart - magnetic panels - Rol-a-chart Div.
Staticmaster - static eliminators - Nuclear Prods.
Static Mixer - adhesives in-line, no moving parts - Kenics
Statos - a prod. line of electrostatic recorders - Varian Data Machines
Stat-o-Speed - inverters - Networks Elctrn.
Statos Sys. - plotting sys. - Varian Data Machines
Stat-Tran - pulse transformer - Pulse Engrg.
Status Seeker - logic test sets - Dataprobe
Sta-Vo-Trol - voltage regulator - General Elec.
STC - silicon transistor converter - Warren Communications
STD - general purpose gloves - Edmont-Wilson
Sted-Coax - flat braiding ribbon - Steel Heddle Mfg.
Stedivolt - a.c. line voltage regulator - Kelk, George
Sted-Tab - narrow strip wire - Steel Heddle Mfg.
Steelgard - corrosion preventative - Miller, Harry
Steelon - nylon covered stainless steel wire - Berkley
Steeltectic - AC-DC electrode - Eutectic
Stehedco - general company trademark - Steel Heddle Mfg.
Stellite - metal-cutting tools and castings - Cabot
Stenafax - electronic stencils - Fitchburg Coated Products
Stenotape - dictate/transcribe machine (tape) - American Geloso Elctrns.
Step - sequential television equipment programmer - Chrono-log
Step - thermoelectric power - Sanders Nuclear
Stepcon Controller - stepping motor controller - Automation Dev.
Stepcon Motor - stepping motor - Automation Dev.
Step-Servo - stepping motors - Bergen Labs.
Stepservo Driver - stepping motor driver - Summit Engrg.
Stereo-Magic - auto stereo - Waber Elctrns.
Stereon - spkr. sys. - Electro-Voice
Stereoscan - 3 dimensional display console - Hughes Aircraft
StereoStar/ZOOM - microscope (stereoscopic) - American Optical
Stereotone - diamond styli - Aldshir Mfg.
Sterilaire - germicidal ultraviolet lamps - Black Light Corp. Amer.
Sterile Conditioner - atmosphere sterilizer - American Ultraviolet
Sterline - clean room tables - Edcraft Inds.
Sterling - radios, antennas, converters - Tenatronics,
STI - taps - Bendix
Sticky Fingers - self-adhesive rf1/em1 shielding - Instrument Specialties
Sticky Mat - special cleanroom shoe sole cleaner - Controlled Environment Equip.
Sticpac - silicon rectifier stick for x-ray generators - Semtech
Stiki-Bak - coated products - Acme Chemical & Insulation
Stik Klip - adhesive backed fastening device - Daburn Elctrns. & Cable
Stikon - temperature sensor - RDF
Stil-Klip - mechanical fasteners - Eckel Inds.
St. James - screwdrivers - Rosenberg Bros.
Stockistors - hi rel power resistors - Shallcross
Stokes - vacuum chambers, gauges, pumps; encapsulating, impregnating and plastic molding machines - Pennwalt
Stolec - thumbwheel switches - Inter-Market
Stored-Arc - welder - Nelson Stud Welding
Store/33 - core memory system - Data Prods.
Strainrite - ceramic products - Star Porcelain
Strap-It - reinforced tape - Permacel
Strapon - temperature sensor - RDF
Strapping - wire/cable harness - Electrovert
Strate-Breaks - prescored substrates - Coors Porcelain
Stratoclad - glass reinforced laminates - Spaulding Fibre
Strato-Therm - splice and terminal - Amp
Streamline - copper tube & solder type fittings - Mueller Brass
Stresscoat - stress analysis coating - Magnaflux
Stresstape - pre-stressed tape packs - Echo Science
String-A-Lite - portable lightingassemblies - Joy Mfg.
String Bean - outlet box - Waber Elctrns.
Stripall - thermal wire stripper - Teledyne Kinetics
Stripe-Omatic - wire marking machines - Geartronics
Stripmaster - wire stripper - Ideal Industries
Strip Pack - terminal boards - Elgin Elctrns.
Striptrol - self assemble control kits - CTS
Strobex - strobe light - Chadwick-Helmuth
Strobolux - stroboscopic light source - General Radio
Strobonar - (electronic flash equipment) - Honeywell
Stroboslave - stroboscopic light source - General Radio
Strobotac - electronic stroboscope - General Radio
Strobrite - high intensity stroboscope - U.S. Scientific Instrs.
Strongset - all purpose solder - ARC Prods. Div.
Structoform - polyester sheet molding compound - Fiberite
Studio Mixmaster - mixers, adapters, audio accessories - Switchcraft
Studio Sound Control Center - mixers, adapters, audio accessories - Switchcraft
Stuntronic - terminals - Teletype
Stur-D-Dial Cord - dial cord - Gudebrod Bros. Silk
Stur-D-Lace - lacing tape - Gudebrod Bros. Silk
Sturges - storage batteries - Electronic Batteries
Stycast - casting resins - Emerson & Cuming
Stylist - panel meter - API Instrs.
Styracon - film capacitor - Sprague Elec.
Styroflex - biaxially oriented polystyrene film - Natvar

How to use eem

to find manufacturers of a specific product

GREEN SECTION

PRODUCT INDEX & DIRECTORY

Absorbers, Microwave
Carborundum Co., Niagara Falls, N.Y.p 2100
Waveline, Inc., W. Caldwell, N.J.
Astrolab Inc., Linden, N.J.
Basic Ceramics Inc., Hawthorne, N.J.
Blocksom & Co., Michigan City, Ind.
Coax Devices Inc., Chelsea, Mass.
Custom Components, Inc., Caldwell, N.J.
Custom Materials, Inc., Chelmsford, Mass.
Emerson & Cuming, Inc., Canton, Mass.
Goodyear Aerospace Corp., Akron, Ohio
Lieco, Inc., Lindenhurst, N.Y.
Magnetic Core Corp., Newburgh, N.Y.

Accelerometers—See Vol 2

Acoustic Materials—See Materials, Acoustic—Vol 3

Adapters, Waveguide
Hewlett-Packard, Palo Alto ... p 1071

Dittmore-Freimuth Corp., Milwaukee, Wisc.
Elctrn. Specialty, Thomaston, Conn.
Guide Inds., Inc., Sun Valley, Calif.
Hughes Aircraft Co. Culver City, Cal.
Kevlin Mfg. Co., Woburn, Mass.
Maury Microwave Corp., Cucamonga, Calif.

Alarms & Alarm Systems—See Vol 2

Alligator Clips—See Clips, Alligator—Vol 3

Alloys, Brazing—See Vol 3

Amplifiers, Klystron
Cober Elctrns., Inc., Stamford, Conn...p 863
Microwave Cavity Labs., La Grange, Ill.
Nippon Electric Co., Ltd., Tokyo, Japan
RCA Elctrn. ... N.J....p 776

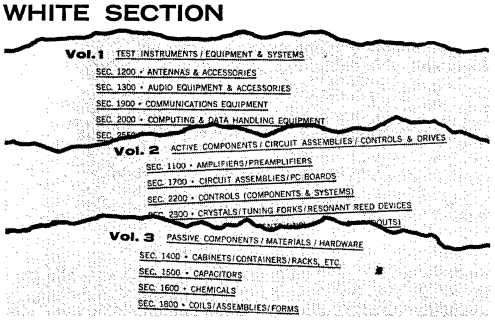
Each of the three volumes of **eem** contains a Product Index and Directory, the Green Section. This Index is a complete alphabetical listing of products. If the product you are looking for appears in the particular volume you are consulting, the green pages will provide a complete list of manufacturers who make that product. If the product is included in another volume of **eem**, the Index will provide a cross reference, directing you to the correct volume.

Boldface listings under product headings indicate that the listed manufacturer has products cataloged in **eem. Boldface** listings with page numbers indicate that this manufacturer's catalog pages include detailed data on the product indicated in the product heading.

Similar products are grouped together. For example, the many kinds of meters are listed in this manner: "Meters, Ampere," "Meters, Capacitance," "Meters, Flux" etc. To help you locate the prime product heading, there are hundreds of cross references, e.g. "Voltmeters — See Meters, Volt."

to find manufacturers' catalog information

WHITE SECTION


Vol. 1 TEST INSTRUMENTS / EQUIPMENT & SYSTEMS
SEC. 1200 • ANTENNAS & ACCESSORIES
SEC. 1300 • AUDIO EQUIPMENT & ACCESSORIES
SEC. 1900 • COMMUNICATIONS EQUIPMENT
SEC. 2000 • COMPUTING & DATA HANDLING EQUIPMENT

Vol. 2 ACTIVE COMPONENTS / CIRCUIT ASSEMBLIES / CONTROLS & DRIVES
SEC. 1100 • AMPLIFIERS / PREAMPLIFIERS
SEC. 1700 • CIRCUIT ASSEMBLIES / PC BOARDS
SEC. 2200 • CONTROLS (COMPONENTS & SYSTEMS)
SEC. 2300 • CRYSTALS / TUNING FORKS / RESONANT REED DEVICES

Vol. 3 PASSIVE COMPONENTS / MATERIALS / HARDWARE
SEC. 1400 • CABINETS / CONTAINERS / RACKS, ETC.
SEC. 1500 • CAPACITORS
SEC. 1600 • CHEMICALS
SEC. 1800 • COILS / ASSEMBLIES / FORMS

Catalog pages in **eem** are divided into three volumes based on very broad product groupings. These are:

Volume 1 — Test Instruments / Equipment and Systems

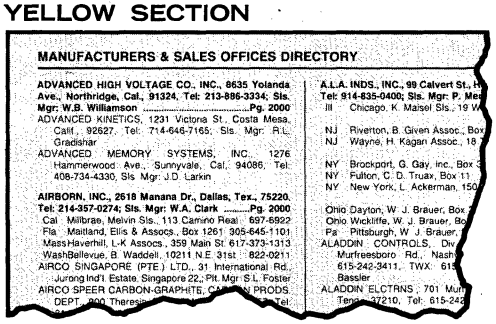
Volume 2 — Active Components / Circuit Assemblies / Controls and Drives

Volume 3 — Passive Components / Materials / Hardware

These volumes are further divided into 55 **eem** Product Sections which are assigned individually to the most appropriate volume. Within each of the 55 product sections manufacturers are arranged alphabetically, wherever possible. A complete index of all manufacturers' catalog pages is included in every volume. To locate the catalog pages of a specific manufacturer, refer to this index at the beginning of the white section in any of the three volumes. This index will provide the page numbers you require. In Volume 1, the index begins on page 302, in Volume 2 on page 1274 and in Volume 3, page 2310.

to find manufacturers' addresses, phones and sales offices

YELLOW SECTION


MANUFACTURERS & SALES OFFICES DIRECTORY

ADVANCED HIGH VOLTAGE CO., INC., 8635 Yolanda Ave., Northridge, Cal., 91324, Tel: 213-886-3334; Sls. Mgr: W.B. Williamson .....Pg. 2000
ADVANCED KINETICS, 1231 Victoria St., Costa Mesa, Calif., 92627, Tel: 714-646-7165; Sls. Mgr: R.L. Gradishar
ADVANCED MEMORY SYSTEMS, INC., 1276 Hammerwood Ave., Sunnyvale, Cal., 94086, Tel: 408-734-4330, Sls Mgr: J.D. Larkin

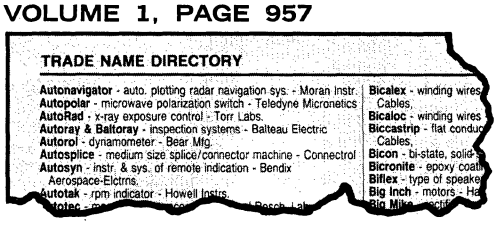
AIRBORN, INC., 2618 Manana Dr., Dallas, Tex., 75220, Tel: 214-357-0274; Sls. Mgr: W.A. Clark .....Pg. 2000
Cal.: Millbrae, Melvin Sls., 113 Camino Real ... 697-5902
Fla.: Maitland, Ellis & Assocs., Box 1261 305-645-1101
Mass: Haverhill, L-K Assocs., 359 Main St. 617-373-1313
Wash: Bellevue, B. Waddell, 10211 N.E. 31st ... 822-0211
AIRCO SINGAPORE (PTE.) LTD., 31 International Rd., Jurong Ind'l. Estate, Singapore 22, Pte. Mgr: S.L. Foster
AIRCO SPEER CARBON-GRAPHITE, C... PRODS. DEPT., 900 Theresia... Tel:

A.L.A. INDS., INC., 99 Calvert St., H... Tel: 914-835-0400; Sls. Mgr: P. Mea...
Ill.: Chicago, K. Maisel Sls., 19 W...
NJ: Riverton, B. Given Assoc., Box...
NJ: Wayne, H. Kagan Assoc., 18...
NY: Brockport, G. Gay, Inc., Box 3...
NY: Fulton, C. D. Truax, Box 11...
NY: New York, L. Ackerman, 150...
Ohio: Dayton, W. J. Brauer, Box...
Ohio: Wickliffe, W. J. Brauer, Bo...
Pa.: Pittsburgh, W. J. Brauer, ...
ALADDIN CONTROLS, Div... Murfreesboro Rd., Nash... 615-242-3411, TWX: 615... Bassler
ALADDIN ELCTRNS., 701 Mur... Tenn. 37210, Tel: 615-242...

More than 6,000 manufacturers of electronic components, materials, instruments, assemblies, systems and key services are listed in the Yellow Section. An identical Yellow Section appears in each of the three volumes of **eem**, listing addresses, phone numbers and sales managers' names. TWX numbers are also included where available. **Boldface** listings indicate that detailed information on the manufacturers' products is cataloged in the White Section of **eem. Boldface** listings also indicate that local sales offices or representatives are listed for that manufacturer.

to find trade name sources

VOLUME 1, PAGE 957


TRADE NAME DIRECTORY

Autonavigator - auto. plotting radar navigation sys. - Moran Instr.
Autopolar - microwave polarization switch - Teledyne Micronetics
AutoRad - x-ray exposure control - Torr Labs.
Autoray & Baltoray - inspection systems - Balteau Electric
Autorol - dynamometer - Bear Mfg.
Autosplice - medium size splice/connector machine - Connectrol
Autosyn - instr. & sys. of remote indication - Bendix Aerospace-Elctrns.
Autotak - rpm indicator - Howell Instrs.
...rotex - ... Bosch Lab

Bicalex - winding wires, Cables,
Bicaloc - winding wires,
Biccastrip - flat conduc... Cables,
Bicon - bi-state, solid-...
Bicronite - epoxy coati...
Biflex - type of speake...
Big Inch - motors - Ha...
Big Mike - ...ectric...

If you know only the trade name, brand name or trade mark of a product, you can locate it in **eem** by using the **Trade Name Directory.** This appears only in Volume 1, beginning on page 957 of the White Section. These pages can be identified by a vertical black band along the outside edge.

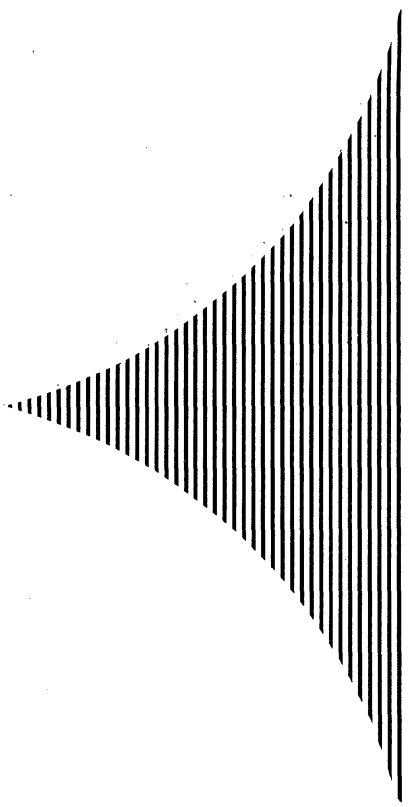
if you require additional assistance

contact the Editorial Department, United Technical Publications, Inc., 645 Stewart Ave., Garden City, N.Y. 11530, or phone (516) 248-9700.

Styroflex - semi-rigid cable - Phelps Dodge Comm.
Styrofoam - polystyrene foam - Dow Chemical
Styron - polystyrene - Dow Chemical
Sub-Minax - subminiature coaxial connectors - Amphenol RF Div.
Sucam - pipe inspection camera - Red Lake Labs
Suidget - slide switch - Continental-Wirt Elctrns.
Sulfamex - nickel plating chems. - Sel-Rex
Sulfol - lubricant - Houghton, E.F.
Sulzer - oscillators - Austron
Sulzer Labs - time & frequency instrumentation - Tracor
Summatic - digital integrator - Nester/Faust Mfg.
Sump-Gard - all plastic sump pumps - Vanton Pump & Equip.
Suntron - flashtube spectroscopic - Xenon
Super Aero Fibre - vulcanized fibre - Bal, William
Super Aeroflex - linear polyethylene - Anchor Plastics
Super Aero Lan - high density polyetelene - Bal, William
Super-Band - CATV equi. - American Elctrn. Labs.
Supercap - electrolytic capacitors - United Elctrn. Mfg.
Super Champ - hand tool - Amp
Supercon - electrical connectors - Superior Elec.
Supercote - micro-slide-dotter - Bycoski, Casmir T.
Super D, Super C - folded frame solenoids - Dormeyer Inds.
Superector - h.p. ratchet wrench - Williams J.H.
Superflex - coaxial cable - Columbia Eletrn. Cables
Super-Flex-Minus 40 - Pacific Electricord
Superfohm - transmission line - Superior Insulated Wire
Super Frost AiD - component cooler - Chemtronics
Superjustable - adjustable wrench - Williams J.H.
Super-K - capacitors, fixed, ceramic - Republic Elctrns.
Super-Lag - renewable fuses - Bussmann Mfg.
Super Max-C - glass & quart piston trimmer - JFD Elctrns./Sub. Riker-Maxson
Super Mite - portable potentiometer - Thermo Elec.
Super-N - high efficiency delay lines - Kappa Networks
Super Prep - screen printing photo stencil films - Ulano Prods.
Super-Pro - communications receivers - Hammarlund Mfg.
Superpulsed - pulsed co2 laser - Photon Sources
Super Q - varactor diodes - MSI Elctrns.
Superrench - open end & box wrenches - Williams J.H.
Supersafe #30 - non corrossive soft solder flux - Superior Flux & Mfg.
Super Shock Bilt Mailers - boxes - Corrugated Paper Prods.
Supersocket - socket wrenches - Williams J.H.
Super-Sonax - tweeter - Electro-Voice
Super Splice - insulation piercing splices for magnet wire - Connectrol
Super-Splice - splice sleeves - Superior Continental
Super-Synclamps - large synchro clamps - Timber-Top
Super T - laminated solenoids - Dormeyer Inds.
Supertape - recording tape - Allied Elctrns.
Super-Torq - cap screws - Allen Mfg.
Super VII - vacuum sys - Vacuum Inds.
Super Wee-Ductor - shielded inductor - Nytronics
Super Wee-Wee-Ductor - shielded inductor - Nytronics
Super Werx - heavy duty gloves - Edmont-Wilson
Super X, Dynamic, Everwear - rewinders - Neumade Prods.
Super 270 - connector - Amphenol Connector Div.
Supramesh - filter medium - Pall
Suprasil - fused quartz - Amersil
Surefire - high voltage test equipment - Ferranti Elec.
Sure Flux - solder - New York Solder
SureStrip - cylindrical fiberglass stripping wheels - Carpenter Mfg.
Surf Analyzer - surface measurement indicator - Gould
Surfax - wetting agents - Houghton, E.F.
Surf Indicator - surface measurement indicator - Gould
Surgeon General - medical elctrns. device - Permavolt Transformers
Surgical - rubber ind'l gloves - Edmont-Wilson
Surgisel - selenium surge suppressors - General Instr.
Surgistor - surge protector - Wuerth Prods.
Surgitron - ac & dc protectors - Joslyn Elctrn. Sys.
Surmetic - plastic package (zener diodes) - Motorola Semiconductor Prods.
Surmetic 20 - plastic package (zener diodes) - Motorola Semiconductor Prods.
Surmetic 30 - plastic package (zener diodes) - Motorola Semiconductor Prods.
Surmetic 40 - plastic package (zener diodes) - Motorola Semiconductor Prods.
Sus-Tension - film processing hangers - Lektra Labs.
Sweep-Sync - automatic synchronizer - Chadwick-Helmuth
Swemar - sweeper marker generator - Leader Instr.
Swemar - sweeper marker - Leader Instr.
Swidget, Jr. - slide switch - Continental-Wirt Elctrns.
Swing Arc - fume exhauster - Torit
Swing Blade - rotary wire stripper - Carpenter Mfg.
Swingrig - antennas - Video Inds.
Swing-Wa - switches, panelboards - General Elec.
Switchcraft/Preh Connector - connectors - Switchcraft
Switchline - switches - Electro-Mech. Comps.
Swivltop - screw drivers - Moody Machine Prods.
SWTL - transmission lines - Surface Conduction
Sydewynder - slide switch - Continental-Wirt Elctrns.
Sylgard - resins - Dow Corning
Syncal - hf manpack radio - Racal Communications
Synchro-Lectric - laboratory viscometer - Brookfield Engrg. Labs.
Synchron - a.c. timing motors - Hansen Mfg.
Synchro-Pac - syn. motors - Electric Machinery Mfg.
Synchro Reedac - switches - Grigsby-Barton
Synchro-Start - speed control switches solenoids - Synchro-Start Prods.
Synchrostat - voltage regulator - Electric Machinery Mfg.
Synchro Sweep Generators - frequency response sweepers - Nelson Ross Elctrns.
Synclamps - synchro clamps - Timber-Top
Syncro-Spede - synchronous induction motors - Allis, Louis
Syncro-Spede - synchronous induction motors - Allis Louis
Sync-Trol - synchronous-motor controls - Electric Machinery Mfg.
Synctron - phototlash equipment - Electro Powerpacs
Synkote - wire insulation - Plastoid
Synthar - capacitor - Industrial Condenser
Syntherm - wire insulation - Plastoid
Synthinol - hook up wire - Consolidated Wire & Assoc. Corps.
Synthite - varnishes - Dolph, John C.
Syntholvar - extruded pvc tubing - Varflex
Syntorque - a.c. motor - EEMCO Div.
System IV/70 - intelligent CRT terminals - Four-Phase Sys
System-Mate - rack housing - Computer Dynamics
System Seven - computer data acquisition - Ircon
Systems 72 - 16 bit, 880 nanosecond, small computer - Systems Engrg. Labs.
System VII - vacuum sys - Vacuum Inds.
System 4 - numerical control, stored program - Bendix
Systrac - data acquisition system - Systron-Donner
Sys. 810A - computer sys. - Systems Engrg. Labs.
Sys. 810B - computer sys. - Systems Engrg. Labs.
Sys. 840 Multi Processor - computer sys. - Systems Engrg. Labs.
Sys. 86 - 32 bit, 600 nanosecond, real time and gen'l. - Systems Engrg. Labs.
Sys. 88 - real-time & gen'l. purpose computer sys. - Systems Engrg. Labs.
S-42 Alloy - antimony gold plating process - Sel-Rex

T

Tab - technical books - G/L Tab Books
Tab-Gun - heat guns - Sigma Sys.
Tabl-Top - automatic plating sys. - Sel-Rex
Tab Mount Light - aircraft instr. post light - Glar-Ban
Tabon - rectangular quick-connect receptacles. - Malco Mfg.
Tac - connectors - Amphenol Ind'l. Div.
Tachlite - tachometer-stroboscope - Power Instrs.
Tach-Pak - elctrn. tachometers - Airpax Elctrns.
Tach-Trol - elctrn. control tachometers - Airpax Elctrns.
Tactic - all products - TAC Tech. Instr.
Tag Ring - grounding ring for shielded wires - Glenair
Take-Me-Along - self shocker behavior control - Farrall Instr.
Takumar - (35mm lenses) - Honeywell
Tamp Tendor - temperature controllers - API Instrs.
Tanco Focused Sound - sound column design - Argos Prods.
Tandemol - rolling oils - Houghton, E.F.
TaNFilm - resistor networks - IRC Burlington Div. of TRW INC.
Tanktrol - pressure operated control - Autocon Inds.
Tannoy - speakers - Tannoy (America),
Tan-O-Mite - capacitors - Ohmite Mfg.
Tan Rubber - liquidproof gloves - Edmont-Wilson
Tantalex - tantalum capacitor - Sprague Elec.
Tantalytic - capacitors - General Elec.
Tantapak - tantalum capacitor assy - Sprague Elec.
Tape Cable - flat flexible cable - Burndy
Tape Command - programmers - Thermotron
Tape/Foil - laminates - Tapecon
Tapered Reel Pak - magnet wire package - REA Magnet Wire
Taperlock - connector for semi-rigid cable - Phelps Dodge Comm.
Tapeswitch - longitudinal contact pairs - Tapeswitch Corp. Amer.
Tap-Lok - self-tapping threaded inserts - Groov-Pin
Ta Pot - slidewire potentiometer - Howell Instrs.
Tarzan - fan - Rotron
Taskote - wire - Revere Elctrn. Div.
Tay-Loc - wiring duct - Taylor Elec.
Taylorclad - metal clad laminates - Synthane Taylor
Taylor Hobson - motion picture lenses - Rank Precision Inds.
Taylorite - vulcanized fibre - Synthane Taylor
Tayloron - phenolic laminates - Port Plastics
Tayloron - laminated plastic - Synthane Taylor
Tayp-Air - airborne taper pin - Amp
T-Bar - multi-contact switches and relays - T-Bar
TBC - sound doors - Eckel Inds.
T-Cell - electrochemical timers - Bergen Labs.
TC-Trim - glass & quartz piston trimmers - JFD Elctrns./Sub. Riker-Maxson
TC-1 - touch activated switch - Wild Rover
TDM - standard power supply modules - Transistor Devices
Tealesocket - set screws - Teale Machine
Technibilt - elctrn. & mat'ls. handling equip., shop. carts - Technibilt
Technic Gold Saver - ion exchange gold recovery units. - Technic
Tech-Ni-Cube - decimal counting module - Techmetric
Techni-Gold 25 - non cyanide bright gold - Technic
TechniMatiC - receiver and transmitter sys - Technical Mat'l.
Techni-Platinum - bright platinum solution - Technic
Techni-Rhodium - bright rhodium solution - Technic
Technistrip AU - gold stripper - Technic
Techn-Kit - dc power supply kits - Universal Elctrns.
Teckaire - filter vent panel - Technical Wire Prods.
Teckcell - honeycomb vent panels - Technical Wire Prods.
Teckfelt - sintered metal/elastomer gaskets - Technical Wire Prods.
Teckscreen - filter vent panel - Technical Wire Prods.
Teckspan - expanded metal gaskets - Technical Wire Prods.
Teckstik - pressure sensitive gaskets - Technical Wire Prods.
Teckstrip - mesh in aluminum extusion - Technical Wire Prods.
Tec-Lite - indicators, switches, readouts - TEC
Tedlar - polyvinyl fluoride film - E.I. DuPont DeNemours
Tee-Lock - toolholder-insert combinations - General Elec.
Teflon - fluorocarbon plastics, finishes, insulating mat'ls - E.I. DuPont DeNemours
Teflon - tfe & fep insulating mat'ls - E.I. DuPont DeNemours
Tek-Pads - transistor mounting pads - Tekna Prods.
Tek-Pulls - instrument pulls/handles - Tekna Prods.
Teks - fasteners - Shakeproof Div.
Telawave - microvave comps. - Polarad Elctrn. Instrs.
Telco - hardware - GC Elctrns.
Tele-Beam - tv projector - Kalart Victor
Telecom - telephone transmission comps. & sys. - Webster Elec.
Tele-Connect - hardwire telephone patch - S Y T
Teledata - data transmitter/receiver - Friden Div.
Tele/Data - data analyzer - Digitech Data Inds.
Teledyne - pressure transducer - Teledyne Taber
Telegrip - dead-end antenna fitting - Preformed Line Prods.
Telejector - tv projectors - Gray Resch. & Dev.
Telemark - digital encoders - Leupold & Stevens
Telemetrics - telemetry decommutation equip - Lear Siegler
Telemike - telephone recorder - Miles Reproducer
Telemote - remote control of radio - Secode Elctrns.
Tele-Page - paging system - Private Tele-Comms.
Telepunch - data converter - General Instr.
Tele-Retriever - memory bank unit - Private Tele-Comms.
Telescan - complete telemetry systems - Autocon Inds.
Telescriber - handwriting transmission equip. - Telautograph
Tele/Sentinel - medical telemetry monitor - Mennen-Greatbatch Elctrns.
Teleslide - indicator light - Drake Mfg.
Telespeed - terminals - Teletype
Telesponder - transponder/encoder telemetry sys. - Vega Precision Labs.
Telestep - remote control systems - Autocon Inds.
Telestrip - slide base telephone lamps in group - Dialight
Teletalk - all prods. - Webster Elec.
Teletap Connector - dead-end antenna fitting - Preformed Line Prods.
Tele-Temp - temperature indicators - T & T Controls
Teletrol - complete telemetry systems - Autocon Inds.
Teletronix - limiting amplifiers - Waveforms
Televac - vacuum measuring instrumentation - Fredericks
Telever - lever switches - Switchcraft
Televerter - flying spot scanner type tv camera - ATV Research
Televex - diamond styli - Aldshir Mfg.
Television Tube Caddy - tube carrier - Argos Prods.
Tel-Eye - solid state alarm sensor - Autocon Inds.
Tel-Line Amplifiers - CCTV on phone lines - Hiett Elctrns.
Tellite - lighted pushbutton switches - Master Specialties
Telmar Data Display Systems - analogue display of up to 400 variables - Telmar
Telop - tv projectors - Gray Resch. & Dev.
Tel-Tru - manometers, psychrometers - Hill, E. Vernon
Temars - transportation environment measuring and recording system - Endevco
Temflex - etched foil heating elements - Electro-Flex Heat
TEM/Guide - coaxial/waveguide components - N-H Microwave
Tem-Line - mixers-couplers-hybrids - Sage Labs.
Temp-Alert* - temp. monitor & alarm, (solid-state) - Neill Engrg.
Tempax - borosilikäte flat sheet glass - Jenaer Glaswerk Schott & Gen.
Tempcor - magnetic steel laminations - Tempel Steel
Temp-Guard - thermostats - Dales, Franklin
Tempilabels - temperature indicating labels - Tempil Div.
Tempilaq - coatings - Tempil Div.
Tempil Pellets - pellets - Tempil Div.
Tempilstik - crayons - Tempil Div.
Temp-Lace - lacing tape - Gudebrod Bros. Silk
Templex - photo polymer plates - E.I. DuPont DeNemours
Temp-lock & TLT - heat shrink tubing - Zippertubing
Tempmatic - soldering tool - Weller
Tempoint - thermometers - AMBAC Inds.
Temp-R-Glas - teflon coated fiberglas - Connecticut Hard Rubber
Temprox - heat proximity - Ircon
Temp-R-Tape - teflon tape - Connecticut Hard Rubber
Tempruf - temperature compensated spring - Chatillon John & Sons
Tempscribe - recorders - AMBAC Inds.
Tempsicle - bath-circulator - Jersey Tech. Conslts.
Tempstat - standard controller - Hotpack
Temp-Term - high-temperature terminal - ETC
Temptest - thermal testing systems - Automation Inds.
Temptrak - surface temperature tracking system - Sloan Technology
Temptron - industrial infrared thermometer - Barnes Engrg.
Tenac - adhesive lubricants - Houghton, E.F.
Tenite - cellulosic & polyolefin plastics - Eastman Chem. Prods.
Tenna-Rotor - antenna rotator - Alliance Mfg.
Tenna-Tube - wall-thru - Javex Elctrns.
Tensile-Flex - high flex copper alloy - International Wire Prods.
Tensionuts - flat nuts - C.E.M.
Tensitron - instruments measuring, recording & control - Tensitron
Tensolon - insulated wire & cable - Tensolite
Tenuline - rf attenuators - Bird Elctrn.
Tenz Nuts - nuts with preassembled dishwashers - Reliance Div.
Tequipco - s-c test equipment - Test Equip.
Teraglas - oleoresinous coated dacron-glass fabric - Natvar
Tera-Ohmmeter - insulation resistance tester - Rohde & Schwarz Sls.
Tere-Cast - polyester casting compounds - Sterling
Tere-Gard - polyester compounds - Sterling
Terevar - varnishes - Sterling
Termaline - rf loads & wattmeters - Bird Elctrn.
Termalum - terminals and splices - Amp
Termashield - ferrules or splices - Amp
Termend - lug - Buchanan Elec. Prods.
Termi-Blok - tab terminal junction block - Amp
Termi-Foil - terminals - Amp
Termi-Grid - interconnection sys - Amp
Terminet - (data communications terminal) - Honeywell Information Systems
Terminyl - terminals and splices - Amp
Termi-Plate - connectors - Amp
Termi-Point - wiring system - Amp
Termi-Twist - connectors - Amp
Terrastar - amphibious vehicle - Lockheed Aircraft Svc.
Test-Glo - circuit tester - Ideal Industries
Test Lead Caddy - test ald - Air-O-Tronics Prods.
Testpac - automatic test system, instruments - Zehntel
Testpak - computer testing procedure - Computer Methods
Tetco - speed recorder - Electric Tachometer
Tetra-Foil - teflon coated aluminum foil - Royal Inds
Tetra-Kloth - teflon coated glass fabric - Royal Inds
Tetra-Kote - teflon dispersion coating process - Royal Inds
Tetralon - proprietary blend reinforced teflon - Royal Inds
Tetralon-510 - proprietary bronze filled tfe - Royal Inds
Tetra-Pad - teflon bearing pads - Royal Inds
Tetra-Pak - teflon thread sealant - Royal Inds
Tetra-Verithin - teflon spaghetti tubing - Royal Inds
Tevco Brand - plastic insulated wire & cable - Carol Cable Co. W.
Texin - thermoplastic urethane elastomer - Mobay Chem.
Textolite - laminated plastics - General Elec.
TFE Lube - Fluoro Plastics
TFE Plastic Coating - Fluoro Plastics
TFE Powder Lube - Fluoro Plastics
TFOT - transfer function data term. - Zonic Tech. Labs.
TFR - transistor float rectifier - Warren Communications
TF Switch - pushbutton switches - Switchcraft



If you want to know

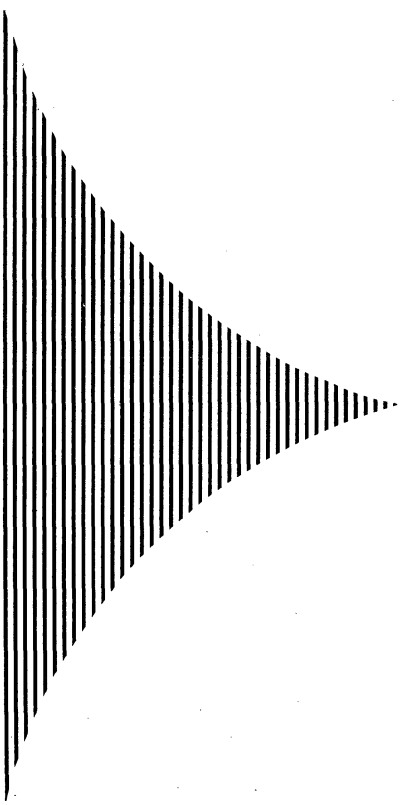
what manufacturers make what products, the **eem** green pages will solve your problem.

Product data is found

in the **eem** white pages they contain just about all the information you need to make a purchase decision.

If you're interested

in finding the address of a specific manufacturer, the **eem** yellow pages is the place to look.



Tell Them You Found It In eem

UNITED TECHNICAL PUBLICATIONS

T Head - hand tool - Amp
The Big Look - Voltmeters & ammeters - General Elec.
Thelco - ovens, baths - Precision Sci.
The Metal Stickers - welding and soldering equip. - Hughes Aircraft
Thermac - temperature control - Research
ThermaComb - corrugated ceramics - American Lava
Therma-flex - liner, tube shield - Int'l. Elctrn. Resch.
Therm-Aimid - polyester insulated magnet wire - REA Magnet Wire
Therm-Al - coated fiberglass - Acme Chemical & Insulation
ThermAlert - industrial infrared thermometer - Raytek
Thermall - electronic heating equip't - La Rose, W.T. & Assocs.
Thermal Mapper - infra-red scanner - Bendix
Therma Rel - tube shields - Int'l. Elctrn. Resch.
Thermasplice - splice for shielded wire - Amp
Thermatab - temperature indicating stickers - Camwil
Therma-Zip - thermal materials & jacketing - Zippertubing
Thermcoat CC - ceramic cement - Omega Engrg.
Thermcoat CO and COL - cement - Omega Engrg.
Thermcoat HT - adhesive and electrical insulator - Omega Engrg.
Thermcoat Kit - insulation and cement kit - Omega Engrg.
Thermcoat SL - silicone lacquer - Omega Engrg.
Thermek - heat exchanger surface - Heatron
Thermersion - immersion heater/exchanger - Sethco Mfg.
Thermetrics - heat rate transducers & thermocouples, thermowells & assy - Exotic Materials
Thermette - thermal relay - G-V Controls
Thermica - synthetic mica - Molecular Dielectrics
Thermi-Kit - cable terminating system - General Elec.
Thermi Linear - linear output thermistor devices - Yellow Springs Instr.
Thermi-Matic - cable termination - General Elec.
Thermi Stemp - thermistor based instruments - Yellow Springs Instr.
Thermist-O-Meter - thermistor temp. thermometer - Rustrak Instr. Div.
Thermit - thermal analyzer (dta) - T & T Controls
Thermo-Alarm - temperature alarms - Mack Elec. Devices
Thermobead - Glass coated bean thermistor - Thermometrics
Thermobond - varnishes - Sterling
Thermobond Varactors - microwave diodes - Varian
Thermochrom - temperature indicating crayons - Brady, W.H.
Thermo Clip - transistor holders - Staver
Thermocon - surface temp pyrometer - Alnor Instr.
Thermodot - radiometers - Infrared Inds.
Thermodur - varnishes - Sterling
Thermo F - varnishes - Sterling
Thermofit - special devices - Rayclad Tubes
Thermofit - tubings - Rayclad Tubes
Thermofit - molded parts - Rayclad Tubes
Thermofit Tool - heating devices - Raychem
Thermofit Tool - heating devices - Rayclad Tubes
Thermofit Zap Gun - infrared heating device - Rayclad Tubes
Thermofit Zap Gun - infrared heating device - Raychem
Thermo-Flag - transistor heat dissipator - Staver
Thermoflake - Flake (thick film) thermistor - Thermometrics
Thermoform - high temperature tubing - Resinite Corp. Div.
Thermoform - high temperature tubing - Precision Paper Tube
Thermofuze - current limiters - Pennsylvania Elctrns. Technology
Thermo-Gauge - thermal conductivity gauge - Granville-Phillips
Thermogels - insulators - Sterling
Thermo-Grip - soldering equipment - Ideal Industries
Thermogun - hot air blower - Raychem
Thermogun - hot air blower - Rayclad Tubes
Thermohm - temperature detector (resistance thermometer-type) - Leeds & Northrup
Thermo-Imager - ir thermal imaging systems - Dynarad
Thermolain - ceramic products - Star Porcelain
Thermolastic - heating element - Cox
Thermo-Markers - temperature monitoring labels - Brady, W.H.
Thermomatic - constant temperature block - Beckman Instrs., (AISSD)
Thermomatic - print machine - Rotolite, Teledyne
Thermomelt - temperature indicators - Markal
Thermometal - bimetal - Engelhard Minerals & Chemicals
Ther-Monic - heating eqpt. - Taylor-Winfield
Thermopad - plastic package (power transistors) - Motorola Semiconductor Prods.
Thermopatch - heating element - Cox
Thermopoxy - varnishes and compounds - Sterling
Thermoprobe - bead-in-glass probe thermistor - Thermometrics
Thermo-Probe - test equipment - Micro-Technical Inds.
Thermorad - wire and cables - Raychem
Thermorod - Bean-in-glass rod thermistor - Thermometrics
Thermoscan - radiometers - Infrared Inds.
Therm-o-Scope - pyrometer - Milletron
Thermosfix - adhesive to withstand temperatures of 3000 F - Adhesive Prods.
Thermosheet - heating element - Cox
Thermo-Sink - transistor heat sink - Staver
Thermospot - welding equipment - Walters, W.A.
Thermo-Strip - wire stripper (thermal) - Ideal Industries
Thermoswitch - temperature controls - Fenwal
Thermotape - heating element - Cox
Thermo-Tector - overload protection sys. - General Elec.
Thermotel - temperature indicators - General Elec.
Thermoterm - noise sources - Maury Microwave
Thermo-Tip - soldering equipment - Ideal Industries
Therm-O-Tron - soldering - Trindl Prods.
Thermotronic - thermocouple thermometers, thermoelectric cooling equip. - Bailey Instrs.
Thermo-Vane - transistor heat dissipator - Staver
Thermowire - heating element - Cox
The Solar Heater - radiant infrared heat source - Cahnman Hugo N. Assocs.
The Voice of the Theatre - speaker systems - Altec
Thick-Panel Jax - phone jacks - Switchcraft
Thin Film - universal transducing cell - Statham Instrs.
Thinflex - pressure sensitive masking tape - Mystik Tape, Borden
Thinistor - thermistor - Victory Engrg.
Thinline - capacitors, fixed, ceramic - Republic Elctrns.
Thin-Shell - needle bearings - Keene
Thin-Tran - transformers - Arnold Magnetics
Thinverter - inverters - Arnold Magnetics
Thorens - turntables - Ortofon Div.
Thorkom - plastic circular connector - Viking Inds.
Thorox - thorium oxide - National Beryllia
Thruline - rf wattmeters - Bird Elctrn.
Thru-Pass - coaxial capacitor - Sprague Elec.
Thru-Way - fast connect terminal - Doran Mfg.
Thumb Mite - miniature size thumbwheel switch - Tech Labs.
Thyac - survey meter - Victoreen Instr.
Thy-Mo-Trol - motor control - General Elec.
Thyrite - dielectric or resistance mat'l. - General Elec.
Thyrochron - special purpose digital computer medical - Harworth Mfg.
Ti-Ball - pumps - Varian Assocs.
Tickopres - label imprinters - Monarch Marking Sys.
TI-CO - wire strippers & stripping brushes - Thomas Instrument
Tiger Brand - electrical wire & cable - United States Steel
Tiger-Tuf - power, industrial, maintenance brushes - Felton, S.A. & Son
Tig-Stix - tungsten electrodes - Eutectic
Tig-Tectic - welding filler alloys - Eutectic
Tilt-A-Mite - (flash unit) - Honeywell
Timatch - connector - Times Wire & Cable
Time Capsule - 2 lead ac timer - Artisan Elctrns.
Time-Delay - renewable fuse - Chase-Shawmut
Timefax NDA - electrosensitive recording paper - Fitchburg Coated Products
Timelok - time delay contactors & relays - Euclid Elec. & Mfg. Div.
Timemark - electrosensitive recording paper - Fitchburg Coated Products
Time-Pak - solid-state controlling device - Gems Div.
Ti Mite - timer - Paragon Elec.
Timoflex - time delay relay - Eagle-Signal Div.
Tineon - indicator light - Leecraft Mfg.
Tinglo-Culmo - the orginal scholotter bright tin - Lea-Ronal
Tini-D Jax - phone jacks - Switchcraft
Tini-Extension Jax - phone jacks - Switchcraft
Tini-Jax - phone jacks - Switchcraft
Tini-Plug - phone plugs - Switchcraft
Tini-Tee - adapters - Switchcraft
tini-telephone - miscellaneous - Switchcraft
Tinsil - silver bearing solder - Bow Solder Products
Tintac - organic coating - Conversion Chem.
Tintillate - tin plating bath - Conversion Chem.
Tinychip - thick film chip resistor - Mepco
Tiny-Glow - pilot lights - Ind'l. Devices
Tiny L - molded chokes - Aladdin Elctrns.
Tinylite - indicator light - Drake Mfg.
Tinymag - relays - Torwico Elctrns.
Tinymax - transformers - Torwico Elctrns.
Tiny-Switch - push button switches - Switchcraft
Tiny-T - miniature p.c. board relays - T-Bar
Tiny-Ties - plastic cable, wire & tag ties - Transcon Mfg.
Tiny Tim - connectors - Amphenol Ind'l. Div.
T.I.P. - economy dies - Templet Ind.
Tipit - mercury switches - Durakool
Tip-Over - switch - Waber Elctrns.
Tippalite - lighted rocker switch - Sorenson Lighted Controls
Tipptronic - industrial electronic controls - Integrated Dev. & Mfg.
Tisan - programmer - Artisan Elctrns.
Titan - batteries - General Battery
Titanite - tempered glass - Lancaster Glass
Tite-Bite - connectors - Thomas & Betts
Titelite - indicator light - Drake Mfg.
Ti-Test - thermometer - AMBAC Inds.
Tivicamera - image sensing device - Alcor
T-Jax - phone jacks - Switchcraft
T-Line - teflon lined valves & pumps - Duriron
T-Lite - bi-pin indicator light - GTE Sylvania
T-Lite Switch - pushbutton switches - Switchcraft
Toccotron - R. F. heating equip. - Tocco Div.
Tog-L-Lok - clamping tool - Channellock
Tokin - all products - Tohoku Metal Inds.,
Tone-Dial - telephone sets - Stromberg Carlson
Tong Test - columbia ac-dc tong test ammeter - Columbia Elec. Mfg.
Tonotron - direct view storage tube - Hughes Aircraft
Tooltectic - tool steel electrodes - Eutectic
Toolweld - tool steel electrode - Lincoln Elec.
Tophel - thermocouple alloy - Driver, Wilbur B.
Tophet - heating element alloy - Driver, Wilbur B.
toPKote - "dead front" process - Penn Keystone
Topseal - screw, bolt, nail with sealing washer - Townsend
Top Tainers - tube clamps - top retaining - Birtcher
Torbal - subminiature toggle switches - Torsion Balance
Torch Robot - torch application device - Henes Mfg.
TOR Heat Sinks - semiconductor heat dissipators - Precision Dipbraze Tor.
Tork-O-Stat - overload coupling - Zero-Max
Tormax - stepper motors and control elec. - IMC Magnetics
Toro-Flex - fittings & couplings - IMC Magnetics
Toroyd - coil winding machine - Universal Mfg.
Torqform - coil forms - Cambridge Thermionic
Torqliner - coil forms for elec. windings - Cambridge Thermionic
Torqsyn Remote Positioner - gearless direct drive servomechanism - Vernitron
Torque-Peak - clutch assembly - Standard Pneumatic Motor
Torque Seal - anti-sabotage lacquer - Organic Prods.
Torquetrol - motor load controller - Electronic Control
Torque Watch - measuring instr. - Waters Mfg.
Torrlite Series - xenon flashtubes - Torr Labs.
Torr Seal - resin - Varian Assocs.
T-O-T - sealant and pipe thread compound - Lake Chemical
Touch-A-Matic - switches - Eagle Elec. Mfg.
Touch/Dial - intercomm sys - Action Systems
Touchette - push type elec. switches - Rodale Mfg.
Touch-Lite Turret - for supervision of calls in a PBX - Stromberg Carlson
Tower - industrial ovens - Feco
Tox-Ex - combustible & toxic gas alarms & indicators - Erdco Engrg.
TPG - timing pulse generators - KDI Adtrol
TPP - transistor power pack - Warren Communications
TP-100 - degreaser fluid - Barco Chem. Prods.
Tra-Bond - adhesives - Tra-Con
Tra-Cast - potting compounds - Tra-Con
Tracer - presence detector - Link Div.
Tracer-Tech - inspection penetrants - Shannon Luminous Mat'ls.
Tracmaster - manual drafting machines - Universal Drafting Mach.
Tracor - time and frequency; audiometric testing - Tracor
Tractoradio - tractor radio - ATR Elctrns.
Tra-Duct - conductive adhesives - Tra-Con
Traff-O-Matic - traffic control equip. - Automatic Signal Div.
Trailblazer - welders - Miller Elec. Mfg.
Transaire - pressure transmitter - Taylor Instr. Process Control Div.
Transcap - capacitor - Erie Technological Prods. (EEM)
Trans. Clip - transistor & diode clips - Birtcher
Transcope - pheumatic transmitter/recorder - Taylor Instr. Process Control Div.
Transelectric - telephone apparatus - Encom Prods.
Transferometer - rf unit - Alford Mfg.
Transheat Furnace - continuous belt-type furnace - BTU Engrg.
Trans-I-Switch - switches - Marathon Instrs. Div.
Transitrack - measurement system - Transducer Controls
Trans-O-Matic - Lakeshore Electric
Transpac - modular power pack - Electronic Resch. Assocs.
Trans-Plug - battery charger - Elctrn. Components
Transvolt - standard voltage - Guildline Instrs.
TransZorb - silicon transient voltage suppressor - General Semiconductor
Trantracer - transistor tester - Desco Mfg.
Trav-Electric - power inverters - Terado
Traypak - ic chip carrier - Engineering Conslts.,
Trebel - balancing machines - Micro Balancing
Trebel - balancing machines - Schenck Trebel
Trendomatic - process chromatograph sys. - Beckman Instrs.
Trendtrak - curve follower program control unit - Leeds & Northrup
TRG - transistor ringing generator - Warren Communications
Tri-Alloy - multipul alloyed solder - Gardiner Solder
Tri-Amp - selenium rectifiers - General Instr.
Tri-Band - 3-band antenna - Telrex Labs.
Tri-Beam - u.v. ray generators - Western Coil & Elec.
Tri Break - circuit breakers - General Elec.
Tri-Carb - counter - Packard Instrument
Tri-Carb - spectrometers - AMBAC Inds.
Tri-Carrier - wafer carrier - Tri-Point Inds.
Tri-Clad - laminates - Tri-Point Inds.
Tri/Clad - motors, generators, frequency converters - General Elec.
Tri-Filmatic - (elmo camera) - Honeywell
Trifoil - aluminum foil - Tri-Point Inds.
Trigac - trigonometric analog converters - Singer-General Precision
Trigard - 3 electrode spark gap - Joslyn Elctrn. Sys.
Tri-Gard - multipul alloyed solder - Gardiner Solder
Trigate - pulse transformer - Sprague Elec.
Trigor - lenses - Goerz Optical
Trig-R-Heat - soldering guns - Wall Mfg.
Trilon - tfe products - Tri-Point Inds.
Trimit - potentiometer - Bourns
Trimpot - potentiometer - Bourns
Trim Tip - porous point pen - Carter's Ink
Trinseel - terminals - Tri-Point Inds.
Trinweld - welding rods - Trindl Prods.
Trionic - fuse - Chase-Shawmut
TR-IOTA - pulse generators - Trump-Ross Ind'l. Controls
Tri-Pac - battery charger - Elctrn. Components
Tri-Pac - v-rings, o-rings, back-up rings - Tri-Point Inds.
Tripad - chip-on-channel mounting method - Motorola Semiconductor Prods.
Tri-Phase - welding machines - Taylor-Winfield
Triphasic - DVM conversion technique - Data Precision
Tri-Planar - flat speaker sys. - Electronic Resch. Assocs.
Tri-Plate - strip line transmission products - Microwave Div
Triple C - solvents - lubricants - Pro-Chem
Triple Cutter - masonry drills - Tilden Tool Mfg.
Triplematic - mixing, metering, dispensing machinery - Hardman
Triploc - break away type conn. - Pyle-National Div., Harvey Hubbell
Tripower - selenium rectifiers - Electro-Standards Labs.
Tri-Power - diesel brush - Stackpole Carbon Co., Carbon Div.
Trirad - tristimulus radiometer - Kollmorgen-Color Sys. Div.
Trisolvadene - degreaser for all metals - Colonial Alloys
Triton - tritium gas monitors - Johnston Labs.
Triumph - p.a. amplifiers - Fanon Elctrns.
Trixie - nixie tube transistor driver - Burroughs
Trol Aid - control cleaner - Chemtronics
Trol-A-Temp - heating & cooling controls - Electro Windings & Comps.
Trolex - selector switch - CTS
Trol-King - motor speed control - Seco Elctrns.
Trolleyphone - carrier com. equip. - Femco Div.
Tron - fuses & fuseholders - Bussmann Mfg.
Trona - chemicals - Kerr-McGee Chem.
Troxide - dry acid salts mixture - Mac Dermid
TRT - transistor ringing-talk generator - Warren Communications
Truarc - rings, tools & gages - Waldes Kohinoor
Trucote - flux coated silver rod - ARC Prods. Div.
Tru-Diamond - metal lath - Republic Steel
True-Color Antennas - tv antennas - Color/Craft Antenna
True-Spot - smoke test set - AMBAC Inds.
Tru-Fidelity - speakers - Components Specialties
Trukrol - dynamometer - Bear Mfg.
Trulex - automatic exposure meter - Zoomar
Tru-Load - load-measuring bolt - Bland
Tru Ohm Products - resistors & rheostats - LTV Electrosystems
Tru Rib - heavy duty resistor - LTV Electrosystems
TRU-ROta - pulse generators & transducers - Trump-Ross Ind'l. Controls
Trusonic - wireless microphone - Automatic Clerical Sys.
Tru-Touch - disposable gloves - Edmont-Wilson
Trutrac - a sys. of process instr. - Barber-Colman
Truvohm - (line of multimeters) - Eico Electronic Instrument
TR-4 - finish over silver - Kings Elctrns.
TR-5 - finish - Kings Elctrns.
T-Screen - insulated tape-shield dividing - Superior Continental
T-Switch - pushbutton switches - Switchcraft
TT-Dummy Plug - phone plugs - Switchcraft
TT - Jack Panel - phone jacks - Switchcraft
TT-Jax - phone jacks - Switchcraft
TT-Jewel Assembly - miscellaneous - Switchcraft

TT Lamp-Jax - phone jacks - Switchcraft
TT-Looping Plug - phone plugs - Switchcraft
TT-Patch Cord - phone plugs - Switchcraft
TTS - timeshare terminals - A C Electronics
TT Series - tiny trim delay lines - Kappa Networks
TT-Switch - pushbutton switches - Switchcraft
TT-Terminating Plug - phone plugs - Switchcraft
TT Twin-Jax - phone jacks - Switchcraft
TT-Twin Plug - phone plugs - Switchcraft
Tube-Guard - remote indicator - American Ultraviolet
Tube O'Gel - thixotropic gelling agent - Beckman Instrs., (AISSD)
Tuchswitch - solid state limit switch - Denison, R.B.
Tuck - pressure sensitive tapes - Technical Tape
Tuf Duk - heavy-duty gloves - Edmont-Wilson
Tuf-E-Coat - spray-on teflon - Shamban, W.S.
Tuf-E-Nuz - teflon wool and string - Shamban, W.S.
Tuffcote - polymide coated wire & cable - Tensolite
Tufflite - wire, insulated - Tensolite
Tuff Tite - screw, bolt, nail undercut washer head - Townsend
Tuf-Stuf - special copper base alloy - Mueller Brass
Tuftane - film & sheet - Goodrich B. F. Chem.
Tuf-Test - lacing tape - Gudebrod Bros. Silk
Tuf-ties - plastic wire & cable ties - Transcon Mfg.
Tulox - cellulose acetate butyrate tubing - Blum, Julius
Tuner-Tonic - tuner cleaner & lubricant - Elctrn. Chemical
Tungar - rectifying apparatus - General Elec.
Tungtec - mesh alloys - Eutectic
Tunnel-5 - mining power supplies - American Rectifier
Tun-O-Foam - tuner cleaner/lubricant - Chemtronics
Tun-O-Lube - tuner cleaner - Chemtronics
Tun-O-Wash - tuner degreaser - Chemtronics
Turbinator - turbine-generator sets - Waukesha Motor
Turbo - electrical insulating materials - Brand-Rex
Turbo - electrical sleeving - Port Plastics
Turbocryl - acrylic coated glass sleeving - Brand-Rex
Turbo-Cut - taps - Bendix
Turboglas - varnish coated glass sleeving - Brand-Rex
Turbolex - plasting insulating tubing - Brand-Rex
Turbo-Probe - turbine flow transducer - Flow Technology
Turbosil - silicone coated glass sleeving - Brand-Rex
Turbotherm - plastic insulating tubing - Brand-Rex
Turbotrans - plastic insulating tubing - Brand-Rex
Turbotuf - vinyl coated glass sleeving - Brand-Rex
Turbozone - plastic insulating tubing - Brand-Rex
Turbo 117 - silicone rubber coated glass sleeving - Brand-Rex
Turcite - plastic bearing material - Shamban, W.S.
Turcon - tfe material - Shamban, W.S.
Turner - microphones - Conrac
Turnguate - rotary switches - Subminiature Instrs.
Turnlight and Minilight - flashlight dry batteries with incorporated bulbs - Leclanche S A
Turn-Loc - captive screw - Deutsch Fastener
Turnlok - lighting connectors - Pass & Seymour
Turn-Tyte - elec. wiring devices - Rodale Mfg.
Tuseal - solvent pump - Baron-Blakeslee
Tutorette - record players - Audiotronics
Tu-Wire - fluorescent dimmer - Lutron Elctrns.
TV Life-Saver - surge protector - Wuerth Prods.
Twelve/Ten - 12kw electron beam power supply - Sloan Technology
Twenty/Twenty - epoxy adhesive - Packaged Resins
Twenty/Twenty - epoxy adhesive - Allaco Prods.
TWF - tailored wafer fabrication - Qualidyne
Twin-Com - intercom - Bogen Div.
TWINCONE - conical fiberglass stripping wheels - Carpenter Mfg.
Twin HI-D Jax - phone jacks - Switchcraft
Twin-Jax - phone jacks - Switchcraft
Twin-Life - filters - AMBAC Inds.
Twin Light - circuit indicator light - GTE Sylvania
Twin-Phone - phone system - Bogen Div.
Twin-Plug - phone plugs - Switchcraft
Twinpot - potentiometer - Bourns
Twins - multiple device transistors - Motorola Semiconductor Prods.
Twinsleeve Tuner - matching network - Alford Mfg.
Twintron - A F reasonator - HB Engrg.
Twin-Warp - plain wire cloth - AMBAC Inds.
Twist-Lite - lightedd pushbutton switches - Master Specialties
Twist-Lok - electrolytic capacitor - Sprague Elec.
Twiston - hole saws - Black & Decker Mfg. Co., The
Two-Way - locknut - MacLean-Fogg Lock Nut
2 DPC - tape control sys - Dynamic Precision Controls
2 D Subminiature - double density 22 ga. contacts in the std. mil-c-24308 shell - Matrix Science
2 Plus 2 - selective calling encoders & decoders - Bramco Controls
20/20 - custom panel instrument line - Westinghouse Elec.
2101 - flux coated electrode - Eutectic
2-24 - AC-DC electrode - Eutectic
2-25 - AC-DC electrode - Eutectic
24-X - AC-DC electrode - Eutectic
263-3F - impregnated paper - Cottrell Paper
27 - AC-DC electrode - Eutectic
Twystron - microwave amplifier - Varian Assocs.
Ty-Fast - cable ties - Tyton
Tygon - polyvinyl chloride tubing - Blum, Julius
Ty-Level - screening machine - W. S. Tyler
Tymeter - clocks, computers - Pennwood Numechron
Ty-Nee Tumbler - small abrasive tumbler - Aubin, A.E.
Type - proton precession magnetometer - GeoMetrics
Typit - technical symbols - Mechanical Enterprises
Typotron - direct view storage tube - Hughes Aircraft
Typrojector - teletype projector - Bolt Beranek & Newman
Ty-Rap - cable ties, clamps, & tools - Thomas & Betts
Ty-Rock - screening machine - W. S. Tyler
Ty-Rocket - screening machine - W. S. Tyler
Ty-Sifter - sifting machine - W. S. Tyler
Ty-Speed - screening machine - W. S. Tyler
Tytex - batteries - Exide Power Sys. Div.
Tyton Cable Binding Systems - Ideal-Hellermann Can.,
T-1 Military Indicator Light - indicator light - GTE Sylvania

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Ucar - boron nitride & graphite prods. - Union Carbide
'Ucar' - metal & ceramic coatings - Union Carbide
U-D-F - unidirectional flow inductors - Ajax Magnethermic
Uinipulser - single decade counter - Durant Digital Instrs.
Ultimeter - meter-relay - API Instrs.
Ultimium - AC-DC electrode - Eutectic
Ultipor - filter cartridge - Pall Trinity Micro
Ultipor - filter medium - Pall
Ultracell - fast responding cell less than 1 use - Sensor Tech.
Ultra-Clean - ultrasonic cleaner - Commander Labs.
Ultra/Clean - laminar flow clean room equipment - Edcraft Inds.
Ultra D - hi fi speaker sys. - University Sound
Ultra F - purifying graphite - Ultra Carbon
Ultraflex - adjustable speed drives - Cutler-Hammer
Ultra-Flex - flat flexable cable - Lane Inds.
Ultralap - lapping and polishing medium - Pfizer-Minerals
Ultra-Mate - connector - Amphenol Connector Div.
Ultramatic - alarm system - Eastcraft
Ultra-Mite - connectors - Amphenol Ind'l. Div.
Ultrasil - fused quartz - Amersil
Ultra-Speed - etchants for production of printed circuits - Hunt, Philip A. Chemical
Ultra-tac - contacts - Amphenol Ind'l. Div.
Ultra-Temp - high temperature adhesive - Aremco Prods.
Ultraverter - uhf lo vhf converter - Blonder-Tongue Labs.
Ultravox - portable p.a. system - American Geloso Elctrns.
Ultrohm - resistors - Ultronix
Unamite - motion sensors - Roltec
Unecap - electrolytic capacitors - United Elctrn. Mfg.
Unelco - capacitors - Underwood Elec. & Mfg.
Unibloc - plastic package (transistors) - Motorola Semiconductor Prods.
Uni-Bus - bus duct - Cutler-Hammer
Uniceram - fixed ceramic capacitors - JFD Elctrns./Sub. Riker-Maxson
Unicoat - insulation coating - Bacon Inds.
Unicon 6314 - laser mass memory system - Precision Instr.
Unicon 690-212 - laser mass memory system - Precision Instr.
Uni-Core - acid filled core solder - Alpha Metals
UniCore 9 - memory sys., core, single card - Cambridge Memories
Uni-Curve - thermistors - Fenwal Elctrns.
Unidar - high density recorder - General Dynamics
Unidec - digital (single decade) counter - ENM
Unidex - rotary switches - Oak Mfg.
Uni-drill - single spindle drill - Excellon Inds.
Unidyne - microphone - Shure Bros.
Uni-Etch - etchants for production of printed circuits - Hunt, Philip A. Chemical
Unifan - axial blower/fan - HICO (Horizons Int'l.)
Uniflex - shelving - BFC-Bernard Franklin
Uni-Just - flying, write/read head - Bryant Computer Prods.
Uni-Kit - cable splicing kit - General Elec.
Unikon - photomask duplicator, (Projection) - HLC Mfg.
Unilay-21 - stranded conductor, bare or plated - Hudson Wire
Uniline - sound columns - University Sound
Unimac - eddy current inspection equip. - Magnetic Analysis
Unimatic - AC-DC electrode - Eutectic
Unimorph - piezoelectric transducer - Vernitron Piezoelectric Div.
Uni-Pac - receptacle - Methode Elctrns.
Unipage - vhf/fm pager - Unimetrics
Unipak - horizontal epitaxial reactor - Hugle Inds.
Uniplex - microphone - Shure Bros.
Uniply - power sources - Power Designs
Unipulser - single decade electromechanical counter - Durant Mfg.
Uniquick - screw driver - Shakeproof Div.
Unirap - cable ties - Burndy
Unireg - power supplies-O-35V - Universal Elctrns.
Uniring - sheath connectors - Burndy
Uniseal - for microphones - Electro-Voice
Uniseal - self-sealing fasteners - ABSCOA Inds.
Unisec - optical angle reading device - Teledyne Gurley
Uniset - select or switch - Durant Digital Instrs.
Uniset - selector switch - Durant Mfg.
Uniset - epoxy compounds - Amicon
Uni-Son (R) - sonic energy cleaners - Bendix
Unisorb - machine mounts - Felters
Unisorb Jakebolts - machinery anchor bolts - Felters
Unisorb Lev-L-Ine - precision machine mounts - Felters
Unisource - frequency & voltage calibrator - Frequency Control
Unispar - elec. insulators - General Elec.
Unisphere - microphone - Shure Bros.
Uniswitch - push button switches - Switchcraft
Unisystem - electron count/control sys. - Durant Mfg.
Unit Amplifier - modular solid state amplifier - Avantek
United Electron - tubes/electron - United-Page
Uni-Therm - thermistors - Fenwal Elctrns.
Unitized - electric motors - General Elec.
Uni-Torque - locknut - MacLean-Fogg Lock Nut
Unitrack - circuit card guides - Calabro Unitrack
Unitron - telescopes - Unitron Instr.
Unitron - gamma radiography machines - Automation Inds.
Uni-Tunnel - backward diodes - Centralab Semiconductor
Universal - clips - Mueller Elec.
Universal - mobile antenna fittings - K-W Engrg. Works
Universal - generators, emergency power - Universal Motor Div.
Universal - generators, portable, engine driven - Universal Motor Div.
Universal Active Filter - multi loop negative feedback filter - Kinetic Tech.
Universal Audio - recording equip. - Waveforms
Universal Pilot Housing - pilot lamp socket - GTE Sylvania
Universal Thread Seal - thread seal - Shamban, W.S.
Uni-Vit - transducer support equip. - Kaman Nuclear
Univolt - coolant-dielectric - Humble Oil & Refining
Uniwatt - plastic package (transistors) - Motorola Semiconductor Prods.
Uniweld - unique construction of coils, applied specifically to our line of buzzers - Endicott Coil
UPI - transistors/diodes - United-Page
Upson - screwdrivers - Upson Tools
Uptrack - uphill plastic ski surface - Felton, S.A. & Son
Uralane - polyurethane compounds - Furane Plastics
Uresolve - urethane solvent - Dynal-
Uresolve - stripping solvent - Amicon
Uresolve Plus - silicone solvent - Dynaloy
URL Simulator Systems - all solid-state sound simulators - Universal Resch. Labs.
U.S. Bearings - bearings - Networks Elctrn.
USE - magnetic comps. - U.S. Elctrns.
USP - purified graphite - Ultra Carbon
UTF-Testing Fixture - glass & quartz piston trimmers - JFD Elctrns./Sub. Riker-Maxson
U-Tile-Mu - shielding tiles - Amuneal Mfg.
Utili-Splice - connectors - Amp
Utili-Tap - power cable - Amp
Utili-Tenshun - connectors - Amp
Utilogic II - monolithic integrated circuits (digital) - Signetics
Uvex - weatherable plastic sheet - Eastman Chem. Prods.
U/V Flame Safeguard - interlock systems & controls - Edison, Thomas A. Instr. Div.
Uvissector - camera tubes - ITT Electron Tube

V

Vacap - variable vacuum capacitors - Dolinko & Wilkens
Vaclon - pumps - Varian Assocs.
Vac-K-Set - vacuum cassette - Research Chem.
Vacombo - kits - Vaco Prods.
VacPac - vacuum equipt - Hull
VacSorb - pumps - Varian Assocs.
Vac-Tite Box - circular polyethylene boxes - Clover Inds. Div.
VacTorr - vacuum products - Precision Sci.
Vactrol - combination photocell & illumination source module - Vactec
Vac-U-Lok - valve entrance/exit - High Vacuum Equip.
Vaculoy - oxide free bar solder - Alpha Metals
Vacu-Matic - vacuum liquid quench furnace - Pacific Scien.
Vacumette - resistor - Continental-Wirt Elctrns.
Vac-U-Sel - current rectifiers - General Elec.
Vacuum Pick-Up - vacuum tweezers - Henes Mfg.
Val-An - (military cases) - Zero Mfg.
Valubel - audible signals - Wheelock Signals
Value Vial - vials - Beckman Instrs., (AISSD)
Valvactor - valve positioner - Foxboro
Val-90 - thermostat - Valverde Labs.
Vam - air variable capacitors - JFD Elctrns./Sub. Riker-Maxson
Vamp - visoal system - Link Div.
Vamp - radiation area monitor - Victoreen Instr.
Van de Graaff - electrostatic generators - High Voltage Engrg.
Vapodyne - vapor phase cooling - Thomson-CSF
Vapo-Met - diffusion coatings - Misco Div.
Vapor-Temp - temperature/humidity chambers - Blue M Engrg.
Vapor Wrapper - paper, corrosion preventing - Daubert Chem.
Vapotron - vapor-phase cooling - Thomson-CSF Electron Tubes
Varax - ac regulator - Wanlass Div.
Varax - voltage regulators - AMBAC Inds.
Varfil - flexible sleeving - Varflex
Varflo - flexible sleeving - Varflex
Varglas - flexible sleeving - Varflex
Variable D - microphone - Electro-Voice
Variable Leak - regulates gas pressure in a system - Granville-Phillips
Variable Scale - data reduction instrument - Gerber Sci. Instr.
Variac - adjustable autotransformer - General Radio
Varicon - electrical contact - Elco
Varicord/Microcord - recorders - Photovolt
Vari-Fine - motor controllers - Waber Elctrns.
Vari-Light - liquid crystal (trademark identification prefix) - Vari-Light
Varilok - electrical contact - Elco
Varimac - eddy current inspection equip. - Magnetic Analysis
Variogon - phase shifter - Nilsen Mfg.
Vari-Pak - solid-state controlling device - Gems Div.
Varipak - printed circuit card cage - Elco
Variplate - interconnecting system - Elco
Varispeed - variable speed model - Perkins Machine & Gear
VariText - text-editing & word-processing system - Varian Data Machines
Varitext - text editing system - Varian Data Machines
Varitor - elect. variable inductor - Data Delay Devices
Varitrim - capacitors - Voltronics
Vari-Vac - metering valve - Vactronic Lab. Equip.
VariZistor - variable resistor - Vacco Electronics
Varoid - variable toroid - Vanguard Elctrns.
Varotal - television lenses - Rank Precision Inds.
Varsol - solvent cleaner - Humble Oil & Refining
Vary Tally - hand operated counters - Veeder-Root
Vatron - solvent - Baron-Blakeslee
V-Ball - resilient soft rubber ball - Vernay Labs.
Vecor - microphones, tape, accessories - Vidaire Electronics Mfg.
VECO Vamp - meter protector - Victory Engrg.
Vectorbord - pre-punched terminal board - Vector Elctrn.
VectorVane - 3-dimensional wind sensor - Meteorology Research
Vectrol - power sys. - Vectrol
Veeder-Decade - decade counters - Veeder-Root
Veederline - counters - Veeder-Root
Veedometer - counters - Veeder-Root
Vee Jem - ceramic chip capacitor - Vitramon
Veetube - spectrometer tube - Veeco Instrs.
Vegas - hi fi speaker sys. - University Sound
Velco - comm. systems/equipment - Virginia Elctrns.
Velocitron - ceramic klystrons - Polarad Elctrn. Instrs.
Velometer - air velocity indicators - Alnor Instr.
Velostat - volume conductive plastics - Custom Materials
Ventender - automatic ventilating equipment - Integrated Dev. & Mfg.
Ventorque - ventilated clutches and brakes - Fawick Airflex Div.
Venture - patents - Permavolt Transformers
Venus Series - elec. connectors - Pyle-National
Veritrak - process control instrumentation - Motorola Instr. & Control
Vernac - measuring instruments - Infrared Inds.
Vernatone - plastic mufflers - Vernay Labs.
Vernatube - plastic tubing - Vernay Labs.

Vernistat - potentiometer - Perkin-Elmer
Veroboard - wiring board - Vero Electronics
Verocase - inst. cases - Vero Electronics
Verorack - p.c. card frames - Vero Electronics
Versa-Cage - p.c. card rack - Calabro Unitrack
Versa Cutter - cut-off machines - Foster & Allen
Versa-Fab - tape - General Elec.
Versa Feed - take-off machines - Foster & Allen
Versaframe - solid state logic modules - Design Prods.
Versa Gear - change gear timer - Foster & Allen
Versakrimp - solderless terminals & connectors - Waldom Elctrns.
Versakrimp - brazed seam uninsulated terminal - ETC
Versa - Lock - matv device lock - Blonder-Tongue Labs.
Versamount brackets - card guides brackets - Calabro Unitrack
VersaPac - miniature industrial relays - Hart-Advance Relay Div.
Versa-Prox - proximity switch - Electro Prods. Labs.
Versatap - matv tap offs - Blonder-Tongue Labs.
Vers-A-Wind - dc-powered winding drives - Hobbs Mfg.
Versilube - silicone lubricant - General Elec.
Vertohold - Embedment anchor - Edo Western
VG - switch - Vitramon
V-Guard - stylus assembly - Stanton Magnetics
VHT - chemical products - Sperex
Vibra-Ball - air-powered vibrator - Cleveland Vibrator
Vibrachopper - dc driven solid state chopper - Solid State Elctrns.
Vibra-Fork - resonant reed - Meson Elctrns.
Vibrakrimp - solderless terminals & connectors - Waldom Elctrns.
Vibrakrinp - vibration resistant terminal - ETC
Vibra-Might - air-powered vibrator - Cleveland Vibrator
Vibramike - optical displacement measuring device - AGAC-Derritron
Vibramite - velocity pick-up - MB Elctrns/Textron
Vibra-Mount - felt pads, vibration absorbing, non-skid - GAF
Vibra-Sonic - ultrasonic cleaners - Dri-Clave
Vibraswitch - monitoring sys - Robertshaw Controls
Vibra-Tel - monitoring sys - Robertshaw Controls
Vibrode - capacitor modulators - Beckman Instrs., (AISSD)
Vibro-Flo - epoxy coating powders - Armstrong Prods.
Vibro-Fluidizer - fluidized-bed coating equipment - Armstrong Prods.
Vibroground - ground resistance testers - Associated Resch.
Vibrolite - strobe accessory - Balance Technology
Vibropac I - vibration meter - Balance Technology
Vibropac II - vibration analyzer - Balance Technology
Vibrotest - megohmmeters - Associated Resch.
Vibrotron - transducer - Sundstrand Data Control
Vico - antennas - Video Inds.
Victor - engraving blocks - Hammel, Riglander
Victor Projectors - 16mm film projectors - Kalart Victor
Victor-Soundview - filmstrip & slide projectors - Kalart Victor
Vidac - instrumentation software - Vidar
Videocron - lenses - Cosmicar Optical Co.,
Video Sensor - motion detection device - GBC Closed Circuit TV
Videx - x-ray collimators - Machlett Labs.
Vidiac - video access equip. & sys. - Merchant, Robert C.
Vidifilm - video film chain - Merchant, Robert C.
Vidigage - thickness tester - Branson Instruments
Vidislide - video slide chain - Merchant, Robert C.
Vidissector - camera tubes - ITT Electron Tube
Vigiltrol - safety switch-high level alarm - Autocon Inds.
Viking - magnetic tape recording equipment - Telex Comm. Div.
Viking - battery chargers - Schauer Mfg.
Vikom - printed circuit connector - Viking Inds.
VI/LAM - plastic overlays - N/P
Vim - leather packings, belts - Houghton, E.F.
Vim - oils - Houghton, E.F.
Vinylug - vinyl insulated terminals - Burndy
Vip - time sequence programmer - Elctrn. Meas.
VIP - pocket pagers - Reach Elctrns.
V.I.P. fifty-six - environmental chambers - Lab-Line Instrs.
VIPS - isotopic power sys. - Sanders Nuclear
VirTronics - thermistor temperature indicators & controllers - VirTis
VI/Scan - record/reproduce system - Himmelstein, S.
Viscofilm - capacitor - Industrial Condenser
Viscorator - viscosimeter - Fischer & Porter
Viscosel - process mounted instrumentation - Brookfield Engrg. Labs.
Vise-Swing - heavy swing away vise storage - Textool Prods.
Visicator - display device - Bowmar Instr.
Visicorder - recording oscillograph - Honeywell
Visicounter - totalizers - Veeder-Root
Visi-Dial - dial assy. - Theta Instr.
Visigraph - recording oscilograph - Dixson
Visi-Guard - lightning & electrical surge protector - Joslyn Elctrn. Sys.
Visilite - light scattering plastic - Electro Optics Assocs.
Visi-Mag - making visible signals on magnetic tape - Magnecessories
Visiprinter - oscillograph digital recording accessory - Honeywell
VisStrip - viscous paint stripper - Oakite Prods.
Vistal - translucent high-alumina ceramic - Coors Porcelain
Vistaphone - picture telephone - Stromberg Carlson
Vistex - laminated rubber & felt sheets - GAF
Vita Drive - rubber drive wheel-cleaner - Friend's Mfg.
Vital - gear engine oils - Houghton, E.F.
Vitamin Q - paper capacitor - Sprague Elec.
Vitavox - speakers, horns & drivers - Ercona
Vi-Tite - bolted lug - Teledyne Penn-Union Elec.
Viton - synthetic rubber insulating mat'ls - E.I. DuPont DeNemours
Vitreosil - fused silica & fused quartz - Thermal Amer. Fused Quartz
Vitrohm - vitreous enamel wire-wound resistors - Ward Leonard
Vitrolain - ceramic products - Star Porcelain
Vix-Syn - rubber packings and "o" rings - Houghton, E.F.
VK - ceramic capacitor - Vitramon
VM *** - non-ferrous metals - Harmon Lichtenstein
Vocal-Amps - voice amplification sys - Bogen Div.
Vocal Master - amplification system - Shure Bros.
Voice Director - portable p.a. system - Argos Prods.
Voice-line - voice transmission system - Kahn Resch. Labs.
Voice of Music - phonographs, tape recorders & high fi. comps. - V-M
Voiceplex - hearing protector - Kahn Resch. Labs.
Vol-O-Flo - flowmeter, volumetric - Nat'l. Instr. Labs.
Voltarc - lamps & fluorescent tubing - Voltarc Tubes
Voltaut - taut-band suspension sys. - Kratos Instrument Div.
Volt-Pac - variable transformers - General Elec.
Voltprobe - voltage testers - Amprobe Instr.
Voltrap - surge suppressors - Westinghouse Elec.
Volt-Ref - voltage standards - Dynage
Voltrip - limit detection & control - Kratos Instrument Div.
Voltrol - constant voltage transformer - Acme Elec.
Voltsensor - voltage comparator - California Elctrn. Mfg.
Volumax - controller peak - CBS Laboratories
Vol-U-Meter - flow calibrator - Brooks Instr. Div.
V-Q - vacuum interrupters - Electric Machinery Mfg.
VRC - valves, gaskets & seals - Vacuum Resch. Mfg.
VSMF - documentation - Information Handling Svc.
VSMF - marine engineering - Information Handling Svc.
VSMF - ms drawings - Information Handling Svc.
VSMF - visual search micro film - Information Handling Svc.
VSMF - design engineering - Information Handling Svc.
VSMF - military specifications - Information Handling Svc.
VSMF - building products - Information Handling Svc.
VSMF - guide specs - Information Handling Svc.
V-Tip - valve - Vernay Labs.
Vu-Break - circuit breakers - General Elec.
Vuemaster - refrigeration products - Mueller Brass
VUfinder-Plus - antennas, log-periodic - Jerrold Elctrns.
Vulcoid - vulcanized fibre - Budd
Vulkaflex - cross-linked polyolefin cords & leads - General Elec.
Vulkene - cross-linked polyethlene insulated wires - General Elec.
Vulkene - heating cable - General Elec.
Vu-Point - position displays for machine tools - Remex Elctrns.
Vu-Scope - fiber optic inspection device - Dyonics
V V C - voltage variable semiconductor capacitor - Computer Diode
VX Super Refractory - crucibles, boats - Western Gold & Platinum
VY - porcelain capacitor - Vitramon
Vylex - laminate insulation - Berk Tek
Vyna-Kote - vinyl adhesive - Spectra-Strip
Vynaloy - sheet - Goodrich B. F. Chem.
Vynawood - vinly laminated cabinets - Taylor Millwork & Stair
V4 - superstrates - Materials Resch.

W

WABCO Minature Relays - small electro-mechanical switching devices - WABCO Aerospace Dept.
Wafercon - housing & terminals - Molex Prods.
Waferpot - potentiometer - New England Instr.
Walkie-Recprdall - conference recorder - Miles Reproducer
Wallbrand - soldering irons & soldering pencils - Wall Mfg.
Wall Covering - sound absorbent - Acoustone
Walsco - chems. - GC Elctrns.
Wametco - hydraulic presses - Wabash Metal Prods.
Warlite - melamime plastic - Warwick Prods.
Wasp - wrapost aluminum systems panels - Malco Mfg.
Wassco Glo-Melt - resistang-type soldering & thermal wirestripping equip. - American Elec. Heater
WAS 3000 - acoustic noise generator - Wyle Labs.
Watch Dog - fluorescent starters - General Elec.
Watco - elevator cabs - Watson Mfg.
Water-Bloc - flooding compound - Superior Continental
Water Mate - connectors - Electro Oceanics
Watertite - moisture resistant rubber insulation - Okonite
Watson - dryers, film loaders, etc. - Burke & James
Watson III, IV - photo repeater, manual - HLC Mfg.
Wattcher - rf monitor/alarm - Bird Elctrn.
Watts - record cleaning equip - Ortofon Div.
Waveform Eductor - single averager - Princeton Applied Resch.
Wavetrak - wave tracking device - Edo Western
Waybond - contact cement - Shamban, W.S.
Wayclean - copper cleaner - Hunt, Philip A. Chemical
Waycoat (a series of products) - photo resists and companion products - Hunt, Philip A. Chemical
Wearite - special copper base alloy - Mueller Brass
Wear-Tec - parts for the botteling industry - Cadilac Plastics & Chems.
Wearweld - hardsurfacing electrode - Lincoln Elec.
Weather-Ometer - accelerated weathering instrument - Atlas Electric Devices
Weblox - nonwoven fabrics - Kendall
Webloy - nonwoven fabrics - Kendall
Webril - nonwoven fabrics - Kendall
Wedge-Lock - shelving and racks - Republic Steel
Wee-Bit - delay line section - Nytronics
Wee-Chip Inductor - shielded chip inductor - Nytronics
Weecoil - if transformers, hf transformers - Syscon Int'l.
Weecoil - chokes, r.f. - Syscon Int'l.
Weecoil - variable inductors - Syscon Int'l.
Weecoil - miniature inductive components - Syscon Int'l.
Wee-Ductor - shielded inductor - Nytronics
Wee-Fil - miniature filter - Nytronics
Wee Fil - standard filter - Nytronics
Wee Line - delay line - Nytronics
Ween - propulsion systems - Mobil Elctrns.
Wee-Tran - miniature transformer - Nytronics
Wee-VL - variable inductor shielded - Nytronics
Wee-Wee-Ductor - shielded inductor - Nytronics
WEG Inserts - threaded inserts - Roylyn
Welderpower - welder/Aux. power generator - Lincoln Elec.
Weldox - adhesives compositions - Hardman
Weldpower - precision welders - Raytheon
Weldrawn - welded-and-drawn tubing - Superior Tube
'Welmegox' - high value resistors - Welwyn Elec.,
'Welmet' - metal film resistors - Welwyn Elec.,
Weltronarc - arc welder - Weltronic
Wenking - potentiostats - Brinkmann Instrs.
Wenking - potentiometer - Brinkmann Instrs.
Werx - general purpose gloves - Edmont-Wilson
Werx-Lite - light duty gloves - Edmont-Wilson
Wesche - motors & slip rings - Welco Inds.
Wesco - solenoids - West Coast Elec. Mfg.
Westach - electric tachometers - Westberg Mfg.
Westcoat - prot. coating - Western Coating
Westel - video recorders - Echo Science
Westime - time-shared comp. sys. - Western Telematic
West-ing Arc - elec. welding apparatus - Westinghouse Elec.
Westoflex - polyvinyl plastisol coating - Western Coating
Wes Top - wall coatings - Furane Plastics
Westwood - tools - Waldes Kohinoor
Whirlclad - fluidized bed coating system - Polymer
Whirlpool Mixers - chemical agitators - Standard Elec. Mfg.
Whirlwind - wire brushes - Black & Decker Mfg. Co., The
Whiskerloy - wisker metal composite - Artech
Whisper - fan - Rotron
Whit - screen press - Etchomatic
White-Bench - ultra-clean, conta..ination proof facility - Matthews Resch.
White Dot - pumice cleaner - Etchomatic
Whiz-Lock - locknut - MacLean-Fogg Lock Nut
Widebeta - radioactivity detection sys. - Beckman Instrs., (AISSD)
Wide-Vue - panel meters - Simpson Elec.
Wide Window - laminations - Thomas & Skinner
Widget - welder - Silver, G.H. & Assocs.
Widney-Dorlec - aluminum constructional system - Bridges Frank Assocs.
Wilbraz - brazing alloys - Wilkinson
Wilco - all products - Engelhard Minerals & Chemicals
Wilco - all products - Engelhard Minerals & Chem.
Wilcoloy E - copper spring material - Engelhard Minerals & Chem.
Wilcoloy E - copper spring material - Engelhard Minerals & Chemicals
Wild One - amplifier - Wilder Engrg. Prods.
Williams - high purity iron oxides - Pfizer-Minerals
Winchester Relays - Reed Relays - Elctrn. Instr. & Specialty
Winco - a.c. generator - Dyna Technology
Windjammer - vacuum-blower system - Ametek/Lamb Elec.
Winter Monkey Grip - foam insulated gloves - Edmont-Wilson
Winter Tuf Duk - foam insulated gloves - Edmont-Wilson
Wirecenter - semi-automatic wiring machine - Hughes Aircraft
Wire-Dial - terminal attaching machines - Kent
Wiretemp - wire temperature sensor - Trans-Met Engrg.
Wire-Wrap - machines and tools - Gardner-Denver
Wissh - chemical cleaner - Workman Elctrn. Prods.
WJH - hermetic sealed receptacles - Amp
Wolverine - loudspeakers - Electro-Voice
Wonder Flux - flux - Eutectic
Workmaster - screwdrivers - Stanley Tools
Wrap-A-Wire - wrapost p.c. terminals - Malco Mfg.
Wrap Rack - card packaging - Scanbe Mfg.
Wrap-X - logic card with 16-14 or 16 pin 1c sockets - Datascan
Wray - process lenses - Rank Precision Inds.
Wrinlay Process - markings for elect. panels - Photo Chemical Prods. Cal.
Write-On-It - labeling tape - Labelon
Wybar - component lead forming - Eraser
Wyr-Guide - audio wiring instructions - Cognitronics

X

X-Air - dilvent & air releasing compound & plastiayr - Isochem Resins
X-Citers - magnetic tape head - Michigan Magnetics
Xcite 1100 - vibration test sys. - Zonic Tech. Labs.
Xcite 1200 - vibration test sys. - Zonic Tech. Labs.
Xcite 1300 - vibration test sys. - Zonic Tech. Labs.
Xcite 1300T - vibration test sys. - Zonic Tech. Labs.
X-CJ - self powered cold junction reference source - Omega Engrg.
Xecon - conductive elastomer - Metex
Xela - scissors & knives - Klein, Mathias & Sons
Xenolite - arc lamp sys - Christie Elec.
Xetex - oscilloscopes - Marconi Instrs.
Xit Rod - grounding sys. - Javex Elctrns.
X-L - low cost power supply modules - Transistor Devices
X-Olene - cross linked polyethylene cable - Okonite
Xpedite - shoe machinery brushes - Felton, S.A. & Son
X Pert - complete line of typing supplies - Carter's Ink
X-Tract-O - fuse adapter removers - Trico Fuse Mfg.
Xtradur - soldering tips - Hexacon Elec.
X-Trube - plastic-coated steel tubing - Republic Steel
X-Tru-Coat - plastic-coated steel pipe - Republic Steel
X-Var - paint strippers - Fidelity Chem. Prods.
XY - dial telephone switching equipment - Stromberg Carlson
Xyron - electrodes - Eutectic
X-Y-Z Joystick Controls - controls, positioning - Bowmar Instr.

Y

Y-Adapter - mixers, adapters, audio accessories - Switchcraft
Yankee - spiral ratchet screwdrivers - Stanley Tools
Yankee Safety Cord - flexible cord type sto-sjto-svto - Plastic Wire & Cable
Yasec - machine tools, heat exchangers, lubricators and lubricating equipment - Yamashina Seiki Co.,
Yellow Handle - crimping tools - Amp
Yellow Jacket - wrapped capacitor - Sprague Elec.
Yellow Jacket Closure - splice closure - Communications Tech.
YEW - measuring instruments - Yewtec Corporation
Young Brothers - industrial ovens & dryers - Feco
Y Series - glass & quartz piston trimmers - JFD Elctrns./Sub. Riker-Maxson
Yttralox - transparent ceramic - General Elec.
Y4 - vacuum systems - Materials Resch.

Z

Z-Angle - measuring instrument - Bowmar/Ali
Zapping - coated paper - Hughes Aircraft
Zapping Paper - laser beams - Hughes Aircraft
'ZA' Pump - plastic chemical pump - Sethco Mfg.
ZenGard - high power transient suppressor - Motorola Semiconductor Prods.
Zero Amp - mixing amplifier - Spectra Sonics
Zero Halliburton - (aluminum luggage & camera cases) - Zero Mfg.

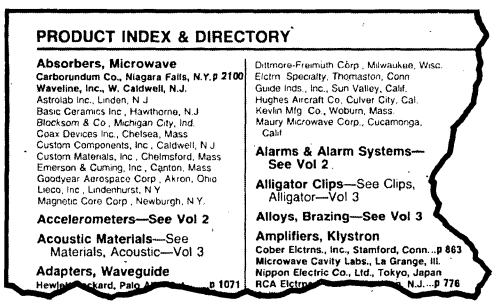
Zeromatic - ph measuring instrs. - Beckman Instrs., (AISSD)
Zero-Ply - (sandwich construction modular cases) - Zero Mfg.
Zero Space Series - (aluminum cabinets & consoles) - Zero Mfg.
Zero TC - zener diodes - Motorola Semiconductor Prods.
Zero-Trak - (steel chassis slides) - Zero Mfg.
Zestron - reed relays - Self-Organizing Sys.
Zip - high speed fet tester - IPT
Zip-Ex - emi cable shielding - Metex
Zip-Loc - stressed panel fastener - Deutsch Fastener
ZIP Sys. - automated circuit test sys. - Automation Dynamics
Zircoa-Cast - zirconia castable - Zirconium Corp. of Amer.
Zitex - fibrous, porous TFE membranes, thick sections - Chemplast
Z-Match - wideband transformers - Vari-L
Zodiac - hi-fi speaker sys - Hartley Prods.
Z-Tron - high-frequency dielectric materials - Polymer
Z Volt - zener voltage reference - General Resistance
Zyglo - fluorescent penetrant test - Magnaflux
Zytel - nylon insulating mat'ls - E.I. DuPont DeNemours

This is the last page of the Trade Name Index

How to use eem

to find manufacturers of a specific product

GREEN SECTION



PRODUCT INDEX & DIRECTORY

Absorbers, Microwave
Carborundum Co., Niagara Falls, N.Y. p 2100
Waveline, Inc., W. Caldwell, N.J.
Astrolab Inc., Linden, N.J.
Basic Ceramics Inc., Hawthorne, N.J.
Blocksom & Co., Michigan City, Ind.
Coax Devices Inc., Chelsea, Mass.
Custom Components, Inc., Caldwell, N.J.
Custom Materials, Inc., Chelmsford, Mass.
Emerson & Cuming, Inc., Canton, Mass.
Goodyear Aerospace Corp., Akron, Ohio
Lieco, Inc., Lindenhurst, N.Y.
Magnetic Core Corp., Newburgh, N.Y.

Accelerometers—See Vol 2

Acoustic Materials—See Materials, Acoustic—Vol 3

Adapters, Waveguide
Hewlett-Packard, Palo [illegible] p 1071
Dittmore-Freimuth Corp., Milwaukee, Wisc.
Electm. Specialty, Thomaston, Conn.
Guide Inds., Inc., Sun Valley, Calif.
Hughes Aircraft Co. Culver City, Cal.
Kevlin Mfg. Co., Woburn, Mass.
Maury Microwave Corp., Cucamonga, Calif.

Alarms & Alarm Systems—See Vol 2

Alligator Clips—See Clips, Alligator—Vol 3

Alloys, Brazing—See Vol 3

Amplifiers, Klystron
Cober Elctrns., Inc., Stamford, Conn...p 863
Microwave Cavity Labs., La Grange, Ill.
Nippon Electric Co., Ltd., Tokyo, Japan
RCA Elctrn[illegible] N.J....p 776

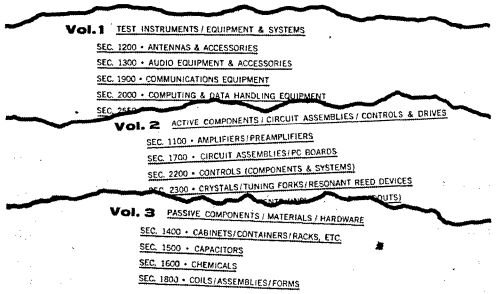
Each of the three volumes of **eem** contains a Product Index and Directory, the Green Section. This Index is a complete alphabetical listing of products. If the product you are looking for appears in the particular volume you are consulting, the green pages will provide a complete list of manufacturers who make that product. If the product is included in another volume of **eem**, the Index will provide a cross reference, directing you to the correct volume.

Boldface listings under product headings indicate that the listed manufacturer has products cataloged in **eem. Boldface** listings with page numbers indicate that this manufacturer's catalog pages include detailed data on the product indicated in the product heading.

Similar products are grouped together. For example, the many kinds of meters are listed in this manner: "Meters, Ampere," "Meters, Capacitance," "Meters, Flux" etc. To help you locate the prime product heading, there are hundreds of cross references, e.g. "Voltmeters — See Meters, Volt."

to find manufacturers' catalog information

WHITE SECTION



Vol. 1 TEST INSTRUMENTS / EQUIPMENT & SYSTEMS
SEC. 1200 • ANTENNAS & ACCESSORIES
SEC. 1300 • AUDIO EQUIPMENT & ACCESSORIES
SEC. 1900 • COMMUNICATIONS EQUIPMENT
SEC. 2000 • COMPUTING & DATA HANDLING EQUIPMENT
SEC. 25[illegible]

Vol. 2 ACTIVE COMPONENTS / CIRCUIT ASSEMBLIES / CONTROLS & DRIVES
SEC. 1100 • AMPLIFIERS/PREAMPLIFIERS
SEC. 1700 • CIRCUIT ASSEMBLIES/PC BOARDS
SEC. 2200 • CONTROLS (COMPONENTS & SYSTEMS)
SEC. 2300 • CRYSTALS/TUNING FORKS/RESONANT REED DEVICES
SEC. [illegible] • [illegible] (INPUT/OUTPUT)

Vol. 3 PASSIVE COMPONENTS / MATERIALS / HARDWARE
SEC. 1400 • CABINETS/CONTAINERS/RACKS, ETC.
SEC. 1500 • CAPACITORS
SEC. 1600 • CHEMICALS
SEC. 1800 • COILS/ASSEMBLIES/FORMS

Catalog pages in **eem** are divided into three volumes based on very broad product groupings. These are:

Volume 1 — Test Instruments / Equipment and Systems

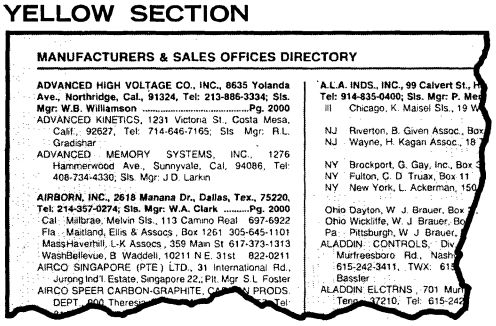
Volume 2 — Active Components / Circuit Assemblies / Controls and Drives

Volume 3 — Passive Components / Materials / Hardware

These volumes are further divided into 55 **eem** Product Sections which are assigned individually to the most appropriate volume. Within each of the 55 product sections manufacturers are arranged alphabetically, wherever possible. A complete index of all manufacturers' catalog pages is included in every volume. To locate the catalog pages of a specific manufacturer, refer to this index at the beginning of the white section in any of the three volumes. This index will provide the page numbers you require. In Volume 1, the index begins on page 302, in Volume 2 on page 1274 and in Volume 3, page 2310.

to find manufacturers' addresses, phones and sales offices

YELLOW SECTION



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Ill: Chicago, K. Maisel Sls., 19 W[illegible]
NJ: Riverton, B. Given Assoc., Box
NJ: Wayne, H. Kagan Assoc., 18[illegible]
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NY: New York, L. Ackerman, 150[illegible]
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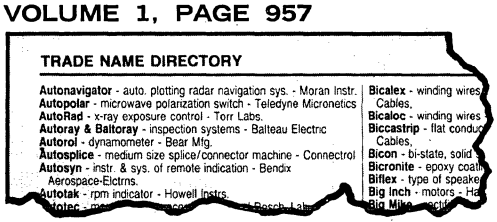
to find trade name sources

VOLUME 1, PAGE 957



TRADE NAME DIRECTORY

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Autopolar - microwave polarization switch - Teledyne Micronetics
AutoRad - x-ray exposure control - Torr Labs.
Autoray & Baltoray - inspection systems - Balteau Electric
Autorol - dynamometer - Bear Mfg.
Autosplice - medium size splice/connector machine - Connectrol
Autosyn - instr. & sys. of remote indication - Bendix Aerospace-Electrns.
Autotak - rpm indicator - Howell Instrs.
Autec - [illegible] - [illegible] Bosch Lab[illegible]

Bicalex - winding wires, Cables,
Bicaloc - winding wires
Biccastrip - flat conduc[illegible] Cables,
Bicon - bi-state, solid
Bicronite - epoxy coati[illegible]
Biflex - type of speake[illegible]
Big Inch - motors - Ha[illegible]
Big Mike - [illegible]

If you know only the trade name, brand name or trade mark of a product, you can locate it in **eem** by using the **Trade Name Directory.** This appears only in Volume 1, beginning on page 957 of the White Section. These pages can be identified by a vertical black band along the outside edge.

if you require additional assistance

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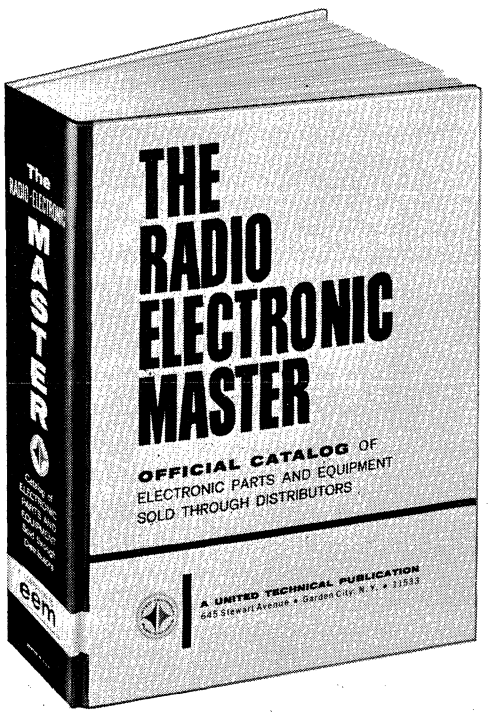

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American Electrical Heater Co.
American Geloso Electronics, Inc.
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American Zettler, Inc.
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Amperite Company, Inc.
Amphenol Sales Division
Amprobe Instrument Div. SOS Consolidated Inc.
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Atlas Sound, Div. American Trading & Production Corp.
Autotron, Inc.

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Birnbach Company, Inc.
Julius Blum & Co., Inc.
Bogen Division, Lear Siegler, Inc.
British Industries Company
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Burgess Battery/Gould, Inc.
Bussmann Mfg. Division McGraw-Edison Company

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Carling Electric, Inc.
Carter Motor Co.
Channellock, Inc.
Chemical Electronic Engineering, Inc.
Chemtronics Inc.
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C. P. Clare & Co.
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Columbia Electronic Cable
Concord Electronics Corp.
Consolidated Wire & Associated Corps.
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Crystek Div. of Whitehall Electronics
Curtis Development & Mfg. Co.

Dalum Electronics & Cable Corp.
Dale Electronics Inc. Subsidiary of Lionel Corp.
Datak Corporation, The
Delco Radio Division of General Motors
Delevan Division, American Precision Industries, Inc.
Desco Manufacturing Co.
Dialight Corp. (Dialco)
Dow-Key, Sub. of Kilovac Corp.
Drake Company, R. L.
Drake Manufacturing Company
Dutrex Industries, Inc.

ENM Company
E-Z-Hook Test Products
Ecco Connector A Div. of Phaostron Instrument & Electronics Co.
Edsyn Incorporated
Elco Corporation
Electro-Mechanical Instrument Co., Inc., (EMICO)
Electro Products Laboratories, Inc.
Electro-Voice, Inc. A Subsidiary of Gulton, Inc.
Electronic Controls, Inc.
Electronic Molding Corporation
Electrons Company (A unit of General Signal Corporation)
Elmenco
Enterprise Development Corp.
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Essex International, Inc. Controls Div. Stancor Products
Essex International, Inc. Electronic Wire & Cable Controls Div.
Eveready

Fedtro, Inc.
Fire Control Company, Inc.
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Freed Transformer Co., Inc.

GC Electronics Co.
Gamble Industries, Charles T.
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J-B-T Instruments, Inc.
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Jonard Industries Corp.

Kedman Co.
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Kilovac Corporation
Kulka Electric Corporation
Kurz-Kasch, Inc.

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Sarkes-Tarzian Inc.
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Staco, Inc.
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Sticht Co., Inc., Herman H.
Superior Electric Co., The
Switchcraft, Inc.

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Write – call your local electronic distributor listed on following pages!

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Birmingham—
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Forbes Distributing Co., 1416 4th Ave. So.
Decatur—
Forbes Distributing Co., 1522 Fifth Ave. S.E.
Mock Distrib. Co., Inc., 902 Bank St.
Dothan—Hand Supply Co., 705 S. Oates St.—P.O. Box 1430
Gadsden—Southeastern Radio, 304 So. 4th St.
Huntsville—Mock Electronics, Inc., 2310 Memorial Parkway, S.W.
Mobile—Forbes Electronics Dists. Inc., 14 Midtown Park, West
Grice Electronics, Inc., 1514 S. Beltline Hwy.
Nelson Radio & Supply, 1541 S. Beltline Hwy.
Montgomery—Forbes-Godfrey Electronics Inc., 915 S. Court St.
Handey's Electr. Center, Inc., 205 Commerce St.
Southeastern Radio, 635 E. Jefferson St.
Muscle Shoals—
Jones Electronics Inc., 902 Woodward Ave.
Selma—Southeastern Radio Parts Co., 729 Jefferson Davis Ave.
Sheffield—Mock Radio & Electronics, Inc., 107 No. Montgomery Ave.

ALASKA

Anchorage—
Yukon Radio Supply, 3222 Commercial Drive
Fairbanks—Yukon Radio Supply, 1112 Cushman

ARIZONA

Phoenix—Dalis Electr. Supply, 917 N. 7th St.
Tucson—Inland Electronic, 715 E. Broadway

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Blytheville—
Bluff City Dist. Co., 113 S. Division
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Jonesboro—Bluff City Dist., 324 W. Huntington
Little Rock—Carlton-Bates Co., 1210 E. 6th St.
Southern Electronics, 1419 Main St.
Pine Bluff—Carlton-Bates Co., 1510 State St.

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Hayward—Dunlap Electronics, 25354 Cypress
Hollywood—
Yale Radio Electric Co., 6616 Sunset Blvd.
Los Angeles—Calif. Electrs, 1911 Armacost Ave.
Radio Products Sales, 1501 So. Hill St.
Mt. View—Brill Electrs., 1065 Terra Bella Ave.
Dunlap Electrs., 2025 Old Middlefield Way
Oakland—Brill Electronics, 610 E. 10th St.
Sacramento—Dunlap Electronics, 1800 18th St.
Sacramento Electronic Supply, 1219 S. St.
San Diego—Shanks & Wright, 2045 Kettner Blvd.
Western Radio, 1415 India St.
San Francisco—Zack Electronics, 1444 Market St.
San Jose—Quement Electrs., 1000 S. Bascom
Sunnyvale—Sunnyvale Electrs., 548 S. Murphy

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Calgary, Alberta—Canadian Electronics Ltd., 457-42nd Ave. S.E.
Quebec City, Quebec—Crobel, Ltd., 225 Rue Lee
Sept-Iles, Quebec—
Eastern Electronics Inc., 765 Laure Blvd.
Sherbrooke, Quebec—Sherbrooke Electronic Supply Inc., 522 Galt St. W.
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Electro Sonic Supply Co. Ltd., 543 Yonge St.
Vancouver, B.C.—
L.A. Varah, Ltd., 1250 W. 6th Ave.

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Newark-Denver Electr. Supply, 2170 S. Grape
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Walker Electronics Inc., 537 N. First
Greeley—Walker Electronics Inc., 1525 8th Ave.
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Darien—Springdale Electronic Corp., 110 Post Rd.
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Connecticut Electro Sales, 1601 Dixwell Ave.
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Sceli Electronics, 78 Maple Ave.
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Stamford—
Westchester Electrs., 181 Stillwater Ave.
Waterbury—
Hatry Electronics, 480 Watertown Ave.

DELAWARE

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Grice Electronics, Inc., 280 N. Eglin Pkwy.
Miami—Electro-Standards Labs, Inc., 3560 N.W. 34th St.
Electronic Equipment Co., Inc., 2701 N.W. 42nd Ave.
Walder Electronic Dists., 1801 N.E. 2nd Ave.
Orlando—
Hammond Electrcs., 911 W. Central Ave.
Pensacola—
Grice Electronics, Inc., 320 E. Gregory St.
St. Petersburg—
Mountain Electronics Inc., 2875 46th Ave. No.
Tampa—Leader Electr. Distributors, Inc., 3411 South Dale Mabry Hwy.
Lykes Electronics Corp., Thurow Division, 121 S. Ashley Dr.
W. Palm Beach—Mountain Electronics Inc., 1000 N. Dixie Highway

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Athens—
Southeastern Radio Parts Co., 393 Finley
Atlanta—Ack Radio Supply Co. of Ga., 554 Deering Rd. N.W.
Jackson Electronics Co., 1135 Chattahoochee Ave., N.W.
Southeastern Radio Parts Co., 430 W. Peachtree St. N.W.
Specialty Distributing, 763 Juniper St., N.E.
Augusta—
Dixie Radio Supply, 1234 Gordon Park Rd.
Gainesville—
Southeastern Radio Parts Co., 412 Oak St.

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Hapeville—Southeastern Radio Parts Co., 565 N. Central Ave.
La Grange—
Southeastern Radio Parts Co., 206 Ridley Ave.
Macon—Southeastern Radio Parts Co., 866 2nd
Rome—
Southeastern Radio Parts Co., 248 N. 5th Ave.
Savannah—
Southeastern Radio Parts Co., 545 E. York

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Honolulu—
Honolulu Electronics, 819 Keeaumoku St.
Industrial Electronic, Inc., 646 Queen St.
Precision Radio, Ltd., 1160 S. King St.
Service Appliance & Electrs., Div/Servo Pacific Inc., 556 Pohukaina

IDAHO

Boise—Kimball Electrs., 418 N. Orchard

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Rinoldi Sales, 6319 No. Central
Danville—Bud Electr. Supply, 22 N. Jackson St.
Decatur—
Klaus Radio & Electric, 370 E. Cerro Gordo
Jacksonville—Baptist Electronic Supply Co., 419 S. Mauvaisterre St.
La Salle—Klaus Radio & Electric, 1055 First
Palatine—Ohmtronics, Inc., 649 Vermont Ave.
Peoria—Klaus Radio & Electric Co., 8400 Pioneer Industrial Park
Quincy—Klaus Radio & Electric, 1101 S. B'dway

INDIANA

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Seybert's Radio Supply Inc., 1331 Main St.
Evansville—
Ohio Valley Sound Inc., 20 E. Sycamore St.
Ft. Wayne—Ft. Wayne Electrs., 3606 E. Maumee
Indianapolis—Graham Electrs., Supply, Inc., 133 S. Pennsylvania St.
Graham Electronics, 6101 N. Keystone
Ra-Dis-Co., Inc., 814 N. Senate Ave.
Kokomo—
Servi-Tronics, Inc., 320 W. Superior St.
Lafayette—
Lafayette Radio Electrs., 408 North St.
Michigan City—Tri-State Electrical Supply Inc., 3320 S. Wabash St.
Muncie—Muncie Electronics, 222 No. Madison
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T.C.R. Distributors, 1205 E. River Dr.
Radio Trade Supply Co., 1017 High St.
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Owensboro—Ohio Valley Sound, 600 W. 3rd St.

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Alexandria—Ralph's, 601 N. 3rd St.
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Davis Wholesale Electronic Supply Co., 3575 Choctaw Dr.
Ralph's 1732 Plank Rd.
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Gretna—EPCOR, 723 Franklin St.
Lafayette—Ralph's, 3004 Cameron St.
Lake Charles—Ralph's, 911 4th Ave.
Metairie—
Sterling Electronics, 5029 Veterans Hwy.
Morgan City—Ralph's, 715 Brashear St.
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New Orleans—Columbia Radio & Sup., 3940 3rd
EPCOR, 3308 Orleans Ave.
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Shreveport—
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Interstate Electric Co., Inc., 1419 Culpepper St.
Koelemay Electronics, 2530 Linwood Ave.
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Henry O. Berman Co., Inc., 12 E. Lombard St.
General Radio Electronics Inc., 2207 E. Joppa Rd.
Radio Electric Service Co. of Pa.

Bethesda—Empire Electr. Sup., 4907 Rugby Ave.
Hagerstown—
Stoddard Supply Co., 354 S. Cannon Ave.
Hyattsville—
Milgray/Washington, 5405 Lafayette Pl.
Rockville—Capitol Radio Wholesalers, Inc., 12270 Wilkins Ave.

MASSACHUSETTS

Boston—
Sager Electrical Supply Co., 172 High St.
Burlington—
Milgray/New England, 79 Terrace Hall Ave.
Cambridge—Electrical Supply Corp., 205 Alewife Brook Parkway
Fitchburg—
Radio Maintenance Supply Co., 1334 Water St.
Lexington—Harvey/R&D, 44 Hartwell Ave.
Lynn—Land Electronics Supply Co., Inc., 9R Franklin St.
No. Wilbraham—Industrial Components Corp., 2551 Boston Road
Springfield—Del Padre Supply of Springfield, 999 Worthington St.
Soundco Electronics Corp., 2095 Roosevelt Ave.
Westwood—Eastco, 26 Dartmouth St.
Worcester—
Radio Maintenance Supply Co., 80 Thomas St.

MICHIGAN

Flint—
Shand Electronics, Inc., 2401 S. Dort Hwy.
Marquette—
NWR Electrs. Corp., 1010 W. Washington
Romulus—Harvey/Detroit, 36312 Ecorse Road

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Duluth—Northwest Radio, 123 E. 1st St.
Edina—Lew Bonn Co., 7275 Bush Lake Rd.
Minneapolis—Electronic Center, 107 3rd Ave. N.
St. Paul—
Electronic Center, 312 W. University Ave.

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Jackson—Ellington Electronic Supply, 824 South Gallatin St.
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Swan Electronics, 342 N. Gallatin St.
McComb—Risher Radio Supply Co., Inc. 401 S. Broadway
Meridian—
Risher Radio Supply Co., Inc., 3510 8th St.
Pascagoula—
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Ralph's, 2102 Ingalls Ave.
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Burstein-Applebee Co., 301-305 E. 55 St.
McGee Radio Co., 1901 McGee St.
Norman Electr. Supply Co., 3814 Main
Radiolab, Inc., 3814 Main
Walters Radio Supply Inc., 3627 Main St.
St. Louis—Radonics-Electrs., 4445 Gustine Ave.
Van Sickle Radio-Electronics, Inc., 1915 Washington Ave.
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Omaha—J-B Distributing Co., 1616 Cass St.
Radio Equipment Co., 625 N. 18th St.

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Industrial Electronics, 300 W. Utah

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Manchester—RSL Distrs., 670 Chestnut St.

NEW JERSEY

Camden—General Radio Supply, 600 Penn St.
Lectronic Distributtors, Inc., 1423 Ferry Ave.
Radio Electric Service Co. of Pa., 211 Market St.
Cherry Hill—
Milgray/Delaware Valley, 1165 Marlkress Rd.
RESCO Electronics, Cherry Hill Mall Dr., Rt. 38
Clifton—Eastern Radio Corp., 312 Clifton Ave.
Harvey/New Jersey, 375 Allwood Road
Irvington—
Kevtron Electronics Corp., 702 So. 21st St.
Pennsauken—Radio Electric Serv. Co. of Pa., Airport and Central Highways
Airport Industrial Park
Totowa—Arrow Electronics Inc., 225 Route 46

NEW MEXICO

Albuquerque—
Walker Radio Co., 102 Granite Ave. N.W.

NEW YORK

Batavia—Radio Equipment Corp., 5 Center St.
Bayside—
Arrow Electronics Inc., 207-02 Northern Blvd.
Binghamton—
Harvey/Federal, Vestal Parkway East
Stack Indl. Electrs. Inc., 45 Washington St.
Brooklyn—Laco Indus. Electrs., 4924 4th Ave.
Buffalo—Radio Equipment Corp., 196 Vulcan St.
Radio Equipment Corp., 3240 Sheridan Drive
Summit Distributors Inc., 916 Main St.
Cheektowaga—
Harvey/Buffalo, 1517 Cleveland Drive
Radio Equipment, 1532 Walden Ave.
Elmsford—
Melville Radio Corp., 1 Nepperhan Ave.
Farmingdale—
Arrow Electronics, Inc., 900 Route 110
Harrison Electronics Corp., 20 Smith St.
Flushing—Allen Electronics, Inc., 41-42 Main
Arrow Electronics, Inc., 207-02 Northern Blvd.
Freeport—Milgray/New York, 191 Hanse Ave.
Glens Falls—Ray Supply Inc., Upper Glen St.
Hempstead—
Davis Electronics Corp., 204 Main St.
Electronic Equipment Co., Inc., 741 Peninsula Blvd.
Jamaica—Harrison Radio Co., 139-20 Hillside Ave.
Lafayette Radio Electrs., 165-08 Liberty Ave.
Norman Radio Distrs., 94-29 Merrick Blvd.
Long Island City—
Dalis Industrial Electronics, 35-35 24th St.
Lynbrook—Peerless Radio Corp., 19 Wilbur St.
Mineola—
Arrow Electronics Inc., 525 Jericho Turnpike
Nanuet—Arrow Electronics Inc., 195 W. Route 59
New York—
Arrow Electronics Inc., 97 Chambers St.
Center Industr. Electrs., 15-17 E. 16th St.
Harrison Radio Co., 8 Barclay St.
Harvey/Pro Audio/Visual, 2 West 45th St.
Midway Industrial Electronics, Inc., 38 E. 29th St.
Midway Radio & Television, 58 W. 45th St.
Newburgh—Chief Electronics, 248 Washington
Niagara Falls—
Radio Equipt. Corp., 1720 Pierce Ave.
Olean—Radio Equipt. Corp., 1615 West State
Poughkeepsie—Chief Electrs., 14 N. Bridge St.
Richmond Hill—
Anchor Electronic Dist., 116-01 101st Ave.
Rochester Radio Supply, 140 W. Main St.
Syracuse—Morris Electronics of Syracuse, Inc., 1153 W. Fayette St.
White Plains—Westchester Electronics, Inc., 610 Mamaroneck Ave.
Woodbury—
Harvey/New York, 60 Crossways Park West

NORTH CAROLINA

Asheville—Freck Radio & Supply Co., Inc., 38-40 Biltmore Ave.
Freck Radio & Supply Co., 1074 Patton Ave.
Charlotte—Dixie Radio Supply, 2220 So. Tryon
Durham—Womack Electr. Supply Co., Inc., Box 1808, 511 Ramseur St.
Gastonia—
Dixie Radio Supply, 507 W. Airline Ave.
Greensboro—
Carolina Radio Supply Co., 838 Huffman St.
Hickory—
Freck Radio & Supply Co., 1012 Hgwy. 64-70
Raleigh—Southeastern Radio Supply, 414 Hillsborough St.
Shelby—Freck Radio & Sup., 402 W. Dixon Blvd.

OHIO

Akron—Sun Radio Co., 110 E. Market St.
Ashtabula—Sim's Electronic Supply Co., Inc., 4933 West Ave.
Cincinnati—Mytronic Co., 1843 N. Reading Rd.
United Radio, Summit Rd. & Reinhold Dr.
Cleveland—
Arrow Electronics, Inc., 23945 Mercantile Rd.
Milgray/Cleveland, 1821 E. 40th St.
Winteradio Electr. Sup., 1468 W. 25th St.

(Continued on next page)

Contact Your Local Distributor For The 1971 Radio-Electronic MASTER

OHIO (cont'd.)

Columbus—Thompson Electronic Supplies, Inc., 182 E. Long St.
Dayton—
Arrow Electronics Inc., 3100 Plainfield Rd.
Stotts-Friedman Co., 108 N. Jefferson St.
Lima—Lima Radio Parts Co., 600 N. Main St.
Parma—Winteradio Electr. Sup., 5373 Ridge Rd.
So. Euclid—
Winteradio Elect. Supply, 4432 Mayfield Rd.
Warren—REM Electrs., Sup., 264 W. Market St.

OKLAHOMA

Ada—Trice Wholesale Electrs., 231 N. Francis
Ardmore—Trice Wholesale Electrs., 709 Grand
Enid—Trice Wholesale Electrs., 223 E. Randolph
Lawton—Trice Wholesale Electrs., 30 "E" St.
McAlester—
Trice Wholesale Electronics, 529 No. Main
Muskogee—
Trice Wholesale Electronics, 211 Callahan
Oklahoma City—Radio, Inc., 903 North Hudson
Trice Wholesale Electrs., 4701 N. Stiles Ave.
Trice Wholesale Electronics, 800 No. Hudson
Wholesale Electronic Supply, 26th & Lincoln
Okmulgee—
Trice Wholesale Electronics, 120 N. Oklahoma
Ponca City—
Trice Wholesale Electronics, 607 No. First St.
Tulsa—Burstein-Applebee Co.,
c/o Crossroads Shopping Center,
6353 E. 41st St.
Oil Capitol Electronics Corp., 708 So. Sheridan
Radio, Inc., 1000 South Main St.
Trice Wholesale Electronics, 730 So. Utica

OREGON

Klamath Falls—RF Supply Co., 509 Commercial
Medford—Verl G. Walker Co., 205 W. Jackson St.
Portland—Almac/Stroum Electronics,
8888 S. W. Canyon Road
JW Electronics, Inc., 2030 S. E. 7th Ave.

PENNSYLVANIA

Allentown—A. A. Peters, Inc., 404 Union Blvd.
Radio Electric Service Co., 425 Hanover Ave.
Braddock—
M. Leff Radio Parts, 225 Braddock Ave.
Carlisle—Cumberland Electrs., 810 No. Hanover
Drexel Hill—Kass Electronics Distributors,
2502 Township Line Rd.
Easton—Radio Elec. Serv. Co., 1700 Northampton
Erie—J. V. Duncombe Electr., 721 Parade St.
Folcroft—Arrow Electronics, Inc.,
700 Carpenter's Crossing
Harrisburg—Cumberland Electrs., 1345 So. 12th
Lancaster—
Barbey Electronics, 622 Columbia Ave.
Lebanon—
Barbey Electronics, 821 Quentin Rd.
Norristown—
Phila. Electronics Inc., 624 W. Airy St.
Philadelphia—
A. C. Radio Supply Co., 1539 W. Passyunk Ave.
Phila. Electronics, Inc., 1225 Vine St.
Radio Electric Service Co. of Pa.,
5930 Market St.
Radio Electric Service Co. of Pa.,
6587 Roosevelt Blvd.
Simco Electrs., Inc., 3907-11 N. Broad St.
Eugene G. Wile, 218 South 11th St.
Pittsburgh—Cameradio Co., 2801 Liberty Ave.
Pottstown—Barbey Electronics, 157 N. York St.
Pottsville—Moyer Electronic Supply Co., Inc.,
330 E. Norwegian St.
Reading—Barbey Electronics, 333 N. 4th St.
Electronic & TV Distrs., Inc., 201 So. 4th St.
Upper Darby—Radio Electric Service Co. of Pa.,
7911 W. Chester Pike
Willow Grove—Radio Electric Service Co. of Pa.,
29 York Rd.

RHODE ISLAND

Cranston—
Jabbour Electronics Inc., 840 Dyer Ave.
Pawtucket—
Jabbour Electronics Inc., 20 Woodbine St.
Providence—
William Dandreta & Co., 28 Wolcott St.
Warwick—
W. H. Edwards, Inc., 55 Electronic Drive

SOUTH CAROLINA

Anderson—
Dixie Radio Supply, 1206 S. Murray Ave.
Charleston—Radio Laboratories, 475 E. Bay St.
Wholesale Radio Supply Inc., 515 E. Bay St.
Columbia—Dixie Radio Supply, 1900 Barnwell
Southeastern Radio Parts Co., 1606 Gregg
Florence—Dixie Radio Supply, 531 Palmetto
Greenville—Dixie Radio Supply, 500 Pendleton
Greenwood—Dixie Radio Supply, 116 Circular St.
Spartanburg—Dixie Radio Sup., 208 E. St. John
Sumter—Dixie Radio Supply, 25 Guignard Dr.

TENNESSEE

Bristol—Clark Radio Supply, 1130 W. State
Johnson City—
Freck Radio & Supply, 1611 W. Market St.
L & S Electronics, 501 So. Roan St.
Kingsport—Radio Elec. Sup., 961 E. Sullivan
Knoxville—Bondurant Bros. Co., 906 Sevier Ave.
Industrial Electronics, Inc.,
Gov. John Sevier Hwy.
Mountain Electronics Inc.,
2211 Dutch Valley Rd.
Roden Electrical Supply Co.,
205 Oklahoma, N.W.
Memphis—Bluff City Distributing, 234 East St.
Nashville—Braid Electric Co., 1101 McGavock St.
Electra Distrib. Co., 1914 West End Ave.
Union City—Bluff City Dist. Co., 306 S. Second

TEXAS

Amarillo—Nunn Electric Supply, 119 Polk St.
Trice Wholesale Electronics, 1014 W. Sixth
Austin—Electrotex, 914 W. 12th St.
Hargis-Austin, Inc., 410 Baylor St.
Beaumont—Electrotex, 1275 E. 11th St.
Ralph's, 1293 Broadway
Bellaire—Tele-Radio, Inc., 5202 Bissonnet
Borger—Trice Wholesale Electrs., 500 W. 3rd
Corpus Christi—Alltec Electronics Corp.,
3854 S. Padre Island Dr.
Electrotex, 1800 Ayers
Wicks Radio Equipment Co.,
513-515 S. Staples St.
Dallas—Crabtree's Electronics, 2608 Ross Ave.
Crabtree's Electronics,
254 W. Carpenter Freeway
Crabtree's Electronics,
11430 N. Central Expressway
Crabtree's Electronics,
3510 Marvin D. Love Freeway
Crabtree's Electronics, 4428 Lemmon Ave.
Electronic Center, Inc., 2929 N. Haskell
Trice Wholesale Electronics, 2914 Commerce
Wholesale Electronic Supply, 2809 Ross Ave.
El Paso—Midland Specialty, 2235 Wyoming Ave.
Nunn Electric Supply, 2137 Mills Ave.
Fort Worth—
Crabtree's Electronics, 2939 W. 7th St.
Swieco, Inc., 1518 E. Lancaster
Trice Wholesale Electronics, 104 South Main
Wholesale Electronic Supply, 520 So. Freeway
Houston—Electrotex Corp., 2300 Richmond
Electrotex, 512 Crosstimbers
Geophysical Supply Co., 1500 Crawford St.
Lenert Co., 1420 Hutchins
Sterling Electrs., 4201 Southwest Freeway
Universal Electronics Supply Inc., 5723 Savoy
Killeen—Trice Wholesale Electrs., 709 N. 8th
La Marque—Electrotex, 216 Byrd St.
Laredo—Guarantee Radio Sup., 1314 Iturbide

TEXAS (cont'd.)

Longview—
Wholesale Electronic Supply, 203 So. High
Lubbock—
Nunn Electric Supply Corp., 1801 4th St.
R & R Electronic Supply, 1607 Ave. G
Trice Wholesale Electronics, 1812 Ave. "Q"
Lufkin—Electrotex, 407 Atkinson Drive
Midland—
Trice Wholesale Electrs., 1907 W. Industrial
Odessa—
Midland Specialty Co., 2101 Andrews Hwy.
Pampa—Trice Wholesale Electrs., 400 S. Russell
Port Arthur—
Texas Electronics Co., 1236 Seventh St.
San Antonio—Electrotex Corp., 910 W. Laurel
Sherman Electronics Supply, Inc.,
722 San Pedro Ave.
Sterling Electronics, 4600 San Pedro Ave.
Sherman—
Trice Wholesale Electronics, 306 S. Crockett
Temple—Trice Wholesale Electrs., 217 No. Main
Texarkana—
McCulloch Electr. Sup., 1222 Main St.
Tyler—East Texas Electronics, Inc.,
119-121 So. Glenwood Blvd.
Victoria—Electrotex, 1007 N. Williams
Waco—
Wholesale Electronic Supply, 1400 Washington
Wichita Falls—
Trice Wholesale Electrs., 1502 11th St.
Wholesale Electronic Supply, 1006 Holiday

UTAH

Salt Lake City—
Kimball Electrs., 350 Pierpont Ave.
Standard Supply Co., 225 E. 6th South St.

VIRGINIA

Alexandria—Certified Electrs., 1313 Powhatan
Norfolk—Avec Electronics, 711 Granby St.
Cain Electronics Co., 1530 Ingleside Rd.
Priest Electronics, Inc., 6431 Tidewater Dr.
Portsmouth—Distributors, Inc., 710 County St.
Richmond—Avec Electrs., 2002 Staples Mill Rd.
Roanoke—Avec Electronics, 2009 Williamson Rd.
H. C. Baker Sales Co., 19 Franklin Rd. S.W.
Staunton—
Southern Electric Corp., 818 Greenville Ave.
Virginia Beach—
World Electronics, 206 Jersey Ave.
Winchester—
Stinson Elects. Inc., 2149 Valley Ave.

WASHINGTON

Bellingham—Advanced Electronics, 804 Dupont
Olympia—J. W. Electronics, 2921 Pacific Ave.
Seattle—Pacific Electrs. Sales, 1209 First Ave.
Almac/Stroum Electronics, 5811 6th Ave. So.
Amateur Radio Supply Co.,
d/b/a/ Radio Supply Co., 6213 13th Ave. So.
Western Electrs., Co., 717 Dexter Ave. N.
Spokane—Columbia Electric, E. 3420 Ferry Ave.
Tacoma—C & G Electrs., Co., 2502 Jefferson Ave.

WEST VIRGINIA

Charleston—Mountain Electrs., 1605 4th Ave.

WISCONSIN

Fond du Lac—
Wisconsin Electr. Sup. 223 N. Seymour St.
Green Bay—Northern Radio & Telev., 1585 Main
Milwaukee—
Marsh Radio Supply, 6047 W. Beloit Rd.
Radio Parts Co., Inc., 1314 N. 7th St.

This is the last page of Volume 1, Catalog Section

Next page starts Manufacturers and Sales Offices Directory

MANUFACTURERS AND SALES OFFICE DIRECTORY

This is an alphabetical listing of more than 6,000 manufacturers supplying electronic equipment, instrumentation, components, materials and fabrication services. Included for each company are address, telephone number and name of the key sales executive.

Bold Face listings indicate those manufacturers who have information in the catalog sections (white pages) of the three volumes of **eem**. Their page numbers are included, as well as listings of their local sales offices. Sales offices are listed by state and city. Look for the sales office nearest you. Be sure to ask the sales office if there is a distributor of electronic parts nearby who handles the line in which you are interested.

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1971-72

note:
This same directory appears in all three volumes of eem.

A & D ELECTRICAL INSTRS., 73-07 88th St., Glendale, N.Y., 11227, Tel: 212-275-6516; Sls. Mgr: D.B. Schettini
A & M INSTRUMENT, INC., Community Dr., Great Neck, N.Y., 11022, Tel: 516-487-0330, TWX: 510-223-0888; Sls. Mgr: P. Stitzer
AAI CORP., P.O. Box 6767, Baltimore, Md., 21204, Tel: 301-666-1400, TWX: 710-232-1800; Sls. Mgr: K.E.

AARON-DAVIS CO., 1150 S.Beverly Dr., Los Angeles,, Cal., 90035, Tel: 213-553-8121; Sls. Mgr: R. Alan Pg. 616
AAVID ENGRG., INC., 30 Cook Ct., Laconia, N.H., 03246, Tel: 603-524-4443; Sls. Mgr: P.A. Johnson
AB RIFA, See LM Ericsson
ABACUS ELCTRNS. CORP., 10 Hudson Terr., Dobbs Ferry, N.Y., 10522, Tel: 914-693-1450; Sls. Mgr: M. Meola
ABADAK INDS., INC., 200 Allen Blvd., Farmingdale, N.Y., 11735, Tel: 516-249-7246
ABALON PRECISION MFG. CORP., 540 Casanova St., Bronx, N.Y., 10474, Tel: 212-LU-9-5682; Pres: L. Orent
ABBEON, INC., 179-15 Jamaica Ave., Jamaica, N.Y., 11432, Tel: 212-AX-7-5600; Sls. Mgr: F.W. Wertheim
ABBEY ELCTRNS. DIV., Liquidonics Inc., 45 S. Service Rd., Plainview, N.Y., 11803, Tel: 516-293-6800; Sls. Mgr: R.R. Reinhardt
ABBOTT PRODS., INC., 14-10 123rd St., College Point, N.Y., 11356, Tel: 212-FL-8-1400; Pres: B.A. Jacobson

ABBOTT TRANSISTOR LABS., 5200 W. Jefferson Blvd., L.A., Cal., 90016, Tel: 213-WE-6-8185; Sls. Mgr: R. Baldarrama ..... Pgs. 618-632,2948,2949
NJ Ft. Lee, Abbott Transistor Labs., 1224 Anderson Ave. 201-224-6900
ABESTO CORP., Ackerman St., Bloomfield, N.J., 07003, Tel: 201-338-6814; Sls. Mgr: R.W. Kay
ABLESTIK ADHESIVE DIV., Ablestik Labs., 833 West 182nd St. E., Gardena, Calif., 90248, Tel: 213-321-6252 H.E. Harris
ABLETECH, Div. of Ablestik Labs., 544 West 182nd St., Gardena, Calif., 90248, Tel: 213-321-0933; Gen'l. Mgr: R.E. Herzman
ABPHOT, 105 W. 27th St., New York, N.Y., 10001, Tel: 212-242-1307; Sls. Mgr: D. Andreycak
A. J. ABRAMS CO., Box 571, Westport, Conn., 06880, Tel: 226-3010; Sls. Mgr: A.J. Abrams

ABRAMS INSTR., 606 E. Shiawassee St., Lansing, Mich., 48901, Tel: 517-484-9441, TWX: 810-251-0785; Sls. Mgr: G. Michael
ABSCOA INDS., 1071 W. Arbor Vitae, Inglewood, Calif., 90301, Tel: 213-776-4561, TWX: 910-328-6180; Sls. Mgr: J.J. Cassidy
ABTRONICS, INC., Box 712, Livermore, Calif., 94550, Tel:

A C ELECTRONICS CO., 2928 Nebraska Ave., Santa Monica, Cal., 90404, Tel: 213-829-2611; Sls. Mgr: Don Balos
A C TRANSFORMER CORP., 89 Madison St., Newark, N.J., 07105, Tel: 201-589-8574; Sls. Mgr: G. Giangrande
ACCEL IND'L. HEAT SINK, 5338 Alhambra Ave., Los Angeles, Cal., 90032, Tel: 213-221-5851; Sls. Mgr: H.B. Hermann

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ACCRATRONICS SEALS CORP., 2121 Kenmere Ave., Burbank, Calif., 91504, Tel: 213-TH-3-1500; Pres: W. Fisch
ACCURATE ELCTRNS. CORP., Box 935J, Elyria, Ohio, 44035, Tel: 216-365-1211; Sls. Mgr: J.F. Seybold

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AEC's Terminal Blocks, Boards, Strips, and other Connectors are made for the appliance, electronic, electrical, automotive and other industries. These are available as standard components from stock tooling or made to your individual spec. AEC also supplies high volume small metal stampings in ferrous and non-ferrous materials. Threaded stampings are a specialty with AEC. Request standard components catalog.

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ACCURIDE DIV., Standard Precision, Inc., 12311 S. Shoemaker Ave., Santa Fe Springs, Calif., 90670, Tel: 213-944-6236; Sls. Mgr: M.F. Hagen

ACDC ELCTRNS., 540 North St., Geneva, Ill., 60134, Tel: 312-232-2600; Sls. Mgr: W.C. Benson ..... Pgs. 1353-1360
Cal Orange, Smith & Assocs., 363 S. Main
Cal Palo Alto, Nor-Cal Assoc., 999 Commerical St. 415-328-6616
Cal Orange, Smith & Assocs., 363 S. Main 714-633-7991
Fla Orlando, GRA MAR Assocs., Box 20493 305-841-2330
Mass Needham, Addelco Corp., 56 Pickering St. 617-444-4754
Ind Ft. Wayne, McDonald Sls. Co., Box 2848 219-745-9214
Minn St. Paul, De Beck Assocs., 2119 Grand Ave. 612-690-1557
NJ Hackettstown, EAC Assocs., Rte. 2, Box 413
NY Cortland, RJC Assocs., 26 Morningside 697-753-3909
NY Great Neck, EAC Assocs., 55 Northern 516-466-9798
Pa Kimberton, W. Dugger Co., Box 482 215-933-7756

ACDC ELCTRNS., Oceanside Ind'l. Ctr., Oceanside, Cal., 92054, Tel: 714-757-1880, TWX: 910-322-1470; Sls. Mgr: J. Hull ..... Pgs. 634-639
Ala Huntsville, Beacon Elctrns., Box 4307 205-881-5031
Ariz Scottsdale, O.E.M. Spec., 6625 E. MacDonald 602-946-4617
Cal Los Altos, ACDC Elctrns., Inc., 1 First St. 415-941-1603
Colo Englewood, PLS Assocs., 8080 E. Union Ave. 303-771-0140
Fla Ft. Lauderdale, Beacon Elctrn. Assocs., 651 N.E. 45 St. 305-564-4298
Fla Maitland, Beacon Elctrn., 540 S. Maitland 305-647-3498
Ga Atlanta, Beacon Elctrn., 2285 Peachtree Rd. 404-351-3654

See Page 957 for TRADE NAME DIRECTORY

Ill Chicago, Data Elctrns., 5505 N. Menard 312-774-1452
Kans Leawood, Poly-Onics, 4434 W. 90th Terr. 913-648-4173
Md Silver Spring, Sel-Tronics, 721 Ellsworth 301-589-3391
Mass Lynnfield, New Eng. Mktg., 55 Salem St. 617-245-9530
Mich Orchard Lake, R. G. Sidnell & Co., Inc., 6051 Pinecroft 313-851-3518
Minn St. Paul, Electro-Prods., Griggs-Midway 612-645-7887
Mo Hazelwood, Poly-Onics, 47 Village Sq. 314-837-0597
NM Albuquerque, PLS Assocs., 4300 H Silver Ave., S.E. 505-255-2330
NY Gt. Neck, H.J. Krasner, 33 Gt. Neck Rd. 516-487-0690
NY Hyde Pk., R. Kennedy Co., Green Tree Dr. 914-229-2269
NY Rochester, R. Kennedy, 39 Saginaw Dr. 716-271-6322
Ohio Dayton, R. G. Sidnell, 3300 S. Dixie Dr. 513-293-1194
Ohio Mentor, R. G. Sidnell, 7191 Dogwood La. 216-942-3304
Pa Norristown, Data Engrg. Co. (DENCO), 304 W. Johnson Hwy. 215-272-1444
Tex Dallas, R. Martin Assoc., 6211 Denton Dr. 214-358-3704
Tex Houston, R. Martin Assocs., Box 19291 713-468-3877
Utah Salt Lake City, PLS Assocs., 5219 Major St. 801-262-2866
Wash Bellevue, Ruggles Tech., 10777 Main St. 206-455-2778
For: Can., Montreal 730, Que., Aeromotive Engrg. Prods., Ltd., 147 Hymus Blvd., Pointe Claire 514-695-6413
For: Can., Toronto, Ont., Aeromotive Engrg. Prods., Ltd., 1914 Avenue Rd. 416-782-8835

ACE DRILL CORP., 2600 E. Maumee St., Adrian, Mich., 49221, Tel: 313-265-5184, TWX: 510-450-2170; Sls. Mgr: E.J. Peters

ACE ELCTRN. ASSOCS., INC., 99 Dover St., Somerville, Mass., 02144, Tel: 617-623-3800; Sls. Mgr: N. Curtis

ACE PLASTIC CO., INC., 91-54 Van Wyck Expwy., Jamacia, N.Y., 11435, Tel: 212-523-5500; Sls. Mgr: S. Seidman

ACE SPRING MFG. CO., INC., 150 32nd St., Brooklyn, N.Y., 11232, Tel: 212-ST-8-0100; Sls. Mgr: L. Edwards

ACHESON COLLOIDS CO., Div/Acheson Inds., 1935 Washington Ave., Port Huron, Mich., 48060, Tel: 313-984-5581, TWX: 810-231-5215; Bus. Mgr: A.J. Stock

ACHRODYNE CORP., Rte. 4, Box 321, Yorktown, Va., 23490, Tel: 703-898-6152; Sls. Mgr: A.L. Newcomb

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ACKERMAN GOULD CO., INC., 10 Neil Ct., Box 188, Oceanside, N.Y., 11572, Tel: 516-678-4110; Sls. Mgr: A.P. Fiorey

ACME BATTERY CORP., 700 Canal St., Stamford, Conn., 06904, Tel: 203-324-4125; Pres: L. Schub

ACME CHEMICAL & INSULATION CO., 166 Chapel St., New Haven, Conn., 06513, Tel: 203-562-2171, TWX: 710-465-0019; Sls. Mgr: R. Von Horn

ACME ELEC. CORP., 28 Water St., Cuba, N.Y., 14727, Tel: 716-968-2400, TWX: 510-245-2700; Sls. Mgr: F.J. Van Alstyne

ACME LITE PRODUCTS CO., Congers, N.Y., 10920, Tel: CO 8-6644; Pres: Wm. H. Katz

ACME MFG. & GASKET CO., 738 North 41 St., Philadelphia, Pa., 19104, Tel: 215-EV-6-8622; Gen'l. Mgr: H. Wagenseller

ACME MODEL ENGRG. CO., 654 Bergen Blvd., Ridgefield, N.J., 07657, Tel: 201-943-7650; Sls. Mgr: A. Asfar

ACME RESIN CO., Div. Corn Prods. Co., 1401 Circle Ave., Forest Pk., Ill., 60130, Tel: 312-366-4715, TWX: 910-220-4413; Sls. Mgr: R.E. Wright

ACMI IND'L. DIV., American Cystoscope Makers, 1500 Bassett Ave., Bronx, N.Y., 10461, Tel: 212-824-4600; Sls. Mgr: C.J. Hickis

ACOPIAN CORP., P.O. Box 585, Easton, Pa., 18042, Tel: 215-258-5441, TWX: 510-651-4919; Sls. Mgr: J.F. Whitaker ..... Pgs. 640,641

Ala Huntsville, Gentry Assocs., Inc., 2109 W. Clinton Ave. 205-534-9771
Ariz Scottsdale, Compar Rocky Mt., Box 1607 602-947-4336
Cal Long Beach, Product Data Co., 3760 Orange Ave. 213-595-1777
Cal Los Altos, Held & Mollard, Inc., 175 S. San Antonio Rd. 415-941-6041
Cal San Diego, Product Data Co., 10457 Roselle St.
Colo Denver, Compar Rocky Mtn., 4600 E. Asbury Cir. 303-757-7621
Colo Englewood, Compar Rocky Mt., 300 E. Hampden Ave. 303-781-0912
Conn E. Hartford, Meas. Equip. Co., Box 8192 203-528-8192
Fla Orlando, Gentry Assocs., Inc., 550 Bumby Ave. 305-841-7740
Ill Chicago, Potter-Mac Co., 6778 N. Northwest Hwy. 312-775-6626
Kans Mission, M. E. Bettis Co., 5915B Woodson 913-362-0772
Kans Wichita, M. E. Bettis Co., 423 N. Fountain 316-MU-5-7441
Md Baltimore, Doss Elctrns, 6660 Security Blvd. 301-944-1900
Mass Wakefield, Meas. Equip. Co., 591 North Ave. 617-245-4870
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CHASE-SHAWMUT CO., 374 Merrimac St., Newburyport, Mass., 01950, Tel: 617-462-6662, TWX: 710-347-0264; Sls. Mgr: H.E. Pike

CHASE & SONS, INC., 19 Highland Ave., Randolph, Mass., 02368, Tel: 617-963-2600; Sls. Mgr: L.P. Graham

CHASSIS-TRAK, INC., 525 S. Webster Ave., Indianapolis, Ind., 46219, Tel: 317-359-5407; Sls. Mgr: J.R. Young

CHATHAM CONTROLS CORP., 33 River Rd., Chatham, N.J., 07928, Tel: 201-635-8892; Sls. Mgr: D.C. Perst

CHATILLON JOHN & SONS, 83-30 Kew Gardens Rd., Kew Gardens, N.Y., 11415, Tel: 212-847-5000; Sls. Mgr: N. Lavenda

CHEM AERO, INC., 231 E. Lomita Blvd., Wilmington, Cal., 90744, Tel: 213-775-2581, TWX: 910-345-6267; Sls. Mgr: H.N. Lee

CHEMALLOY ELCTRNS., Box 10, Santee, Cal., 92071, Tel: 714-448-5715; Sls. Mgr: S. Freedman

CHEMCUT CORP., 500 Science Pk., State College, Pa., 16801, Tel: 814-238-0514

CHEMELEC PRODS., INC., 8 Fellowship Rd., Cherry Hill, N.J., 08034, Tel: 609-424-1470; Pres: F.O. Dutton

CHEMICAL COMMERCE, 123 Sussex Ave., Newark, N.J., 07103, Tel: 201-621-9652; Owner: R. Handel

CHEMICAL MICRO MILLING CO, Box 770, Camden, N.J., 08101, Tel: 609-964-2030, TWX: 710-892-0731; Sls. Mgr: F.D. Kronslak

CHEMICAL PRODS. CORP., King Philip Rd., E. Providence, R.I., 02914, Tel: 401-434-1770, TWX: 401-438-2607; Pres: H.B. Allison

CHEMPLAST, INC., 31-150 Dey Rd., Wayne, N.J., 07470, Tel: 201-696-4700, TWX: 710-988-5834; Exec. V.P., Sls. Mgr: M. Powell, Jr.

CHEMTRONICS, INC., 1260 Ralph Ave., Brooklyn, N.Y., 11236, Tel: 212-NA-9-1300; Sls. Mgr: A. Friedman

CHERRY ELECTRICAL PRODS., 3623 Sunset Ave., Waukegan, Ill, 60085, Tel: 312-689-7600, Ext. 7703, TWX: 910-235-1572; Sls. Mgr: D. Grady .....Pg. 1899

Ala Huntsville, Powertronics, Box 3384 205-852-6347
Cal Palo Alto, Abbott Engrg., 2450 El Camino Real 415-327-0830
Cal Torrance, O'Donnell, 18053 Crenshaw Blvd. 213-323-9243
Colo Broomfield, Arrowhead Sls., Box 335 303-222-6462
Conn Meriden, Electro-Products Sls., Box 92 203-235-4040
Fla Belleair Bch., Consultants for Industry, 211 Howard Dr. 813-595-1486
Ind Ft. Wayne, Menze Sls., Box 9178 219-747-5616
Mass Waltham, Electro-Products Sls., Box 121 617-899-1570
Mich Troy, McPhail, 1820 Stephenson Hwy. 313-689-6444
Mich Westland, Miltimore Sls., 34142 Fountain 313-261-8117
Minn St. Paul, Cahill, 3000 Hudson Rd. 612-739-8445
Mo Kansas City, Thro Industrial Sls., Box 7244 913-362-2533
NJ Ft. Lee, S. Justin, Box 1068 201-947-4371
NJ Pitman, Colrud Co., 601 Ardmore Ave. 609-589-5866
NM Albuquerque, Crown Engrg., 2129 San Mateo, N.E. 505-265-2066
NY Rochester, W.J. Andres, 39 Saginaw Dr. 716-244-2445
NC Thomasville, Powertronics, Box 403 919-476-4257
Tex Dallas, Reese Assoc., Box 24410 214-638-6575
Tex Houston, Reese Assoc., Box 26247 713-621-3134
Va Lynchburg, Powertronics, 5633 White Oak Dr. 703-239-6085
Wash Seattle, Jas. J. Backer Co., Box 9327 206-205-1300
Wisc Pewaukee, D. Herrick, 220 Sussex St. 414-691-2770

CHERRY RIVET DIV., Townsend Co., P.O. Box 2157, Santa Ana, Calif., 92707, Tel: 714-545-5511, TWX: 910-595-1500; Sls. Mgr: D.J. Sauser

CHESAPEAKE INSTR. CORP., Shadyside, Md., 20867, Tel: 301-867-2151; Mktg. Mgr: J.F. Luckey

CHICAGO CONDENSER CORP., 3255 W. Armitage Ave., Chicago, Ill., 60647, Tel: 312-227-7070; Sls. Mgr: P. Philips

CHICAGO DYNAMIC INDS., Precision Prods. Div., 1725 W. Diversey Blvd., Chicago, Ill., 60614, Tel: 312-935-4600; Sls. Mgr: J.M. Early .....Pg. 1900

Cal Burbank, Weightman, 1226 W. Olive 213-VI-9-2435
Cal Menlo Pk., Weightman & Assocs., 120 Santa Margarita 415-325-2885
Colo Aurora, Bishop Entprs., 126 Del Mar Cir. 303-364-7361
Conn Waterbury, Coakley, Boyd & Abbett, 820 Hamilton Ave. 203-756-8766
Fla Orlando, W. Lehmann Co., Box 20275 305-841-4901
Ga Atlanta, W. Lehmann Co., Box 52786 404-237-0600
Ill Rolling Meadows, Sumer, 5105 Tollview 312-392-7370
Ind Fort Wayne, Sumer, Inc., 2211 S. Calhoun 219-744-4331
La New Orleans, Glidden Eng. & Equip. Co., Box 10442 504-721-4763
Md Glen Arm, Billis Sls. Co., Box 94H-40, Ravenhurst Cir. 301-592-7047
Mass Needham, Coakley, Boyd & Abbett, 1424 Highland 617-444-5470
Mich Deroit, L. Dickelman, 18315 W. Seven Mile 313-255-3300
Minn Mpls., M. Foster, 228 S. Cedar Lake 612-374-2612
Mo St. Louis, Harris-Hanson, 2814 S. Brentwood Plaza 314-962-0111
NJ Cherry Hill, J. Billis Sls., 14 Galway 609-HA-8-3651
NJ Wayne, S.A.M. Assocs., 18 Tilghman 201-684-7682
NY Albany, Compar-Albany, 6 Highland Ave. 518-489-4777
NY Jamaica, S.A.M. Assocs., 150-08 87th 212-OL-8-8881
NC Greensboro, L & D, Inc., Box 7243 919-292-3201
Ohio Cleveland, L. Dickelman, 28829 Chagrin 216-831-1039
Tex Dallas, Glidden Engrg. & Equip. Co., 8609 N.W. Plaza Dr. 214-EM-3-6539
Tex Houston, Glidden Engr. & Equip. Co., 7728 Long Pt. Rd. 713-681-1415
Utah Salt Lake Cy., Bishop Entprs., 2520 S. State 801-487-2551
Wash Seattle, R. Johnston, 1011 N.E. 69th 206-514-5170
EXP: N.Y., Westbury, Minthorne Int'l. Co., 2200 Shames Dr. 212-895-3120
For: Ville Lasalle 650, Que., Electrodesign, Ltd., 840 Lafleur 514-363-5120

CHICAGO LOCK CO., 4275 W. Belmont Ave., Chicago, Ill., 60641, Tel: 312-282-7177; Sls. Mgr: E.L. Lovelace Pg. 1901

NY New Rochelle, 271 North Ave. 914-636-1311

CHICAGO MINIATURE LAMP WORKS, 4433 N. Ravenswood Ave., Chicago, Ill., 60640, Tel: 312-784-1020, TWX: 910-221-5445; Sls. Mgr: W. Bofhoven .....Pg. 1443

Ariz Phoenix, Howe & Howe Sls., Box 10497 602-264-7971
Cal No. Hollywood, CMLC, 10213 Riverside Dr. 213-877-0158
Cal San Francisco, CMLC, 115 New Montgomery St. 415-391-1098
Colo Denver, Nelson Co., 1294 S. Bannock St. 303-733-5528
Conn New Haven, Gerber Sls., Box 2917, 29 Whalley Ave. 203-777-6279
Fla N. Miami Bch., Cartwright & Bean, 20100 N.E. 25th Ct. 305-945-2962
Fla Orlando, Cartwright & Bean, 601 N. Fern Creek 305-425-8284
Ga Atlanta, Cartwright & Bean, 3223 Cain's Hill Pl., N.W. 404-237-2273
Ill Chicago, CMLW, 4433 N. Ravenswood Ave. 312-784-1020
Iowa Atlantic, Koenig-Myers Assoc., 300 Linn St. 712-243-3342
Kans Shawnee Mission, Koenig-Myers Assoc., 5500 Buena Vista Dr., Box 374 913-432-8300
La Metarie, Cartwright & Bean, 7010 Magnolia Ct., Box 73336 504-887-0482
Mass E. Longmeadow, Gerber Sls., 24 Maple Ct. 413-525-3059
Mass Waltham, Gerber Sls., 176 Second Ave. 617-891-8040
Mich Detroit, R.C. Merchant, 18411 W. McNichols 313-535-6000
Mich St. Joseph, R.C. Merchant, 505 Pleasant St. 616-983-7378
Minn Minneapolis, M. Foster Co., 228 S. Cedar Lake Rd. 612-374-2612
Mo Maryland Hgts., Koenig-Myers Assoc., 2721 Beloit Dr. 314-739-1655
NJ Cherry Hill, Trinkle Sls., 500 N. Kings Hwy. 609-667-3500
NY DeWitt, F. W. Taylor Co., 4455 E. Genesee St. 315-446-0422
NY Pt. Washington, T.M.A., Inc., Box 735 516-767-2432
NC Charlotte, Cartwright & Bean, 25 Harwyn Dr. 704-537-7965
NC Raleigh, Cartwright & Bean, 1016 Belfast Dr. 919-832-7128
Ohio New Bremen, T. Shelby & Co., 17 S. Walnut St. 419-629-6511
Tenn Memphis, Cartwright & Bean, Box 4760 901-276-4442
Tex Dallas, Techno, Box 20544 214-357-9213
Wash Seattle, J.J. Backer Co., 221 W. Galer St. 206-285-1300
EXP: Ill., Chicago, E.D. Magnus & Assoc. Inc., 5715 N. Lincoln Ave. 312-334-1503
For: Can., Scarborough, Ont., Lake Engrg., 123 Manville Rd. 416-751-5980

CHICAGO RIVET & MACH. CO., 950 S. 25 Ave., Bellwood, Ill., 60104, Tel: 312-LI-4-5100, TWX: 312-547-7316; Sls. Mgr: W.O. Shineflug

CHICAGO SWITCH, 2035 W. Wabansia Ave., Chicago, Ill., 60647, Tel: 312-489-5500; Sls. Mgr: M. Podgorski Pg. 1902

Cal Santa Clara, Richards, 2938 Scott 408-246-5860
Cal Venice, Coplan Assocs., 4206A Glencoe 213-397-2166
Fla Indian Rocks Bch., Tech-Rep., Box 425 813-595-2834
Fla Melbourne, Tech-Rep., Box 2095 305-723-9140
Ga Jonesboro, Tech-Rep., Box 955 404-753-0111
Ill Rolling Meadows, Sumer, 5105 Tollview 312-392-7370
Iowa Cedar Rapids, Engrg. Svc., 1026 3rd Ave., SE 319-366-1591
Kans Prairie Vlg., Engrg. Svc., 7924A State Line 913-649-4000
Mass Newton Upper Falls, Brookdale/Richter Engrg., 1214 Chestnut 617-244-6969
Mich Southfield, J. Montgomery, 19400 W. Ten Mile 313-358-2616
Minn Mpls., Sumer, 7710 Computer 612-920-8414
Mo St. Louis, Engrg. Svc., 6717 Vernon 314-726-2233
NJ Riverton, Given Assocs., Box 183 609-829-7249
NY Port Wash., P. D. Aaron, Box 511 516-767-2600
NY Syracuse, Nycom, 2002 Teall 315-437-8343
Ore Beaverton, N. R. Schultz Co., Box 156 503-646-1345
Tex Addison, Campion Sls., Box 396 214-239-9196
Wash Bellevue, N. Schultz, 305-112th Ave., NE 206-GL-4-5224
For: Can., Scarborough, Ont., D. Randall, 1710 Midland 416-751-7911

CHICOPEE MFG. CO., Cornelia, Ga., 30531, Tel: 404-778-2281, TWX: 404-778-4450; Gen'l. Mgr: W.J. Shortt

CHISSO CORP., 3-2 Marunouchi 2-Chome, Chiyoda-Ku, Tokyo 100, Japan, Tel: Tokyo 231-4571, TWX: TK 2554 Chisso

CHOMERICS, INC., 77 Dragon Ct., Woburn, Mass., 01801, Tel: 617-935-4850, TWX: 710-393-0173; Sls. Mgr: K. Dunne

CHRISTIE ELEC., 3404A W. 67th St., Los Angeles, Cal., 90060, Tel: 213-750-1151, TWX: 910-321-3867; V.P: F. Benjamin ..... Pgs. 674,675

Ala Huntsville, Ridge Instr., 7220 Governors, W. 205-837-1761
Ariz Phoenix, R.A. Mayes, 4014 N. 7th St. 602-279-5243
Cal Diablo, Thomas Assocs., Box 684 415-837-8411
Cal Los Angeles, Halbar Assocs., 3261 W. 4th 213-387-8283
Colo Denver, R.A. Mayes Co., Box 10486 303-466-6311
Fla Orlando, Ridge Instr. Co., 2227 Seely Dr. 305-293-4711
Ga Atlanta, Ridge Instr., 3094 McCully, NE 404-939-1554
Haw Honolulu, Victor Kim Elctrns., 623-25 South St. 507-132
Ill Chicago, K. Meyers, 7256 W. Touhy 312-774-6440
Ind Indianapolis, K. Meyers, 3512 Rockville 317-243-6681
Iowa Cedar Rapids, Engrg. Svcs., 1026 Third, SE 319-366-1591
Kans Prairie Vlg., Engrg. Svcs., 7924-A State Line 913-649-4000
Md Silver Spg., L. White, 1110 Fidler La. 301-585-3141
Mass Lexington, W.M. Hague, 10 Muzzey St. 617-862-5700
Mich Farmington, Carter, McCormic & Pierce, 23995 Freeway Pk. 313-477-7700
Mo St. Louis, Engrg. Svcs., 6717 Vernon 314-726-2233
NJ Ridgewood, Instr. Sls. Co., Box 403 201-445-5210
NM Albuquerque, R. Mayes, 8016 Zuni, SE 505-265-7989
NY Clarence, Rep. Tech., Inc., Box 156 716-684-6250
NY Syracuse, Rep. Tech., Inc., 2002 Teall Ave. 315-437-2845
NC Winston-Salem, L.G. White, Box 2356 919-725-3612
Ohio Cleveland, Carter, McCormic & Pierce, 21380 Lorain 216-333-5650
Ohio Dayton, Carter, McCormic & Pierce, Box 1472 513-278-5873
Pa Narberth, L. White-Keystone, 100 Essex 215-664-6505
Pa Pittsburgh, Carter, McCormic & Pierce, 201 Penn Ctr. 412-824-3760
Tenn Oak Ridge, Ridge Instr., 164 Ridgeway Ctr. 615-483-1311
Tex Richardson, C. Tinch, First Bank & Trust 214-231-1322
Va Arlington, Gans-Fryling, 2030 - 16th St., N.
Wash Bellevue, A. Smith Co., 405 - 106 S.E. 206-746-6770
Wisc Milwaukee, K. Meyers, 4359 S. Howell 414-482-1313
EXP: Cal., L.A., Trans-World Trade, 11973 San Vicente 213-472-0444

CHRONETICS, INC., 500 Nuber Ave., Mt. Vernon, N.Y., 10550, Tel: 914-699-4400, TWX: 710-560-0014; Sls. Mgr: S. Gordon ..... Pg. 425

Ala Huntsville, Brennan Assocs., Box 1074 205-536-7425
Ariz Phoenix, Barnhill Assocs., 537 E. Osborn Rd. 602-263-1250
Cal Sherman Oaks, Winsor Dynamics, Box 5500 213-989-3631
Cal Woodside, Winsor Dynamics, 195 Greer Rd. 415-854-4870
Colo Denver, Barnhill Assocs., 1170 S. Sheridan Blvd. 303-934-5505
Conn Hamden, J & J Assocs., 965 Dixwell Ave. 203-624-7800
Fla Clearwater, Brennan Assocs., Inc., Box 5006 813-446-5006
Fla Orlando, Brennan Assocs., Box 13026 305-425-8161
Ill Chicago, L.F. Green & Assocs., 5218 W. Diversey Ave. 312-286-6824
Ind Indianapolis, L.F. Green & Assocs., 1111 E. 54th St. 317-253-2087
Md Silver Spring, Q.E.D. Elctrns., Inc., 850 Sligo Ave. 301-JU-8-8134
Mass Burlington, J & J Assocs., 12 Cambridge St. 617-899-0160
Minn Minneapolis, L.F. Green & Assocs., 6225 University Ave. 612-781-1611
NM Albuquerque, Barnhill Assocs., 827 Pennsylvania, N.E. 505-265-7766
NY Dewitt, DB Assocs., Box 14 315-446-0220
NY Mt. Vernon, Q.E.D. Elctrns., Inc., 500 Nuber Ave. 914-664-0080
Tex Houston, Barnhill Assocs., 3810 Westheimer 713-621-0040
Tex Richardson, Barnhill Assocs., 312 N. Central Expwy. 214-231-2573
Wash Seattle, H. Levinson Co., 1211 E. Denny Way 206-EA-3-5100

CHRONO-LOG CORP., 2583 W. Chester Pike, Broomall, Pa., 19008, Tel: 215-EL-6-6771; Sls. Mgr: D. Biberman Pg. 340

Ala Huntsville, Reynolds & Assoc., 904 Bob Wallace Ave., S.W. 205-536-1941
Ariz Phoenix, R.A. Mayes Co., 4014 N. 7th St. #6 602-279-5243
Cal Los Angeles, Thorson Co., 6824 Melrose Ave. 213-WE-7-0790
Cal Palo Alto, Thorson Co., 2443 Ash St. 415-DA-1-2414
Cal San Diego, Thorson Co., 444 Olive St. 714-CY-8-8385
Cal Tustin, Thorson Co., 17461 Irvine Blvd. 714-544-5121
Colo Denver, R. A. Mayes Co., Box 10486 303-466-6311
Fla Ft. Lauderdale, Reynolds & Assocs., 161 S.W. 75th St. 305-581-6611
Fla Melbourne, Reynolds & Assocs., 822 E. Strawbridge Ave. 305-727-3205
Fla Orlando, Reynolds & Assocs., Box 8877 305-424-3836
Ga Atlanta, Reynolds & Assoc., 175 W. Wieuca Rd. 404-252-5360
Mass Needham, Wild & Assocs., 570 Hillside Ave. 617-HI-4-2366
Minn St. Paul, De Beck Assoc., 2119 Grand Ave. 612-690-1557
NJ Mountainside, J. J. Wild, Inc., Box 1217 201-654-3272
NM Albuquerque, R.A. Mayes Co., 8016 Zuni Rd. 505-265-7989
NY Hastings on Hudson, Wild & Assocs., Box 266 914-963-3803
NY Jericho, J. J. Wild, Inc., 400 Jericho Tpke. 516-WA-1-7100
Ohio Worthington, Ohio Instr. Co., 505 Whitney Ave. 614-885-0743
Pa Southampton, Wild & Assocs., 80 Second St. Pike 215-EL-7-6645
Tex Richardson, R. A. Mayes Co., Box 1021 214-235-3043
Va Arlington, H.J. Heffernan Co., 1123 N. Irving St. 703-JA-2-6666
Wash Seattle, Thorson Co., 909 N.E. 43rd St. 206-ME-2-0710
For: Can., Don Mills, Ont., York Instrs., 1262 Don Mills Rd. 416-445-1255
Providencia Ave., Burbank, Cal., 91502, Tel: 213-846-4731; Sls. Mgr: C. Jones
CHU ASSOCS., INC., P.O. Box 387, Whitcomb Ave., Littleton, Mass., 01460, Tel: 617-456-3282; Sls. Mgr: I.M. Faigen

CIMCO WIRE & CABLE, 250 W. Crescent Ave., Allendale, N.J., 07401, Tel: 201-DA-7-2522; Pres: W.J. Indoe ..... Pg. 2996

Ariz Scottsdale, OEM Specialties, 6625 E. MacDonald Dr.
Cal Hawthorne, Falmat, Inc., 13125 Yukon Ave.
Fla Altamonte Springs, Grose Assoc., Box 536
Ill Chicago, Kennedy Engrg., 6713 N. Oliphant Ave.
Mass Weston, F.C. Talbot Co., Box 366
Mich Birmingham, Comp./Insulation, 610 N. Woodward
Minn Minneapolis, W. Schmitt Assoc., 4522 Excelsior Blvd.
Mo St. Charles, Metal Craft Supply Co., 23 North Dr.
NJ Montclair, E.B. Hinck, Box 201 201-716-2625
NC Charlotte, B. Jackson Co., 4632 Randolph Rd.
Ohio Cleveland, Component/Insulation Corp., 14235 Detroit
Pa Glenside, Precision Elctrns., Inc., 1601 Church Rd.
Pa Pittsburgh, J.W. Kight Co., 4 Longfellow Rd.
Tex Dallas, R.E. Nesbitt Co., 2930 Merrell Rd.
For: Can., Montreal, Que., Allied Elctrn. Sls., 5350 Montclair

CINCH DIV. TRW INC., 1501 Morse Ave., Elk Grove Village, Ill., 60007, Tel: 312-439-8800, TWX: 910-222-1796; Sls. Mgr: K.E. Myers ..... Pgs. 2600-2609

Cal Monterey Pk., 887 S. Atlantic Blvd. 213-282-8416
Cal Mountain View, 2680 Bayshore Frontage Rd. 415-969-2252
Cal Tustin, 17501 Irvine Blvd. 714-838-4392
Fla Boca Raton, 1499 S.W. 5th Ave. 305-399-4884
Fla Orlando, 5360 Diplomat Cir. 305-645-2503
Ill Elk Grove Village, 1982 Lunt Ave. 312-437-5110
Ind Indianapolis, 2511 E. 46th St. 317-547-9411
Mass Reading, 100 Main St. 617-944-3020
Mich Detroit, 2832 E. Grand Blvd. 313-873-1150
Minn Minneapolis, 7615 Metro Blvd. 612-941-4353
Mo St. Louis, 8000 Bonhomme 314-727-7370
NJ Ft. Lee, 530 Main St. 201-947-7600
NY Millbrook, Box AD 914-677-3488
NY Syracuse, Pickard Bldg., E. Molloy Rd. 315-454-9268
Ohio Dayton, 1250 W. Dorothy La. 513-298-9862
Pa Glenside, 1601 Church Rd. 215-887-7520
Tex Dallas, 1066 W. Mockingbird La. 214-637-6650
Wash Seattle, 2320 N. 45th St. 206-633-3160

CINCH-GRAPHIK, Div. TRW INC., 200 S. Turnbull Canyon Rd., City of Industry, Cal., 91744, Tel: 213-333-1201, TWX: 910-584-1861; Pres: G.C. Morse Pg. 1297

(Refer to Cinch, Div. TRW INC for Sales Office Information)

CINCH MFG. CO., A Div. of TRW INC., 1501 Morse Ave., Elk Grove Village, Ill., 60007, Tel: 312-439-8800, TWX: 910-222-1796; Sls. Mgr: J. Hermacinski Pgs. 2600-2609

(Refer to Cinch, Div. TRW INC for Sales Office Information)

CINCH-MONADNOCK, Div. TRW INC., 18300 E. Valley Blvd., Box 1222, City of Industry, Cal., 91747, Tel: 213-964-6581, TWX: 910-584-1303; Sls. Mgr: C.M. Miller
(Refer to Cinch Div. TRW INC for Sales Office Information)

CINCH-NU LINE, Div. TRW INC., 1015 S. Sixth St., Minneapolis, Minn., 55415, Tel: 612-339-8301, TWX: 910-576-2748; Gen'l Sls. Mgr: E.R. Schmidt Pg. 2610

(Refer to Cinch Div. TRW INC. for Sales Office Information)

CINCINNATI FAN & VENTILATOR CO., 6516 Wiehle, Cincinnati, Ohio, 45237, Tel: 513-531-1742, TWX: N/A; Pres: G.B. Klee
CINCINNATI SUB-ZERO PRODS., 2612 Gilbert Ave., Cincinnati, Ohio, 45206, Tel: 513-751-8810; Sls. Mgr: L.M. Doherty
CINTRA INC., Sub/Physics Int'l Co., 1089 Morse Ave., Sunnyvale, Cal., 94086, Tel: 408-734-3630, TWX: 910-339-9225; Mktg. Mgr: P. Kertesz
CINTRA PHYSICS INT'L., 1089 Morse Ave., Sunnyvale, Cal., 94086
CIRCLE "F" INDUSTRIES, Box 591, Trenton, N.J., 08604, Tel: 609-392-3141; Pres: E. Laskin
CIRCLE SEAL CORP., Circle Seal Ctr., Box 3666, Anaheim, Cal., 92803, Tel: 714-774-6110, TWX: 910-591-1147; Exec. Sls. Mgr: C. Siebert, Jr.

CIRCON CORP., Santa Barbara Airport, Goleta, Cal., 93017, Tel: 805-967-0404; Sls. Mgr: K.C. Jensen Pg. 2937

Ariz Phoenix, Circon Tools Distrib.
Fla Miami, Elctrn. Equip., 2701 N.W. 42nd Ave.
NY Binghamton, Stack Ind'l. Elctrns., 45-49 Washington 607-723-6326
NY Hempstead, Davis Elctrns., 204 Main St. 516-483-9200
NY New York, Terminal-Hudson Elctrns., 236 W. 17 212-243-5200
Pa Cornwells Heights, H. Mann, 977A Bristol Pike 215-639-6200
Pa Phila., Techni-Tool, 1216 Arch St. 212-569-4457

CIRCUIT POWER, INC., 227 Main St., Portland, Conn., 06480, Tel: 203-342-2520; Sls. Mgr: P.C. Hooper Pgs. 676,677

Cal Los Altos, Cain & Co., 175 S. San Antonio 415-948-6533
Cal Los Angeles, Cain & Co., 522 S. Sepulveda 213-476-2251
Conn Milford, Westwood Assocs., 125 Cherry St. 203-878-8528
Ill Mt. Prospect, Cain, 1203 Ironwood Dr. 312-253-3578
Mass Reading, Geder, 39 Cross St. 617-944-3105
NJ Montville, G & A Sls., 8 Brittany Rd. 201-227-3926
NY Cortland, RJC Assocs., 26 Morningside Dr. 607-753-3909
Ohio Reynoldsburg, Cain, 1467 Graham Rd. 614-861-2119
Pa Lafryette Hill, M. Lader, 628 Ridge Pike 215-825-3177
Tex Dallas, Cain, 8609 N.W. Plaza Dr. 214-369-2897
Va Woodbridge, M. Lader, 1561 Randall Ct. 202-296-2497

CIRCUIT-STIK, INC., 1518 W. 132 St., Gardena, Cal., 90249, Tel: 213-321-3220; Sls. Mgr: D. Harper Pgs. 1298,1299

Ariz Scottsdale, F. Board Assocs., Box 1906 602-949-9561

Ark Magnolia, J.V. Schoonmaker Co., Box 247 505-234-3778
Cal Burlingame, W.J. Purdy Co., 770 Airport Blvd. 415-347-7701
Cal Los Angeles, Black & Strong, 1728 S. Lacienega Blvd. 213-870-9191
Colo Littleton, W.J. Purdy Co., 1449 Littleton Blvd. 303-794-4283
Conn Meriden, P.R. Sturgeon Co., 99 Colony St. 203-237-1112
Ill Hinsdale, Hill-Gray Assoc., 2 Salt Creek La. 312-325-4810
Iowa Des Moines, T.L. Dowell, 4127 27th St. 515-255-6480
Kans Overland Pk., T.L. Dowell, 7208 W. 80th St. 913-649-6069
Mass Chestnut Hill, P.R. Sturgeon Co., 1330 Boylston St. 617-734-7710
Mich Detroit, R.C. Merchant Co., 18411 W. Mc Nichols 614-535-6000
Minn Mpls., M. Foster Co., 228 S. Cedar Lake Rd. 612-374-2612
Mo St. Louis, T.L. Dowell, 47531 Tital Ct. 314-892-2859
NJ Cherry Hill, Trinkle Sls., 500 N. Kings Hwy. 609-667-3500
NM Albuquerque, C.T. Carlberg & Assocs., Box 3177, Sta. D 505-265-1579
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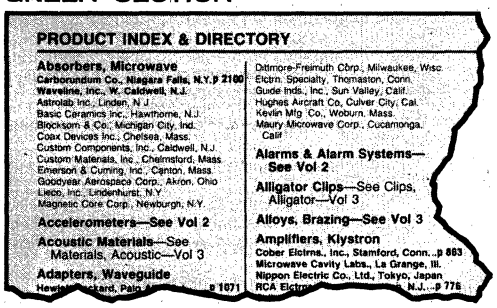
V1	80-260	150min	3MHz 290
V2	250-520	150min	spfy 190
U7	490-1000	150min	spfy 190
L1	900-1900	100min	spfy 210
S1	1400-2400	100min	spfy 290

WANDEL & GOLTERMANN, 6 Great Meadow La., E. Hanover, N.J., 07936, Tel: 201-887-8700, TWX: 710-986-8255; Sls. Mgr: D.E. Foreman

How to use eem

to find manufacturers of a specific product

GREEN SECTION


PRODUCT INDEX & DIRECTORY

Absorbers, Microwave
Carborundum Co., Niagara Falls, N.Y. p 2100
Waveline, Inc., W. Caldwell, N.J.
Astrolab Inc., Linden, N.J.
Basic Ceramics Inc., Hawthorne, N.J.
Brocksom & Co., Michigan City, Ind.
Coax Devices Inc., Chelsea, Mass.
Custom Components, Inc., Caldwell, N.J.
Custom Materials, Inc., Chelmsford, Mass.
Emerson & Cuming, Inc., Canton, Mass.
Goodyear Aerospace Corp., Akron, Ohio
Lieco, Inc., Lindenhurst, N.Y.
Magnetic Core Corp., Newburgh, N.Y.

Accelerometers—See Vol 2

Acoustic Materials—See Materials, Acoustic—Vol 3

Adapters, Waveguide
Hewlett-Packard, Palo A... p 1071
Dittmore-Freimuth Corp., Milwaukee, Wisc.
Electro Specialty, Thomaston, Conn.
Gude Inds., Inc., Sun Valley, Calif.
Hughes Aircraft Co, Culver City, Cal.
Kevlin Mfg Co., Woburn, Mass.
Maury Microwave Corp., Cucamonga, Calif.

Alarms & Alarm Systems—See Vol 2

Alligator Clips—See Clips, Alligator—Vol 3

Alloys, Brazing—See Vol 3

Amplifiers, Klystron
Cober Elctrns., Inc., Stamford, Conn...p 863
Microwave Cavity Labs., La Grange, Ill.
Nippon Electric Co., Ltd., Tokyo, Japan
RCA Elctrn... N.J....p 776

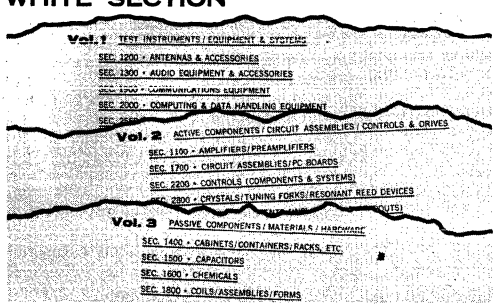
Each of the three volumes of **eem** contains a Product Index and Directory, the Green Section. This Index is a complete alphabetical listing of products. If the product you are looking for appears in the particular volume you are consulting, the green pages will provide a complete list of manufacturers who make that product. If the product is included in another volume of **eem**, the Index will provide a cross reference, directing you to the correct volume.

Boldface listings under product headings indicate that the listed manufacturer has products cataloged in **eem. Boldface** listings with page numbers indicate that this manufacturer's catalog pages include detailed data on the product indicated in the product heading.

Similar products are grouped together. For example, the many kinds of meters are listed in this manner: "Meters, Ampere," "Meters, Capacitance," "Meters, Flux" etc. To help you locate the prime product heading, there are hundreds of cross references, e.g. "Voltmeters — See Meters, Volt."

to find manufacturers' catalog information

WHITE SECTION


Vol. 1 TEST INSTRUMENTS / EQUIPMENT & SYSTEMS
SEC. 1200 • ANTENNAS & ACCESSORIES
SEC. 1300 • AUDIO EQUIPMENT & ACCESSORIES
SEC. 1900 • COMMUNICATIONS EQUIPMENT
SEC. 2000 • COMPUTING & DATA HANDLING EQUIPMENT
SEC. 2500 • ...
Vol. 2 ACTIVE COMPONENTS / CIRCUIT ASSEMBLIES / CONTROLS & DRIVES
SEC. 1100 • AMPLIFIERS/PREAMPLIFIERS
SEC. 1700 • CIRCUIT ASSEMBLIES/PC BOARDS
SEC. 2200 • CONTROLS (COMPONENTS & SYSTEMS)
SEC. 2800 • CRYSTALS/TUNING FORKS/RESONANT REED DEVICES
...OUTS)
Vol. 3 PASSIVE COMPONENTS / MATERIALS / HARDWARE
SEC. 1400 • CABINETS/CONTAINERS/RACKS, ETC.
SEC. 1500 • CAPACITORS
SEC. 1600 • CHEMICALS
SEC. 1800 • COILS/ASSEMBLIES/FORMS

Catalog pages in **eem** are divided into three volumes based on very broad product groupings. These are:

Volume 1 — Test Instruments / Equipment and Systems

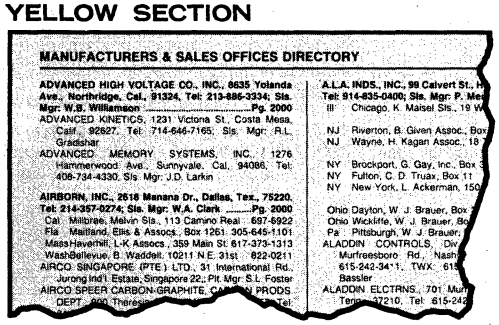
Volume 2 — Active Components / Circuit Assemblies / Controls and Drives

Volume 3 — Passive Components / Materials / Hardware

These volumes are further divided into 55 **eem** Product Sections which are assigned individually to the most appropriate volume. Within each of the 55 product sections manufacturers are arranged alphabetically, wherever possible. A complete index of all manufacturers' catalog pages is included in every volume. To locate the catalog pages of a specific manufacturer, refer to this index at the beginning of the white section in any of the three volumes. This index will provide the page numbers you require. In Volume 1, the index begins on page 302, in Volume 2 on page 1274 and in Volume 3, page 2310.

to find manufacturers' addresses, phones and sales offices

YELLOW SECTION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NY: Fulton, C. D. Truax, Box 11
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Pa.: Pittsburgh, W. J. Brauer, ...
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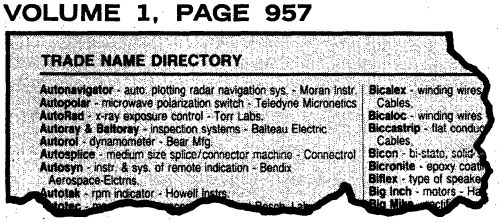
ALADDIN ELCTRNS., 701 Murf... Tenn. 37210, Tel: 615-242...

More than 6,000 manufacturers of electronic components, materials, instruments, assemblies, systems and key services are listed in the Yellow Section. An identical Yellow Section appears in each of the three volumes of **eem**, listing addresses, phone numbers and sales managers' names. TWX numbers are also included where available. **Boldface** listings indicate that detailed information on the manufacturers' products is cataloged in the White Section of **eem. Boldface** listings also indicate that local sales offices or representatives are listed for that manufacturer.

to find trade name sources

VOLUME 1, PAGE 957


TRADE NAME DIRECTORY

Autonavigator - auto. plotting radar navigation sys. - Moran Instr.
Autopolar - microwave polarization switch - Teledyne Micronetics
AutoRad - x-ray exposure control - Torr Labs.
Autoray & Baltoray - inspection systems - Balteau Electric
Autorol - dynamometer - Bear Mfg.
Autosplice - medium size splice/connector machine - Connectrol
Autosyn - instr. & sys. of remote indication - Bendix Aerospace-Elctrns.
Autotak - rpm indicator - Howell Instrs.
...
Bicalex - winding wires... Cables.
Bicaloc - winding wires
Biccastrip - flat conduc... Cables.
Bicon - bi-static, solid-...
Bicronite - epoxy coati...
Biflex - type of speake...
Big Inch - motors - Ha...
Big Mike - ...

If you know only the trade name, brand name or trade mark of a product, you can locate it in **eem** by using the **Trade Name Directory.** This appears only in Volume 1, beginning on page 957 of the White Section. These pages can be identified by a vertical black band along the outside edge.

if you require additional assistance

contact the Editorial Department, United Technical Publications, Inc., 645 Stewart Ave., Garden City, N.Y. 11530, or phone (516) 248-9700.

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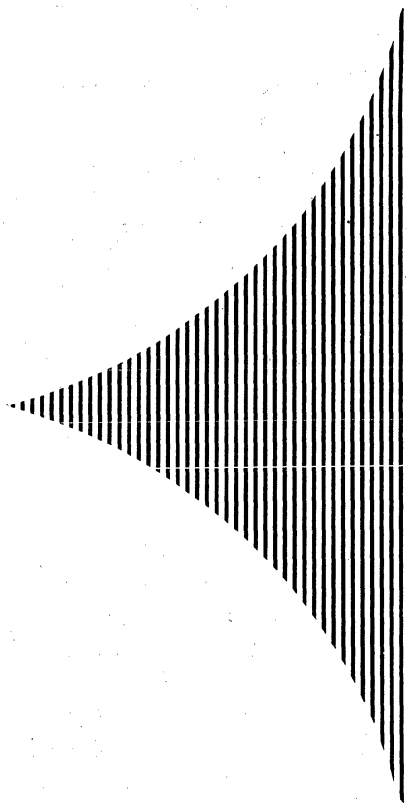
Wash Seattle, R.S. Drake, 6133 Maynard 206-763-2755

See Page 957 for TRADE NAME DIRECTORY



If you want to know

what manufacturers make what products, the **eem** green pages will solve your problem.

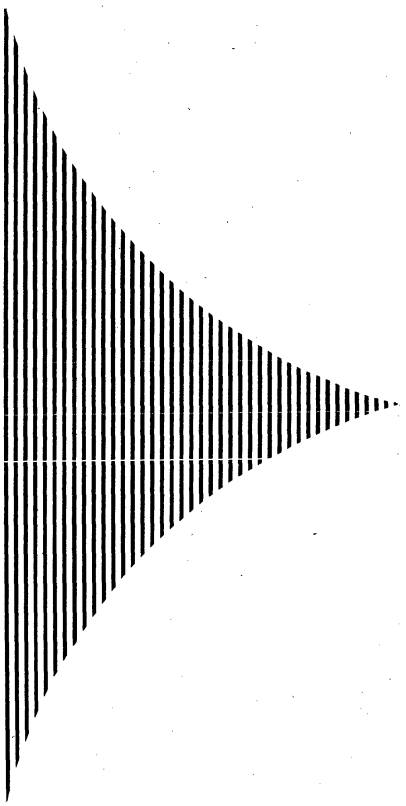
Product data is found

in the **eem** white pages they contain just about all the information you need to make a purchase decision.

If you're interested

in finding the address of a specific manufacturer, the **eem** yellow pages is the place to look.

Tell Them You Found It In eem



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1	1300	308	Audio Equipment & Accessories
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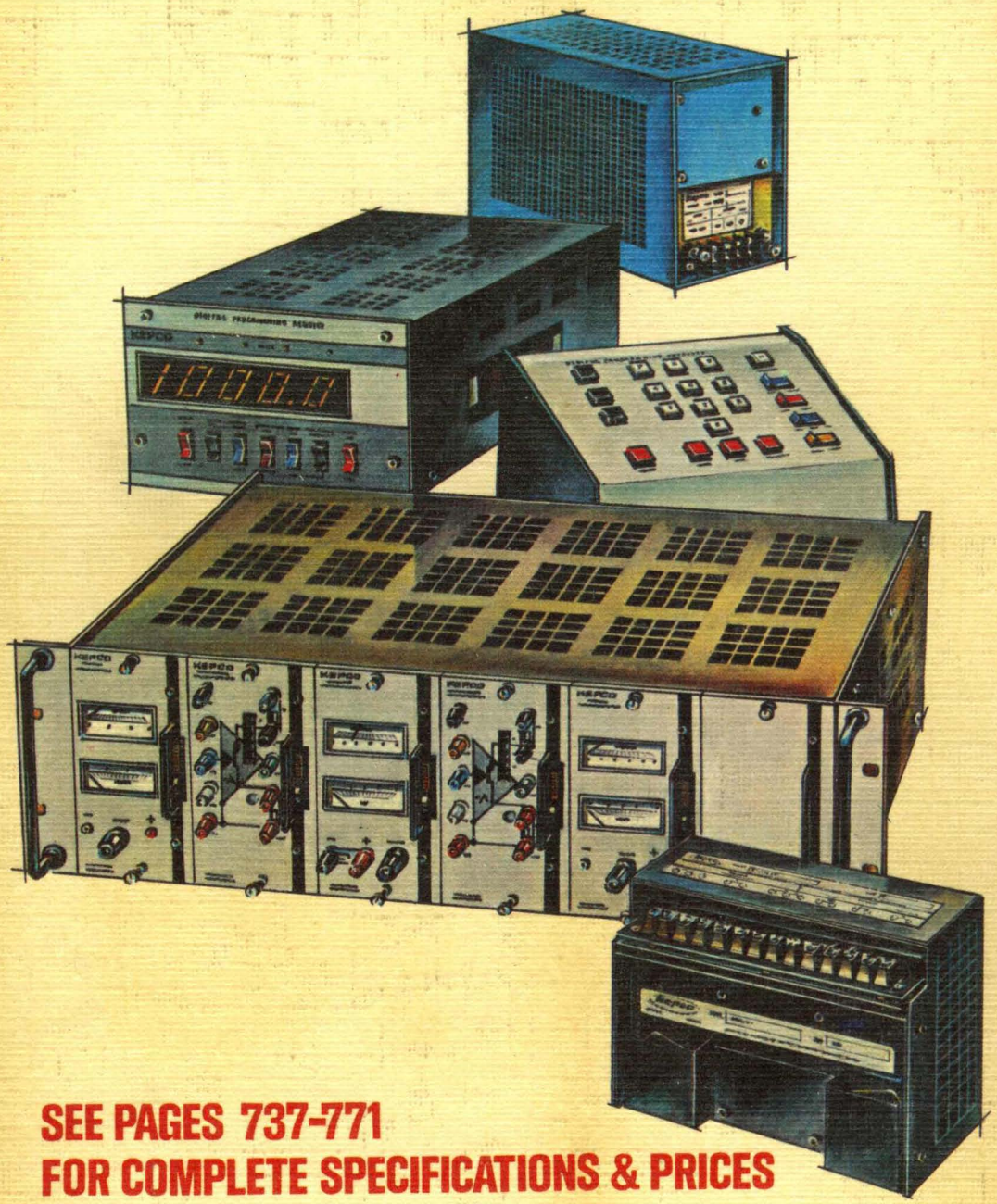

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